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B. T. WALL

2,413,014

MEANS FOR THREADING NEEDLES

Filed Aug. 19, 1944

2 Sheets-Sheet 1

Fig. 1.

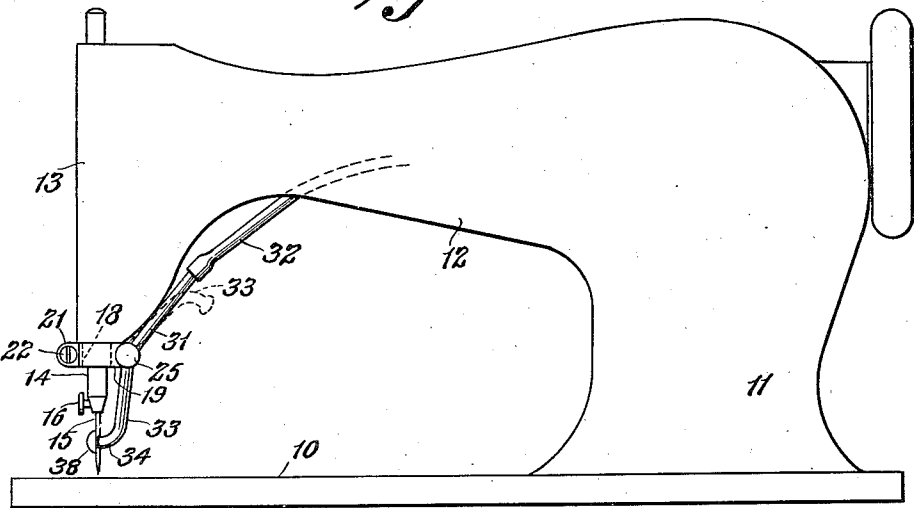


Fig. 3. Fig. 4. Fig. 5.

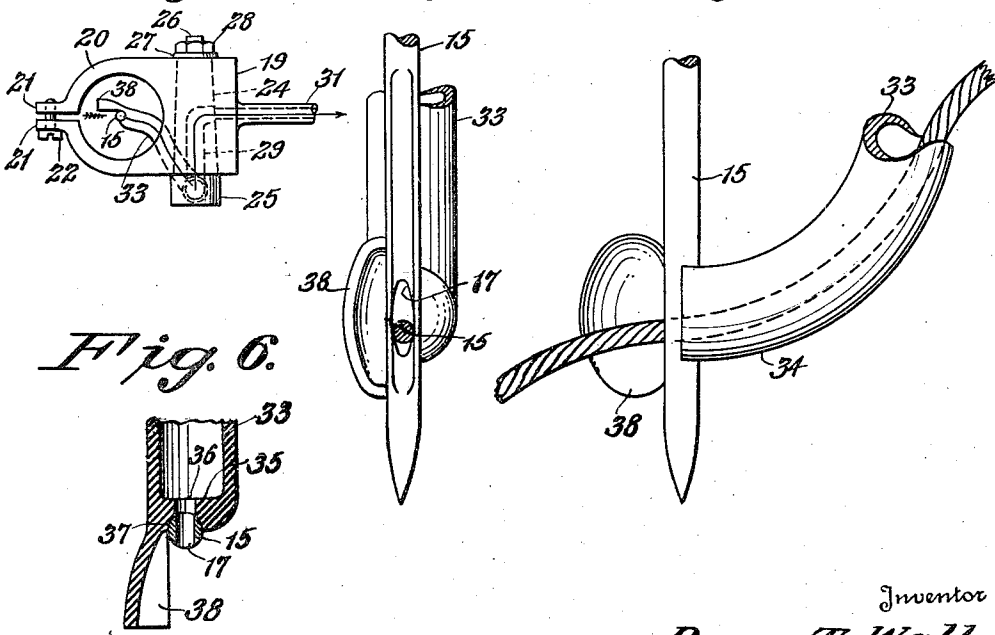
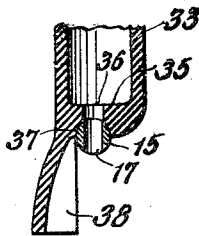


Fig. 6.



