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METHOD AND APPARATUS FOR MENDING HOSIERY

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Fig. 1.

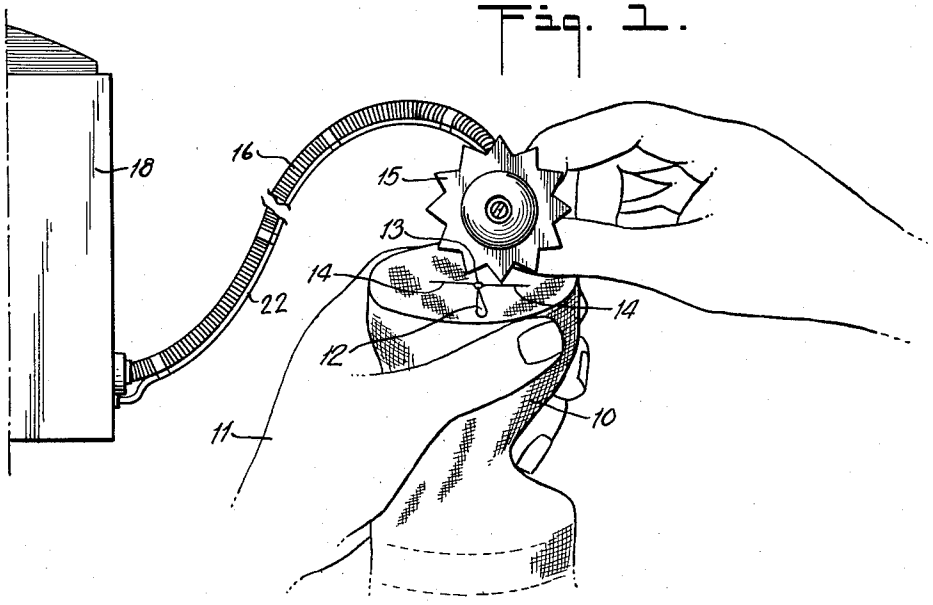


Fig. 2.

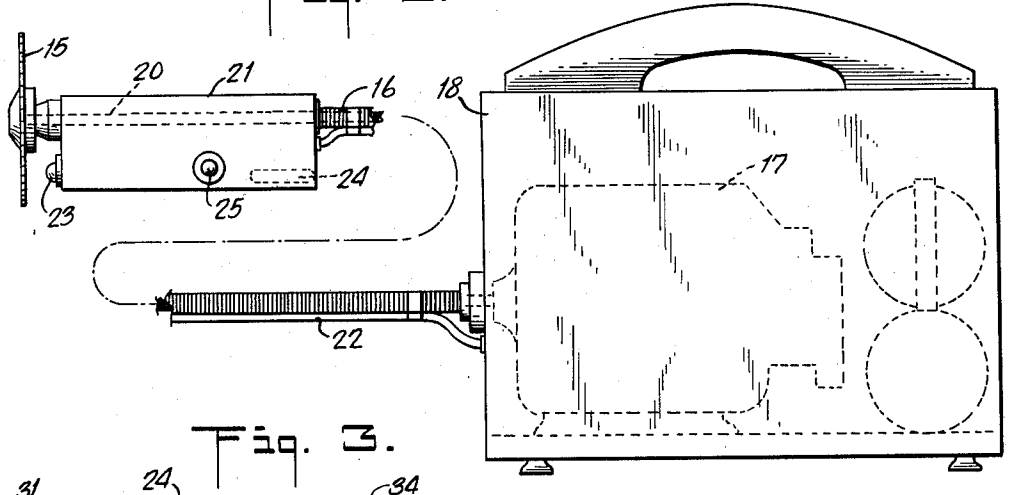
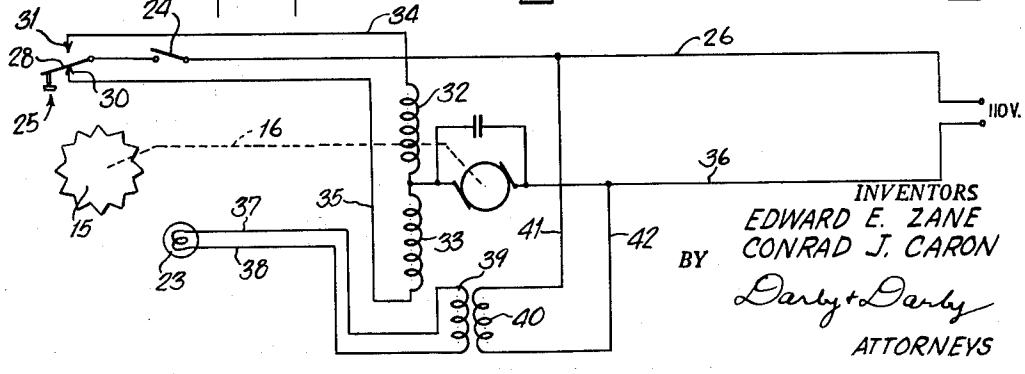


