Dec. 4, 1945. W. O. RUNCIE ET AL 2,390,329

DARNING ATTACHMENT FOR SEWING MACHINES

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Fig. 1.

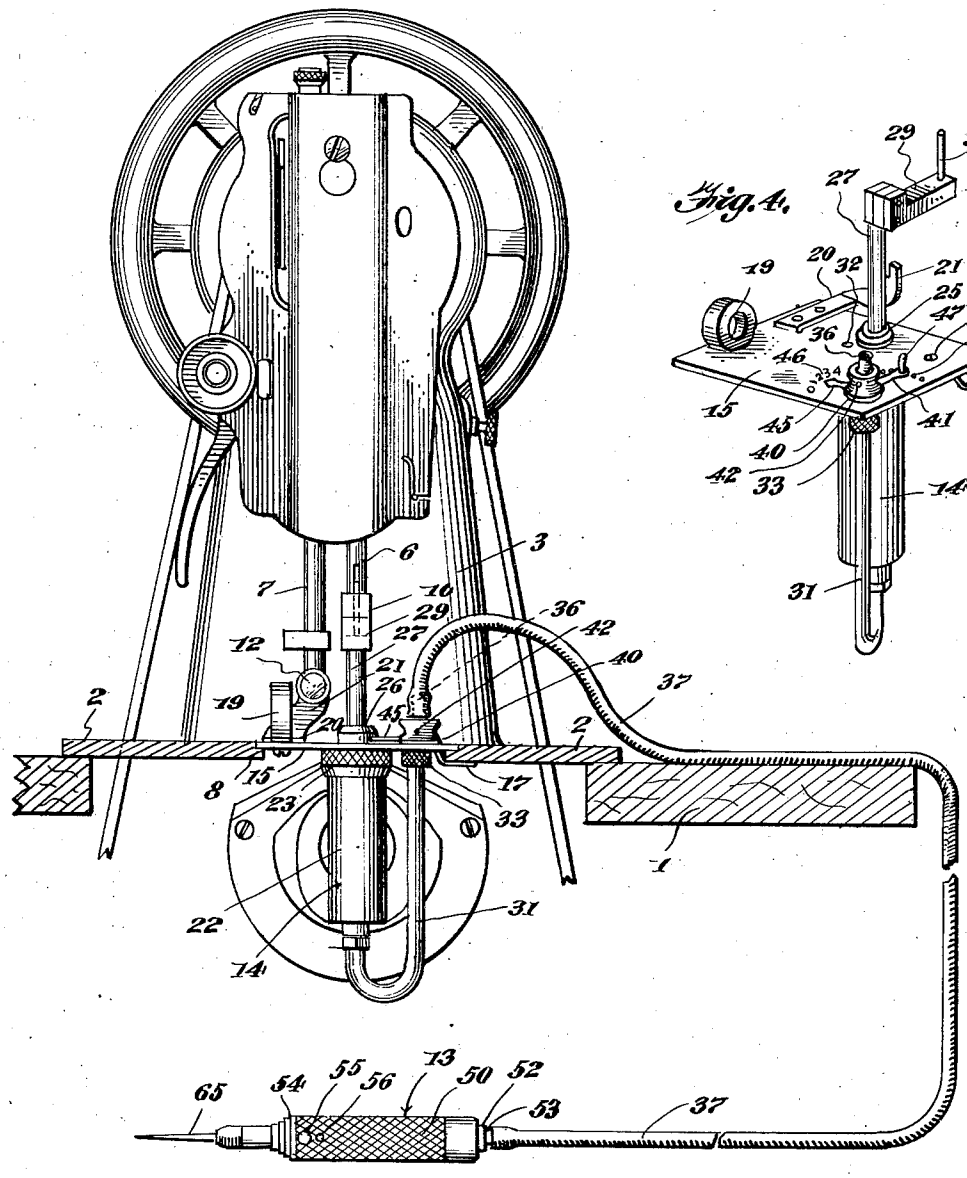


Fig. 4.

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Fig. 2.