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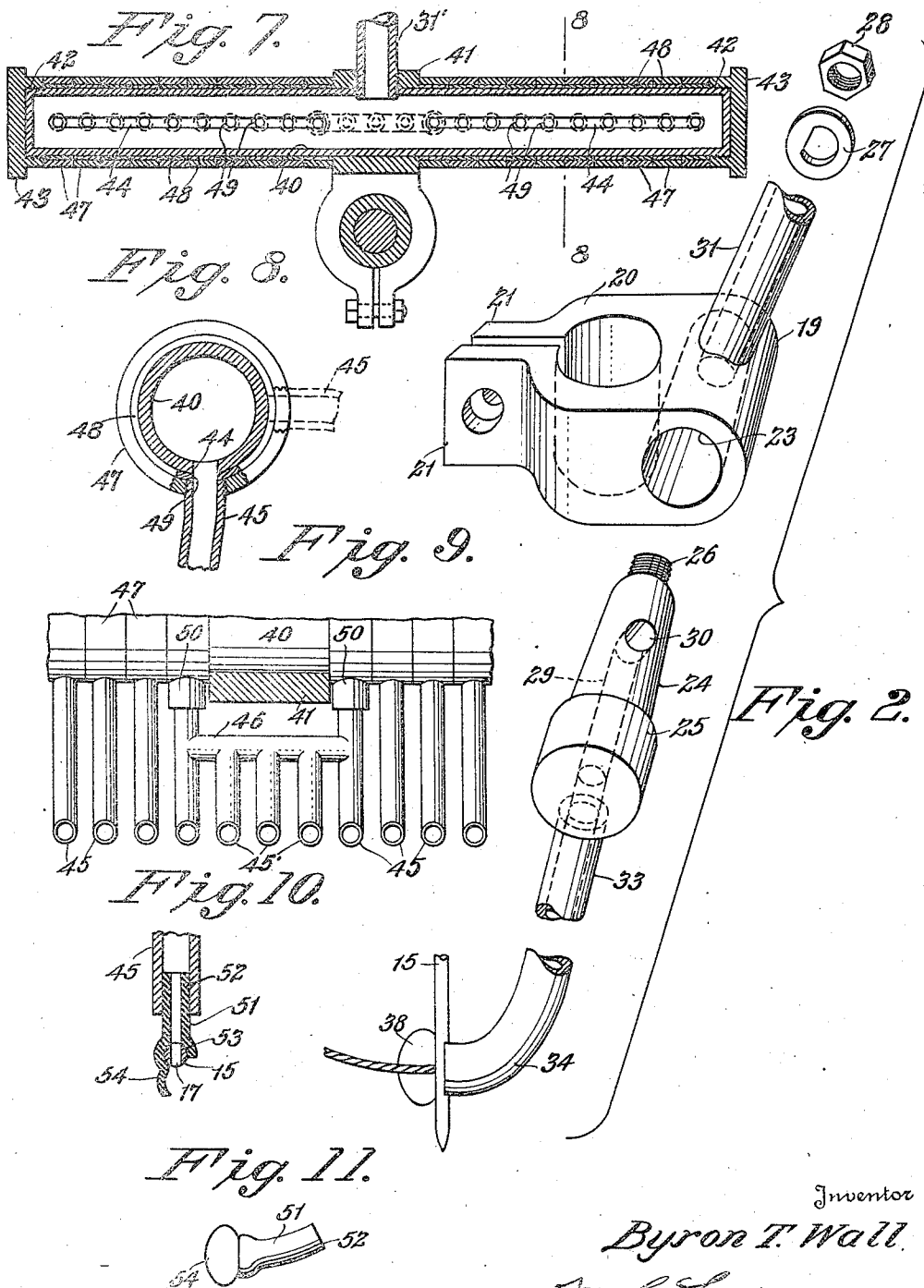
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2 Sheets-Sheet 2



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MEANS FOR THREADING NEEDLES

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This invention relates to an improved means for threading needles, and is more particularly designed for application and use in connection with various types of industrial sewing machines where loss of time in the machine operation, due to breakage of the threads, is an important factor in large scale production where the profit on the individual article or garment is very small.