Fig. 3.



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METHOD AND APPARATUS FOR MENDING HOSIERY

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4 Claims. (Cl. 66—1)

The present invention relates to methods and apparatus for mending hosiery and particularly to a method and apparatus for restoring to original condition a knitted fabric a loop of which has become enlarged or "pulled" accidentally in the handling of the fabric after completion of the knitting thereof.

Patent No. 2,570,737 issued to M. M. Brown on October 9, 1951, discusses in considerable detail the manner in which such enlargement of a loop occurs and the exact effect which it has upon the hosiery fabric. That patent discloses a method and apparatus for mending hosiery similar to the method and apparatus of the present application.

The mechanism of the Brown patent, however, has certain disadvantages, the chief one of which is that the mending wheel of the Brown patent rotates in one direction only, necessitating that the hosiery being mended be first held in one position and then rotated through 180° and held in that position during the completion of the mending operation. The necessity for this reversal of the work (or in some instances of the mending mechanism) arises because the mending wheel has teeth or projections thereon so shaped that were it rotated in the opposite direction it would catch in the fabric and destroy rather than repair.

The present invention provides a mending mechanism having a mending wheel so shaped that it may be rotated effectively in both directions, eliminating the necessity of reversing either the work or the implement. By means of this change in structure the mending of hosiery is greatly facilitated due to the fact that the work does not have to be rotated and due also to the fact that the wheel having been properly located in the hole formed by the pulled thread, it is unnecessary to remove the mending wheel from the work and reinsert it in the hole which has been much decreased in area by the performance of a part of the mending operation.

It is an object of the invention to provide a method and means of mending pulled loops in hosiery fabric.

It is a further object of the invention to provide such a method and means which eliminates the necessity of reversing the work during the mending process.

It is another object of the invention to provide an apparatus and method of using that apparatus which by eliminating the necessity of reversing the work likewise eliminates the necessity for inserting the mending instrumentality in position to perform the mending operation twice for each repair and makes it necessary to place the mending instrumentality in position only once at the initiation of the mending operation when the hole formed by the pulled loop is of the greatest area and therefore more readily used as a guide for positioning the mending instrument.

Other objects and features of the invention will be apparent when the following description is considered in connection with the annexed drawings, in which,

Figure 1 is a perspective view showing the manner of using the mending instrument of this application and illustrating particularly the manner in which the hosiery to be mended is placed on a mending cup and held in one hand while the mending instrument is held in the other hand;

Figure 2 is a side elevational view of the mending instrument showing also the driving motor therefor; and

Figure 3 is a schematic circuit diagram of the electrical connections of the motor and controlling switches therefor.

Referring now to the drawings, and particularly to Figure 1, there is shown at 10 a stocking which is stretched over a mending cup, the mending cup being held in the hand 11 of an operator. The stocking 10 has a pulled thread therein indicated at 12 the pulling of the thread forming an opening 13 (which is enlarged by stretching the fabric over the cup) and drawing the fabric together at either side of the opening as is indicated by the lines 14.