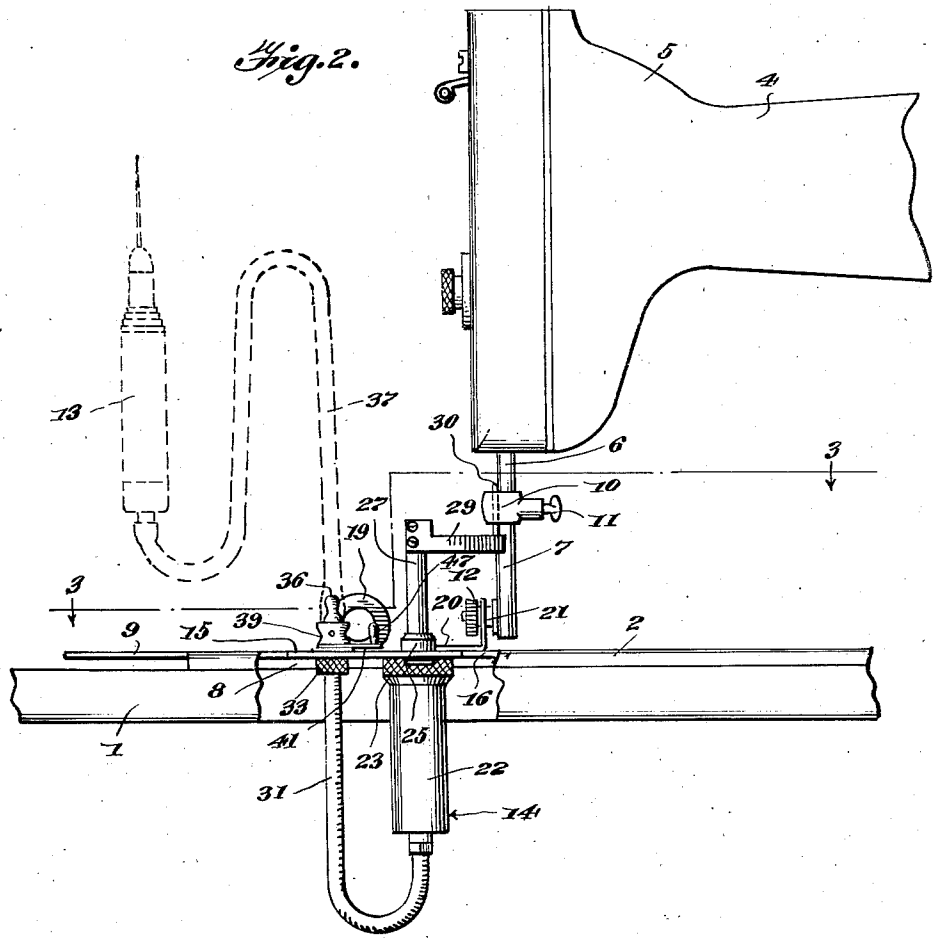
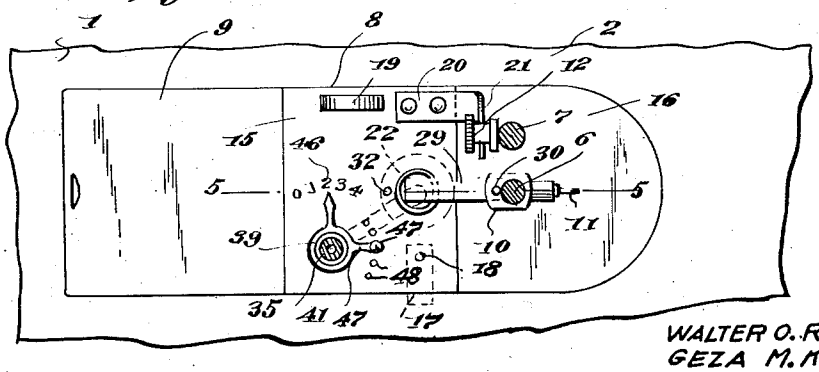


Fig. 3.



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Fig. 5.