It is, therefore, one important object of the present invention to provide a threading attachment for sewing machine needles which may be easily and quickly manipulated by unskilled workers to re-thread the needle when breakage occurs in the operation of the machine.

Another object of my invention is to provide a device for the above purpose in which the thread is pneumatically drawn through the needle eye and which is of such construction that the thread end may be quickly positioned relative to the needle eye without requiring any particular dexterity on the part of the worker.

It is a further object of my invention to provide a tubular member connected at one of its ends with rotatable valve means mounted on the needle bar guide head, and provided at its other end with an orifice adapted, in one position of said tube for registration with the needle eye at one side thereof, said valve means in the latter position of the tube connecting said tube with a source of vacuum and automatically cutting off communication with the vacuum source when said tube is vertically swung to an inoperative position.

A still further object of the invention is to provide said valve operating tube at its free end with a thread directing wing extending in advance of the needle at one side thereof when said tube is in its operative position, said wing serving to direct the thread end positioned in contact therewith into the needle eye.

An additional object of the invention in one embodiment thereof, is to provide a novel mounting and arrangement of the movable needle threading tubes or members and the valve means therefor in a multiple needle type of sewing machine.

It is also the aim and purpose of my invention to provide a needle threading attachment for single or multiple needle sewing machines as above characterized, which comprises a small number of simply constructed elements which may be fabricated at low cost, and easily and quickly assembled in proper cooperative relation.

With the foregoing and other subordinate objects in view, the invention consists in the im-

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proved needle threading attachment for sewing machines, and in the construction and relative arrangement of the several elements thereof, as will hereinafter be more fully described, illustrated in the accompanying drawings and subsequently incorporated in the subjoined claims.

In the drawings, in which I have shown two typical embodiments of the invention, and in which similar reference characters designate corresponding parts throughout the several views:

Figure 1 is a front side elevation of a conventional type of sewing machine having one form of my improved needle threading attachment applied thereto.

Figure 2 is a perspective view showing the essential parts of the attachment in separated relation.

Figure 3 is a top plan view of the attaching bracket member and valve means.

Figure 4 is a fragmentary elevation, illustrating the position of the valve adjusting tube relative to the needle eye, when the valve is open.

Figure 5 is a front side elevation of the parts shown in Figure 4.

Figure 6 is a detail horizontal section of the needle engaging end of the thread-guiding tube.

Figure 7 is a horizontal sectional view illustrating a modified embodiment of the invention as applied to the multiple needle type of sewing machine.

Figure 8 is a vertical section on an enlarged scale as indicated by the line 8—8 in Figure 7.

Figure 9 is a fragmentary front elevation illustrating one arrangement of the individual thread-guiding tubes.

Figure 10 is a detail horizontal section showing the special form of needle engaging tip carried by the guide tube, and

Figure 11 is a side elevation of said needle engaging tip.

With further and more detailed reference to the drawings, for the purpose of this explanation, in Figure 1, I have illustrated a conventional type of sewing machine embodying the usual base or bed plate 10 having the pedestal 11 at one end and the overhanging horizontal arm 12 integral with the upper end of said pedestal and terminating in the needle bar guide head 13. In said pedestal and arm, the operating mechanism (not shown) for the reciprocatory needle bar and stitch-forming mechanism of the machine is housed.

To the lower end of the needle bar 14, the stem of the needle 15 is detachably connected by the

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usual binding screw 16, said needle adjacent its lower pointed end having the elongated eye 17.

The head 13 of the sewing machine at its lower end has the reduced cylindrical extension indicated at 18 through which the needle bar 14 reciprocates. The needle threading attachment, in the examples which I have selected for illustration, includes a bracket member 19 having a split collar 20 to embrace the part 18 of the sewing machine head, the opposed portions of this collar being formed with laterally projecting lugs 21 connected by the clamping screw 22, whereby said bracket member may be rigidly clamped or fixed to the part 18 of the machine head 13.