In accordance with this invention the fabric is restored by delivering a series of light blows against the sides of the loops adjacent to the pulled loop, these blows serving to progressively reduce the amount of yarn in the pulled loop and restore it to the loops lying on either side thereof it being understood that the yarn will have been taken from a number of loops in wales extending outwardly from the wale in which the loop was enlarged.

In order to deliver the light blows mentioned I provide a toothed wheel 15 which is approximately 1¾ inches in maximum diameter although this dimension is not critical. This wheel has a thickness of approximately 0.010". The wheel 15 is mounted on the end of a flexible shaft 16 which shaft is driven in any suitable manner as by means of an electric motor 17 which may be suitably housed in a casing such as indicated in Figures 1 and 2 at 18.

With the fabric under tension, that is, stretched across the open mouth of the mending cup, the operator positions the wheel 15 in such manner that the tip of one of the teeth extends into the opening 13, and then by operating a switch, as will later be described, causes the wheel to rotate in a clockwise direction as seen in Figure 1.

As the wheel rotates it is moved along the line 14, the teeth thereof striking the sides of the loops in the successive wales. This results in taking all the yarn from the pulled loop 12 and adding it to the shortened loops in the successive adjacent wales. After the yarn has been thus added to the loops in the wales to the left of the opening 13, the switch previously mentioned and provided in the handle of the instrument is released causing the direction of the motor 17 to be reversed and the implement is then moved to the right as seen in Figure 1 taking the yarn from the wales to the left of the pulled loop 12 and distributing it evenly around all of the previously distorted loops.

The wheel thickness mentioned above is suitable for operating upon hosiery of the now commonly used gauges, such for example as 51 and 60 gauge and may of course be used for hosiery knitted in lesser gauges, it being understood that the mending operation is performed when the hosiery is stretched across the mending cup so that the wheel may readily rotate without coming into contact with the yarn in adjacent courses.

Although the patent above-identified states that the impact members are resilient it has been found in practice that such resiliency does not contribute to proper operation and, as has been above stated, it has additionally been found that when a wheel is utilized having teeth which are substantially isosceles triangles the mending operation may be performed by rotating the wheel in either direction without danger of catching the fabric and damaging it, it being of course understood that the direction of movement of the wheel across the wales adjacent

to the pulled loop is correlated with the direction of rotation of the wheel.

As is clearly shown in Figure 2, the sheath of flexible shaft **16** is fastened at one end to the casing **18** and at the opposite end to the handle or housing **21**. Wheel **15** is fixed to one end of the core **20** of the flexible shaft **16**, and the other end of the core is connected directly to the shaft of motor **17**. Fixed to the flexible shaft **16** is a cable **22** certain conductors of which supply power to a lamp **23** suitably mounted in the handle or housing **21** and other conductors of which extend to a mercury switch **24** within the housing **21** and to a manually operated reversing switch **25** likewise located within the housing and having an operating button extending outwardly therefrom.

The circuit arrangement is such that power is supplied from a 110 volt source over one of the conductors of the cable **22** (the particular conductor being designated **26** in Figure 3), to the mercury switch **24** which is shown schematically in Figure 3. Thence the conductor leads to the tongue **28** of the reversing switch **25** which tongue cooperates with contacts **30** and **31**.

The motor **17** is a reversible motor having two field windings **32** and **33** which windings are connected by means of conductors **34** and **35** respectively, to the contacts **30** and **31** of the reversing switch **25**. The motor armature is connected in the usual manner from the juncture of windings **32** and **33** to the other side of the alternating current line, this connection being made by means of a conductor **36**.

It will be seen therefore that as the wheel is placed in a horizontal position in order to start the mending operation the mercury switch closes and since the reversing switch is a two-position switch, the tongue of which is at this time preferably held closed against the contact **31**, the motor will commence to rotate in a desired direction, namely, clockwise as seen in Figure 1.