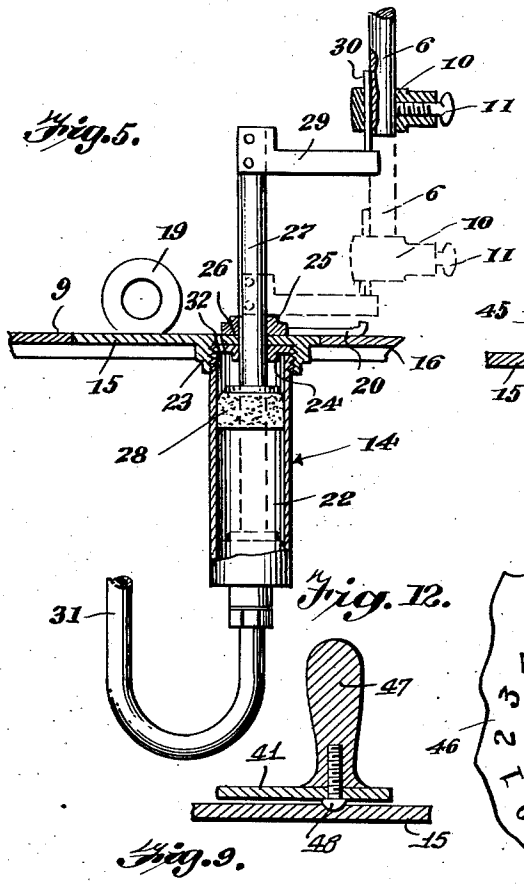


Fig. 6.

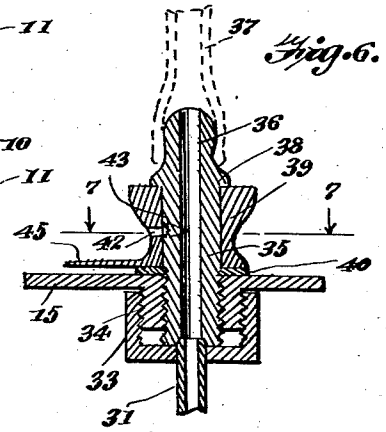


Fig. 12.

Fig. 7.

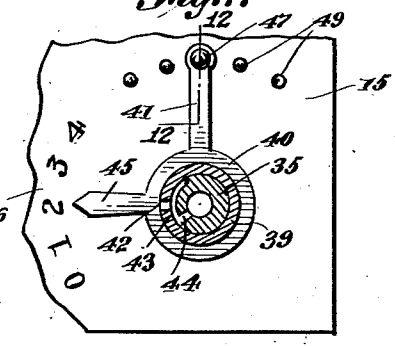


Fig. 9.

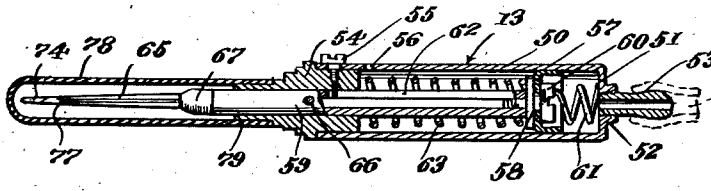


Fig. 8

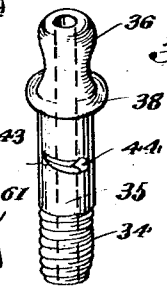


Fig. 10.

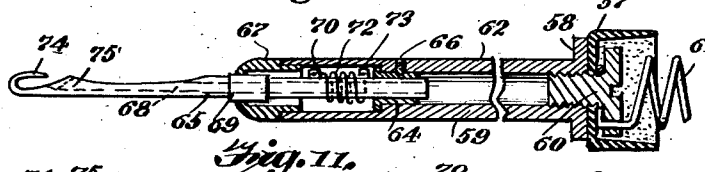
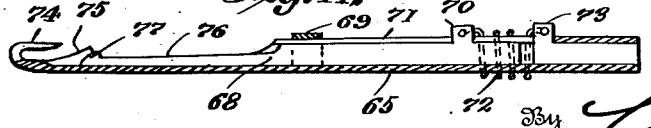


Fig. 11.



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DARNING ATTACHMENT FOR SEWING MACHINES

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Lima, Peru

Application December 18, 1942, Serial No. 469,462

12 Claims. (Cl. 66—1.5)

This invention relates to a darning attachment for sewing machines and it is one object of the invention to provide an attachment which may be easily applied to a sewing machine of conventional construction and used for mending runs formed in stockings, socks, and other hosiery.

Another object of the invention is to provide a darning attachment which is not only easy to apply without the use of tools, but very easy to operate after being installed, thus permitting a person to personally repair runs and making it unnecessary to take the damaged hosiery to a professional hose repairer. It will thus be seen that time and annoyance will be saved and also the cost of repairing damaged hosiery appreciably reduced.