The inner end of the bracket member 19 is formed with a longitudinally tapering bore 23 having its axis disposed substantially at right angles to the axis of the collar 20, said bore rotatably receiving the tapered valve member 24 having an enlarged head 25 on one end abutting against one side face of the bracket member 19. The other end of said valve member is formed with the reduced threaded extension 26 to receive the washer plate 27 and nut 28, whereby the valve member is retained in properly assembled relation with the bracket 19.

The valve member 24 is provided with an axially extending bore 29, one end of which opens upon the peripheral surface of the valve member as at 30, and in one position of said valve registers with one end of the pipe 31, which is connected by the tube 32 with a small vacuum pump (not shown) or other means for producing a pneumatic pressure differential.

The other end of the bore 29 in valve 24 opens through the valve head 25 in communication with the upper end of the thread-receiving and guiding tube 33 which is fixed to the valve head. This tube may be formed of hard or soft rubber, and at its free end is laterally curved as at 34, said curved portion having an end wall 35 provided with an orifice 36. This orifice is centrally disposed with reference to the concave sealing face 37 of the tube wall 35, as clearly shown in Figure 6. This sealing face which extends vertically across the end of the tube has substantially the same radius as the stem of the needle 15.

At one side of the sealing face 37, a thread-guiding wing 38 is integrally formed with the wall 35 and projects forwardly therefrom.

From the above description, the operation of this embodiment of my invention will be readily understood. As shown in Figure 3 of the drawings, the tube 33 extends from the valve head 25 at an acute angle to the axis of said valve so as to position the end wall 35 thereof in transverse alignment with the reciprocating needle 15. When said tube is disposed in the dotted line position shown in Figure 1 of the drawings, extending upwardly above the bracket 19, the end 30 of the bore 29 in the valve member is out of registration with the pipe 31, so that communication between the tube 33 and the vacuum pressure line 32 is cut off. When the needle 15 is to be threaded, the tube 33 is swung downwardly to the full line position shown in Figure 1, so that the concave sealing surface 37, at the end of the tube is brought into contact with the side of the needle stem and orifice 36 disposed in registering relation with the needle eye 17 with the thread-guiding wing 38 extending laterally from the needle stem at the outer side thereof.

This downward movement of the tube 33 also rotates the valve member 24 and establishes communication between the tube 33 and the vacuum

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line. Therefore, when the end of the thread is positioned by the operator against the inner surface of the guide wing 33 in the vicinity of the needle eye 17, as a substantially air-tight seal is provided between the orifice 36 and the needle stem, the thread will be drawn by suction produced in the operation of the vacuum pump through the needle eye 17 and into the lower end of the tube 33, as shown in Figures 3 and 5 of the drawings. In this manner it will be seen that the needle may be easily and quickly initially threaded, or re-threaded in case the thread should break during the operation of the machine. No special skill or dexterity on the part of the operator is required, and after the threading of the needle, the tube 33 is swung upwardly to its inoperative position where it is entirely out of the way and does not obstruct the vision of the worker or the feeding movement of the work to the machine needle.

It will further be recognized that this invention may be effectively employed, for the purpose of threading needles with tape, braid, or other strands which may not be of circular form in cross section, and in this description the term "thread" is used in a generic sense to include cords or strands of different forms and weights, as best adapted for a particular purpose or use.

As above stated, the tube 33 may be made of soft rubber. This tube may also be of such length that any one of a reasonable number of needles mounted to reciprocate as a unit may be threaded with the use of a single tube.

Of course, it is also apparent that, if desired, the valve means above described may be dispensed with by using a hand-operated or electrically driven vacuum pump which is operated only when the necessity therefor arises.

In Figures 7 to 11 of the drawings, I have shown an embodiment of my invention which is more particularly designed for use in connection with large scale factory production or multiple needle sewing machines. For this purpose I provide the tube 40 supported intermediate of its ends in the bracket member 41, and held in a fixed position relative thereto by the threaded end of the suction pipe line connection 31' which is threaded in said bracket member and the wall of the tube 40. The opposite ends of said tube are closed and externally threaded as at 42 to receive the internally threaded cap members 43. At its lower side, the wall of the tube 40 is provided with the longitudinally aligned slots 44 which extend respectively from one end of the tube to a point adjacent the bracket member 41.