When the pulled thread **12** has been added to the loops of the successive adjacent wales to the left as seen in Figure 1 by movement of the wheel to the left, the button of switch **25** is released, causing the tongue **28** to be positioned against the contact **30** thereby reversing the direction of rotation of the motor **17** and causing the wheel to rotate counterclockwise and the wheel is moved to the right. As the wheel rotates in this counterclockwise direction as it is moved toward the right it takes yarn from the now enlarged loops to the left of loop **12** and adds this yarn to the loops of the successive adjacent wales along the line **14**, distributing the yarn from the enlarged loops evenly throughout the distorted area. The mending operation is thus completed.

It will be noted that I have supplied a lamp **23** which is connected by means of conductors **37** and **38** to the secondary **39** of a transformer whose primary winding **40** is connected by means of conductors **41** and **42** across the alternating current line, the lamp being thus energized whenever power is supplied to the power supply unit in the casing **18**.

The mercury switch is so located in the housing **21** that when that housing is held horizontally the switch is closed and the motor energized. Ordinarily the handle will be grasped so that switch **25** is on the bottom during operation since this places the switch conveniently for operation.

It will be noted that the wheel **15** is so shaped that the teeth cannot catch the fabric and damage it but rather is provided with teeth the sides of which are at an angle to a radius passing through the teeth tips being inclined rearwardly as respects the particular direction of rotation.

Of course the teeth are smooth and polished so that they cannot catch the yarn against which they deliver light impact blows and thus the objects of the invention are attained since the wheel in striking such impact blows causes the excess length in the pulled yarn to be restored to the loops of adjacent wales.

While we have described a preferred embodiment of our invention, it will be understood that many other modifications may be made without departing from the spirit of our invention. We wish therefore to be limited not by the foregoing description but, on the contrary, solely by the claims granted to us.

What is claimed is:

1. Apparatus for restoring to original condition a knitted fabric one loop of which has become enlarged and adjacent loops reduced, comprising, in combination, a wheel having teeth thereon which teeth are substantially isosceles triangles, said wheel having a thickness in the tooth area no greater than the width of a normal course of the fabric to be restored, means for rotating said wheel in either direction while in contact with the sides of the enlarged and reduced loops whereby said wheel may operate upon loops at either side of the enlarged loop while maintaining the apparatus and fabric in substantially the same relative positions.

2. Apparatus for restoring to original condition a knitted fabric one loop of which has become enlarged and adjacent loops reduced, comprising, in combination, a reversible motor, a handle having a toothed wheel mounted thereon, said wheel having teeth which are substantially the shape of an isosceles triangle, said wheel being of a thickness no greater than the width of a normal course of the fabric to be restored, a flexible shaft joining said motor and said wheel, and switch means mounted in said handle for controlling said motor and determining the direction of rotation of said motor and of said wheel.

3. A device as claimed in claim 2, characterized in that a second switch is mounted in said handle, said switch being of the mercury type and closing the circuit to said motor through said first-mentioned switch when said wheel is placed in a predetermined position for performing the restoring operation.

4. A method of restoring to original condition a distorted course of a knitted fabric one loop of which has become enlarged by incorporation therein of material withdrawn from adjacent loops which have for this reason been reduced, comprising placing an area of the fabric which includes enlarged and reduced loops under light tension and while maintaining the fabric under tension, withdrawing material from the enlarged loop and adding it to reduced loops until all are restored substantially to normal size by striking a distorted loop located closely adjacent the enlarged loop a series of relatively light rapidly repeated blows applied in a direction longitudinally of the distorted course and away from the enlarged loop by impact members the effective widths of the work engaging surfaces of which do not exceed the width of a normal course of the fabric, thereafter similarly applying a series of similarly directed relatively light and rapidly repeated blows in succession to those remaining distorted loops of the course which are located upon the same side of the enlarged loop as the loop first engaged, thereby enlarging all distorted loops of the course upon that side of the enlarged loop to more than normal size and reducing the enlarged loop, thereafter reversing the direction of movement of the impact members to apply a series of similar light rapidly repeated blows in succession to the now distorted loops of the courses which are located upon the same side of the enlarged loop and thereafter to the loops on the opposite side of the original enlarged loop, to distribute yarn from the loops on the first side to those on the opposite side and restore both the enlarged loops and the reduced loops to normal size.

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