Another object of the invention is to provide a darning attachment which is air operated and includes a compressor adapted to be connected with and actuated by the needle plunger or other movable part of a sewing machine. It will thus be seen that no changes are necessary in the construction of the sewing machine and that the sewing machine may be actuated by the usual foot treadle so that both hands will be free to hold the stocking being repaired and manipulate the darning device.

Another object of the invention is to provide the device with an air regulating valve carried by a coupling mounted through the plate upon which the compressor is mounted and serving as means for controlling actuation of the needle by air pumped from the compressor. It will thus be seen that the length of the stroke imparted to the needle may be controlled and also operation of the needle stopped when necessary without stopping operation of the sewing machine.

Another object of the invention is to provide a needle assembly including a casing adapted to be easily held in a person's hand and a piston mounted for reciprocating motion in the casing, the piston being so formed that a needle carried thereby will be prevented from turning out of proper position during use.

Another object of the invention is to provide a needle assembly wherein the needle carrying piston is yieldably held retracted by a compression spring surrounding the piston, the piston being moved outwardly by air pulsations forced into the casing from the compressor as the compressor piston is reciprocated by the needle plunger of the sewing machine.

Another object of the invention is to so mount the needle that it will be yieldably held against outward movement relative to the latch and to so mount said needle in the piston carrying the same that it will be firmly held in place but permitted to be easily removed when necessary.

Another object of the invention is to provide a mounting plate which may be easily and quickly set in place after removal of the plate serving as a cover for the bobbin of the sewing machine, a securing member for the mounting plate being then connected with the presser foot plunger of the sewing machine so that the mounting plate will be firmly held in place.

In the accompanying drawings:

Fig. 1 is a view principally in side elevation and partially in section, showing the darning attachment mounted in position for use.

Fig. 2 is a view similar to Fig. 1, looking from the front of a sewing machine.

Fig. 3 is a view on the line 3—3 of Fig. 2.

Fig. 4 is a perspective view of the mounting plate and elements carried thereby.

Fig. 5 is a sectional view on the line 5—5 of Fig. 3.

Fig. 6 is a detail sectional view of the coupling and its associated parts.

Fig. 7 is a sectional view on the line 7—7 of Fig. 6.

Fig. 8 is a perspective view of the coupling to which the flexible tube is connected.

Fig. 9 is a sectional view taken longitudinally through the needle assembly.

Fig. 10 is a view on an enlarged scale, taken longitudinally through the piston of the needle assembly.

Fig. 11 is a sectional view taken longitudinally through the needle.

Fig. 12 is a detail sectional view on the line 12—12 of Fig. 7.

This improved darning device is intended as an attachment for use in connection with a sewing machine of conventional form, including the usual table 1 upon which is mounted the base 2 which carries the pedestal 3 of the sewing machine. The usual hollow arm or shaft housing 4 extends from the pedestal over the base and, at its free end, carries a housing 5 enclosing the usual mechanism including the usual needle plunger 6 and presser foot plunger 7. The base 2 has formed therein the usual opening 8 for access to the bobbin and this opening is normally closed by a conventional cover plate 9 which is slid out of closing relation to the opening when the attachment is applied as shown in Figs. 2 and 3. It will thus be seen that no changes are necessary in the conventional construction of a sewing machine in order that the attachment

may be applied thereto. The needle plunger 6 is provided with the usual needle holding clamp or socket 10 which is held to the plunger by a set screw 11, and the presser foot plunger carries the usual fastener 12 by which the presser foot is secured.

The attachment constituting the subject matter of this invention consists briefly of a needle assembly 13 driven by air under pressure which is delivered to the needle assembly from a compressor 14 carried by a mounting plate 15 and actuated from the needle plunger 6 when the sewing machine is operated in the usual manner by a foot pedal or by an electric motor. The mounting plate 15 fits into the opening 8 between the plate 16 of the sewing machine and the slidable closure 9 and carries a resilient tongue 17 secured to the mounting plate by a rivet 18 and projecting from an edge of the plate for engagement under the machine base 2, as shown in Figs. 1 and 3. A ring 19 is mounted on the plate 15, near the rear edge thereof in order that the plate may be easily set in place or removed from the opening 8 and adjacent its rear side edge the mounting plate carries a tongue or bracket 20 having an upstanding bill 21 having its upper end notched so that it may be engaged with the fastener 12 and firmly gripped thereby when the fastener 12 is tightened. It will thus be seen that the mounting plate may be readily set in place or removed and that, when it is set in place, it will be firmly held and prevented from slipping out of its proper position within the opening 8.