Upon the tube 40 a plurality of thread-receiving tubes 45 are mounted, corresponding in number to the number of reciprocating needles. In this particular example of the invention, the three central thread-receiving tubes 45' which are in line with the bracket member 41 are connected in spaced relation from said bracket member, to the tubes 45 at opposite sides of said bracket by means of the horizontal tube 46. Each tube 45 has a threaded connection with a sleeve or collar 47, said collar being provided with a liner 48 of sealing material frictionally contacting the outer periphery of the tube 40. Each of said liners has an opening 49 in registration with the bore of the tube 45.

The sleeves 47 adjacent each side of the bracket 41 are formed with radial socket extensions 50 to receive the ends of the tubes 45 with which the tubes 45' are connected, after said sleeves 47 have been assembled on the tube 40. The ends

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of the tubes 45 have a tight frictional fit with the walls of the sockets 50.

After the required number of thread-receiving tubes 45 have been assembled on the tube 40, the end caps 43 are adjusted so as to hold said tubes against relative movement axially of the tube 40 while permitting of their independent rotation with respect thereto.

In this embodiment of the invention, it is assumed that the plurality of needles are equidistantly spaced apart. The tubes 45 and 45' are of metal, and a separate rubber tip member 51 has a cylindrical end portion 52 inserted into the free end of each of said tubes. The other end of the tip member has a concave sealing surface 53 as in the first described embodiment of the invention, and a guide wing 54 for directing the thread to the eye of the needle. As will be seen from reference to Figure 10, the wing 54 of this small rubber tip member does not project laterally beyond the extended peripheral surface of the tube 45. Therefore, with comparatively close spacing of the needles from each other, the sealing tips of the tubes 45 may be properly engaged with the needles in the manner above described. When the tubes are in operative position, the suction line is open through the tube 40, and the slots 44 thereof, and the openings in the liners 48, as seen in Figures 7 and 8 of the drawings. The tubes 45 at each side of the central connected group may be selectively moved from inoperative to operative position when any particular needle thread breaks while the remaining tubes 45 and 45' are retained in the raised inoperative position by the friction liners 48, said tubes and the openings 49 of the liners being then out of registration with the slots 44, so that communication between the latter tubes and the suction line 31' is cut off.

From the foregoing description and the accompanying drawings, the construction, manner of operation, and several advantages of the selected structural embodiments of my invention will be clearly understood. It will be seen that I have devised a needle threading attachment for single or multiple needle sewing machines in which the several parts are of simple and durable structural form, and which may be manufactured and sold as a sewing machine accessory, requiring no special skill in the application to conventional types of sewing machines. It will be evident that such a pneumatic needle threading device will obviate the not inconsiderable loss of time in the productive operation of the machine which is now incident to the more or less frequent breakage of the threads. It will be understood that the means which I have described for mounting the attachment upon the machine is merely suggestive, and also various other alternative means might be adopted for operatively mounting a plurality of the needle threading devices on the multiple needle type of sewing machine.

Accordingly, while I have herein disclosed several simple and practical embodiments of my present invention, it is nevertheless to be understood that the essential features thereof may also be incorporated in other structural forms, and I, therefore, reserve the privilege of adopting all such legitimate variations in the form, construction, and relative arrangement of the several elements as may fairly be comprehended as within the spirit and scope of the appended claims.

I claim:

1. A device for threading sewing needles, comprising a tubular member, a valve means con-

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trolling communication between said member and a source of vacuum having a movable valve element with which one end of the tubular member is operatively connected, and means on the other end of said tubular member having sealing contact with one side of the needle around the eye opening thereof when said tubular member is moved to one position relative to the needle to open said valve means, whereby a thread positioned adjacent the eye opening at the opposite side of the needle is drawn by the vacuum through said eye opening and into the tubular member.

2. The threading device for sewing needles defined in claim 1, in which said tubular member, at the needle-engaging end thereof, is provided with means projecting beyond said sealing means at one side of the needle for guiding the thread end towards the eye opening of the needle.

3. A needle threading attachment for sewing machines, comprising a bracket member, and means for attaching the same to the machine head, a conduit from a source of vacuum connected to said bracket, a rotary valve member mounted in said bracket, and controlling the conduit connection, a tubular member fixed to the valve member at one of its ends, means at the other end of said tubular member for sealing contact with the needle stem around the eye opening thereof, said tubular member having an orifice registering with said eye opening when said member is moved into engagement with the needle stem to rotate the valve member to open position and establish communication between said tubular member and said conduit, whereby the thread will be drawn through the eye opening into said tubular member, said tubular member, when moved to an inoperative position with respect to the needle, rotating said valve member to its closed position.

4. The needle threading attachment for sewing machines defined in claim 3, in which said tubular member is provided with a guide wing at one side of said sealing means to guide the thread end towards the needle eye.

5. A needle threading attachment for sewing machines, comprising a bracket and means for attaching the same to the machine head, a tubular member movable relative to the bracket to operative and inoperative positions, and having an end wall contacting the needle in the operative position of said member, provided with an orifice therein registering with the eye opening of the needle, and valve means on the bracket operatively controlled by said tubular member in the movement thereof, to establish communication between a source of vacuum and said member when the latter is in its operative needle threading position, and to cut off such communication when said member is moved to its inoperative position.

6. A needle threading attachment for sewing machines, comprising a bracket and means for attaching the same to the machine head, a conduit fixed to said bracket and adapted to be connected with a source of vacuum, a tubular member movable to operative and inoperative positions relative to the bracket, having an end wall provided with an orifice to register with the eye opening at one side of the needle stem, and a rotary valve member mounted on the bracket to which the other end of said tubular member is rigidly connected, whereby when said member is moved to operative position in engagement with the needle stem, said valve member is rotated to establish communication between the tubular member and the vacuum supply conduit, and

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when said member is moved to its inoperative position said valve is rotated to cut off communication with said conduit.

7. A needle threading attachment for multiple needle sewing machines, comprising a plurality of tubular members, means mounting said members on the sewing machine head at one of their ends for selective vertical swinging movement, including a fixed tube adapted for connection with a source of vacuum, each of the tubular members having means at one end for sealing contact with one of the needles around the eye opening at one side thereof when said member is swung to its operative position, and each of said members and said fixed tube having coacting means to establish communication between the source of vacuum and the selected tubular member in the operative position thereof and to cut off such communication when said member is swung to an inoperative position.

8. The needle threading attachment for multiple needle sewing machines defined in claim 7, in which said sealing means comprises a hollow rubber tip on the end of said tubular member having a concave sealing surface at one end to contact the needle stem on one side thereof, and provided with a thread guiding wing extending beyond the opposite side of the needle stem.

9. The needle threading attachment for multiple needle sewing machines defined in claim 7, in which said coacting means on the fixed tube and each tubular member comprises a collar and

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liner therefor rotatably mounted on the fixed tube and connected with the end of the tubular member, and having openings therethrough registering with the bore of said member, and a longitudinal slot in the wall of the fixed tube common to a plurality of the tubular members and with which said openings are in register when the respective tubular members are moved to needle threading position.

10. Means for threading sewing machine needles in situ comprising a tubular member having means for sealing contact with the machine needle at one side of the eye opening thereof, means supporting said member on the machine for movement into and out of operative position with respect to the needle, and means controlled by said member in the movement of said member to operative position to establish a pneumatic-pressure differential at opposite sides of the needle eye.

11. The needle threading means defined in claim 10, wherein said last named means includes a valve member rigidly fixed to said tubular member.

12. The needle threading means defined in claim 10, wherein said tubular member is mounted at one of its ends on the supporting means for pivotal movement in a vertical plane and said last named means includes a valve member rotatable about the pivotal axis of said tubular member.

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