The compressor has a cylinder 22 disposed vertically under the plate 15 having its upper end screwed into a collar 23 which surrounds a disc or cap 24 upon the under face of the plate. A collar 25 is mounted on the upper face of the plate over the disc 24 and the plate is formed with an opening registering with openings of the disc and the upper collar to provide a bore or passage 26 through which passes the plunger or rod 27 of the piston 28. At its upper end the plunger carries a side arm 29 which projects radially from the plunger and, at its outer free end, carries an upstanding pin 30 of such length and diameter that it may be secured through the clamp 10 of the needle plunger 6 of the sewing machine during use of the darning attachment. It will thus be seen that when the darning device is in use, movement of the plunger 6 will impart vertical reciprocating motion to the plunger or piston rod 27 and the piston will be reciprocated in the cylinder to force air out of the cylinder and through the tube 31 leading from the lower end of the cylinder. An opening 32 is provided in order that oil may be fed into the cylinder and also serves as an air inlet port through which air at atmospheric pressure enters and leaves the cylinder during operation of the compressor or pump 14. The tube 31 may be formed of metal, or other desired material, and, at its upper end, is mounted through the center opening of a socket 33 which is screwed upon an externally threaded nut 34 carried by the threaded lower portion of a coupling 35. This tubular coupling is screwed through a threaded opening formed in the plate 15 and, when the nut is applied to its protruding lower end portion, it will be firmly held against vertical displacement. The socket 33 may then be applied and tightened to form an air-tight joint between the tube 31 and the lower end of the coupling, as shown in Fig. 6. The upper end of the coupling is formed into a nipple 36 for receiving one end of a tube or pipe 37 formed of rubber or other flexible material and having its outer end connected with the needle assembly 13. An annular shoulder 38 surrounds the base of the nipple and overlies a valve sleeve 39 which surrounds the coupling and is fixed to a disc or plate 40 provided with a lever 41 in order that the sleeve may be turned to adjusted positions. An opening or port 42 is formed through the sleeve to move into and out of registry with the groove 43 leading from the opening 44 formed through a side of the coupling 35, as the sleeve is turned about the coupling. Attention is called to the fact that the groove tapers toward its outer end, as shown in Fig. 8. By this arrangement, escape of air may be gradually cut off as the opening 42 moves from a position in alinement with the opening 44 toward the outer end of the groove 43 and operation of the needle assembly thus controlled. A pointer 45 extends radially from the disc 40 for movement relative to a scale 46 marked upon the upper face of plate 15 and the handle 47 of the lever is secured by a screw 48 having its head protruding from the under face of the lever in position to serve as a latch and move from one of the arcuate lines of sockets 49 to another, as the handle is moved, and hold the sleeve in a set position with the opening 42 of the sleeve in predetermined relation to the groove 43. The operator of the darning device may thus accurately set the valve and control operation of the needle assembly by allowing a desired amount of air to escape during reciprocation of the piston or so set the valve sleeve that no air will escape.

The needle assembly is constructed as illustrated in Figures 9 through 11 and referring to these figures, it will be seen that this assembly has a casing 50 having a head 51 at its rear end formed with a neck 52 through which is mounted a nipple 53 to receive the front end of the tube 37. A bushing 54 is secured in the front end of the casing by a screw 55 and, adjacent the inner end of this bushing, the casing is formed with an opening 56 for flow of air into and out of the casing as the piston 57 reciprocates in the casing. The piston or cup is secured against the head 58 of a plunger 59 by a screw 60 which also serves as an anchor for the bumper spring 61 which cushions rearward movement of the piston of the plunger. A slot 62 is formed in the plunger longitudinally thereof and receives the inner end of the screw 55 to prevent turning of the plunger in the bushing. Therefore, the needle will remain in its proper position during use of the device.

A spring 63, which is coiled about the plunger with one end bearing against the bushing 54 and its other end abutting the head 58, urges the plunger rearwardly and returns it to its retracted position after it has been forced forwardly to extended position by the pressure of air forced into the casing through the tube 37. A bushing 64 to receive the needle 65 is mounted within the plunger, where it is secured by a set screw 66. The needle projects forwardly from the plunger through a cap 67 and is U-shaped or channeled throughout the major portion of its length to receive a latch 68 which is slidable longitudinally of the needle and is held against displacement therefrom by a clip 69. A lug 70 projects from the latch through a slot 71 extending longitudinally of the needle, and this lug is engaged by one end of a spring 72 which is coiled about the

needle and has its rear end anchored to the lug 73 so that the spring serves to yieldably hold the latch retracted, as shown in Fig. 11. A hook 74 is formed at the front end of the needle in advance of humps 75 formed on opposite sides of the needle and the latch has a forward portion 76 of reduced thickness terminating in a hook 77 located between the humps 75 when the latch is in its retracted position. A hood or cap 78 is provided to protect the needle when not in use and when this hood is applied, it fits a sleeve or collar 79 at the front end of the bushing 54 in frictional engagement with the collar so that it may be easily removed when the needle is to be used.

When this darning device is to be used, the cover plate 9 of the sewing machine is slid to open position and the mounting plate 15 set in place with the compressor 14 extending downwardly therefrom as shown in Fig. 2. The cover plate is then slid in a closing direction until it abuts the outer side edge of the mounting plate and the cover plate and the tongue 17 which engages under the base plate 2 of the sewing machine, will firmly hold the mounting plate in position. The upper end 21 of the bracket 20 is then secured to the presser foot plunger by the fastener 12, in lieu of the presser foot, which is removed, and the pin 30 then engaged through the socket 10 previously occupied by the needle and secured by tightening the screw 11. The sewing machine is then set in motion, either by a motor or by means of its foot treadle, and, as the needle plunger 6 moves, the piston rod 27 will be reciprocated vertically and the piston 28 force air from the cylinder 22 through the tube 31, as it moves downwardly. Pulsations of air will thus be forced through the tube 37 into the rear end of the casing 50 of the needle assembly for forcing the piston 57 and its rod 59 forwardly and advancing the needle 65 to extended position, and, between pulsations of air, the spring will force the piston 57 rearwardly to retract the needle. The needle assembly is held by its casing or cylinder 50 with the needle passing through the portion of a stocking in which a run has formed and, as the needle reciprocates through the stocking, the run will be taken up by action of the needle in the well known manner.

By grasping the handle 47 and imparting movement to the lever 41, the valve sleeve 39 may be turned about the tubular coupling 35 to control escape of air through the openings 44 and 42 and the speed and stroke of the needle will be regulated according to the desires of the person operating the device. After the stocking has been darned the device may be easily and quickly removed and put away until again needed. It will thus be seen that the darning device is adapted for home use and for commercial use in a store where stockings are sold and mended.

While it is preferred to actuate the compressor from the needle plunger, it will, of course, be understood that said compressor may be connected with and operable from the flywheel or other movable part of the sewing machine without departing from the spirit of the invention.

Having thus described the invention, what is claimed is:

1. In a darning device, a mounting adapted to be secured in the bobbin exposing opening in the base of a sewing machine, a compressor carried by said mounting and operatively connected with the needle plunger of the sewing machine, a pneumatically operated needle assembly, a conduit for conducting air under pressure from the compressor to the needle assembly, and a valve for regulating flow of air through the conduit.

2. In a darning device, a mounting adapted to be secured in the bobbin exposing opening in the base of a sewing machine, a compressor carried by the mounting and operatively connected with and actuated from a moving part of the sewing machine, a needle assembly, a conduit for conducting air from the compressor to the needle assembly, and a valve for controlling flow of air from the compressor to the needle assembly.

3. In a darning device, a mounting adapted to be carried by the base of a sewing machine, a compressor carried by said mounting and including a piston having a rod projecting upwardly from the mounting and provided with a coupling having a pin adapted to be secured in the needle socket of the needle plunger of the sewing machine whereby the compressor will be actuated from the needle plunger during operation of the sewing machine, a pneumatically operated needle assembly, and a conduit for conducting air under pressure from the compressor to the needle assembly.

4. In a darning device, a mounting adapted to be carried by the base of a sewing machine, a compressor carried by said mounting and including a piston having a rod projecting upwardly from the mounting, a side arm carried by the upper portion of said rod, a pin projecting upwardly from the arm for engagement in the needle socket of the needle plunger of a sewing machine, a needle assembly, and a conduit for conducting air from the compressor to the needle assembly for actuating the same.

5. In a darning device, a mounting adapted to be carried by the base of a sewing machine, a compressor carried by said mounting and including a cylinder carried by the mounting and projecting downwardly therefrom, a piston in the cylinder having a rod projecting upwardly from the mounting and adapted for connection with the needle plunger of the sewing machine, a coupling mounted through the mounting, a tube leading from the cylinder to the lower end of said coupling, a needle assembly, a tube between the upper end of the coupling and the needle assembly for delivering air under pressure to the needle assembly to operate same, and a valve for controlling flow of air to the needle assembly.

6. In a darning device, a mounting adapted to be carried by the base of a sewing machine, a compressor carried by said mounting and adapted for operative connection with the needle plunger of the sewing machine, a pneumatically operated needle assembly, a coupling carried by the mounting, a tube between the compressor and the coupling, a conduit between the coupling and the needle assembly, and a valve associated with the coupling for controlling flow of air from the compressor to the needle assembly.

7. In a darning device, a mounting adapted to be carried by the base of a sewing machine, a compressor carried by said mounting and adapted for operative connection with the needle plunger of the sewing machine, a pneumatically operated needle assembly, a tubular coupling mounted vertically through said mounting and formed with a side opening above the mounting, a conduit connecting said compressor with the lower end of the coupling, a conduit connecting the upper end of the coupling with the needle assembly, and a valve member movable into and out of closing relation to the side opening of the coupling

for controlling flow of air to the needle assembly.

8. In a darning device, a mounting adapted to be carried by the base of a sewing machine, a compressor carried by said mounting and adapted for operative connection with the needle plunger of the sewing machine, a pneumatically operated needle assembly, a tubular coupling mounted vertically through said mounting and formed with a side opening above the mounting, a conduit connecting said compressor with the lower end of the coupling, a conduit connecting the upper end of the coupling with the needle assembly, a valve sleeve rotatably mounted about the coupling above the mounting and formed with a side opening movable into and out of registry with the side opening of the coupling as the sleeve is turned about the coupling, the coupling being formed with an external groove leading from its side opening in the path of movement of the opening of the sleeve and tapered toward its outer end, and a turning lever for the sleeve extending therefrom over the mounting.

9. In a darning device, a mounting adapted to be carried by the base of a sewing machine, a compressor carried by said mounting and adapted for operative connection with the needle plunger of the sewing machine, a pneumatically operated needle assembly, a tubular coupling mounted vertically through said mounting and formed with a side opening above the mounting, a conduit connecting said compressor with the lower end of the coupling, a conduit connecting the upper end of the coupling with the needle assembly, a valve sleeve rotatably mounted about the coupling above the mounting and formed with a side opening movable into and out of registry with the side opening of the coupling as the sleeve is turned about the coupling, a disc fixed to the under face of the sleeve, a lever extending from said disc, an upstanding handle for the lever, a fastener for said handle passing through the lever with its lower end constituting a latch, the upper face of the mounting being formed with sockets for receiving the latch and holding the lever against accidental movement with the sleeve in a set position, and a pointer extending from the disc in cooperating relation to a scale upon the upper face of the mounting for indicating the position of the opening in the sleeve relative to the opening of the coupling.

10. In combination, a sewing machine including a reciprocating needle carrier, a compressor including a cylinder on the machine laterally spaced from said carrier, a piston in said cylinder having a rod projecting therefrom, supporting means for supporting said cylinder, means connecting said rod to said needle carrier whereby said piston will reciprocate with said carrier, a needle assembly, and a conduit connecting said cylinder with said assembly.

11. A darning attachment for mounting on a sewing machine having a reciprocating needle carrier, said attachment including a needle assembly, an operator for said assembly connected to and actuated by said carrier, said operator including a cylinder, means for mounting said cylinder on the machine in laterally spaced relation with respect to the longitudinal axis of said carrier, a piston slidable in said cylinder, a piston rod secured to said piston and extending from said cylinder, an arm secured at one end to said piston rod, carrier clamping means at the other end of said arm whereby reciprocation of said carrier will also reciprocate said piston, and a tubular connection between said cylinder and said operator.

12. A darning attachment for mounting on a sewing machine having a reciprocating needle carrier, said attachment including a fluid actuated needle assembly, a fluid pressure means, means for mounting said fluid pressure means on the machine, means connecting said fluid pressure means with said carrier whereby to generate fluid pressure upon reciprocation of said carrier, a flexible conduit connecting said fluid pressure means with said assembly and valve means for regulating the amount of pressure flowing to said assembly.

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