Jan. 14, 1958 H. G. MAYER 2,819,598

HOSIERY MENDING DEVICE

Filed June 20, 1955 2 Sheets-Sheet 1

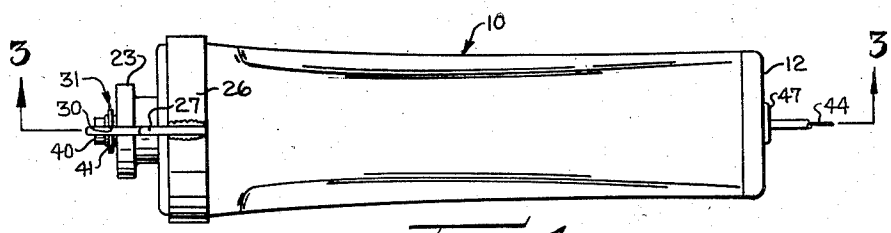


Fig-1

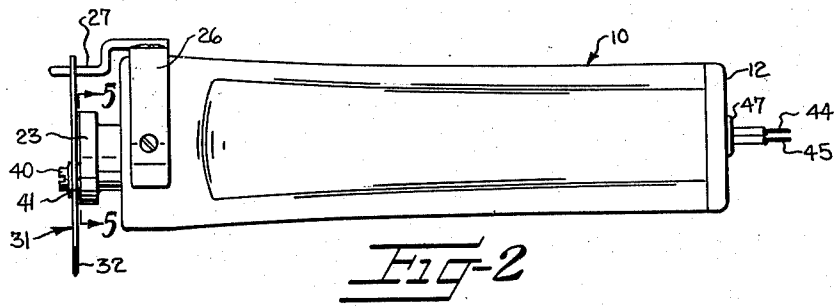


Fig-2

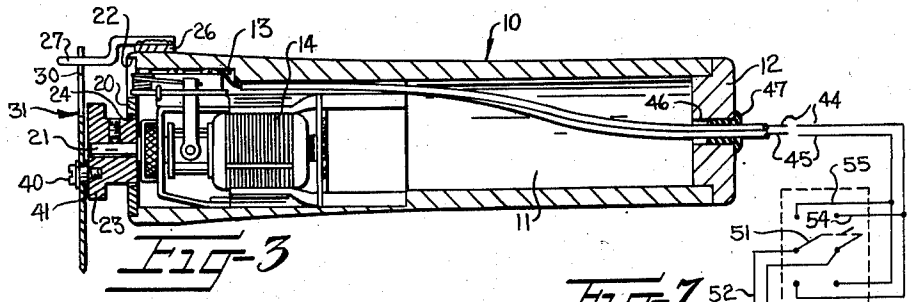


Fig-3

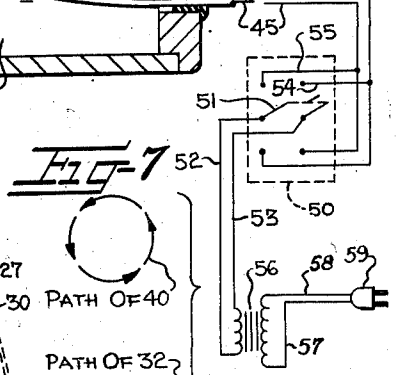


Fig-7

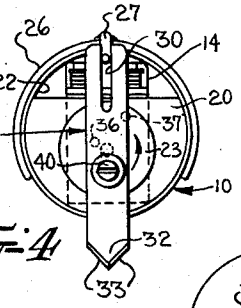


Fig-4

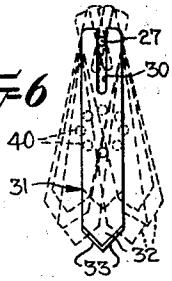


Fig-6

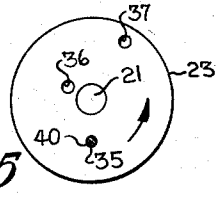


Fig-5

INVENTOR:
HENRY G. MAYER
BY Eaton & Bell
ATTORNEYS

Jan. 14, 1958 H. G. MAYER 2,819,598

HOSIERY MENDING DEVICE

Filed June 20, 1955 2 Sheets-Sheet 2

Fig-8

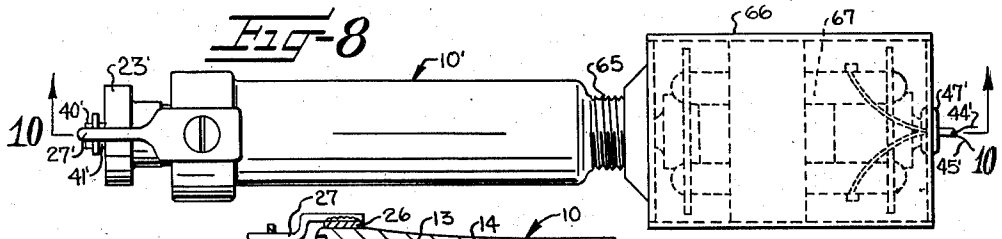


Fig-13

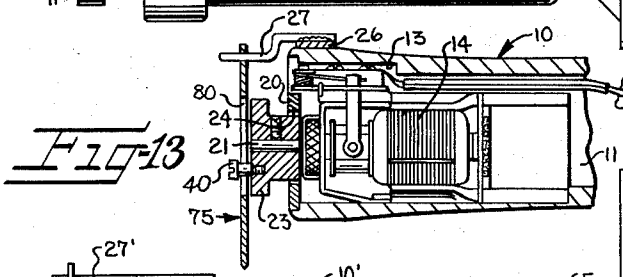


Fig-9

Fig-14

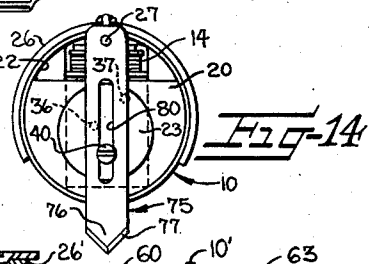
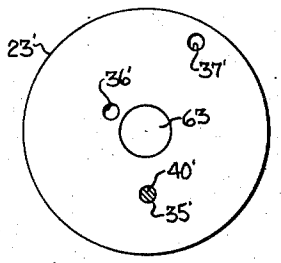


Fig-10

Fig-12



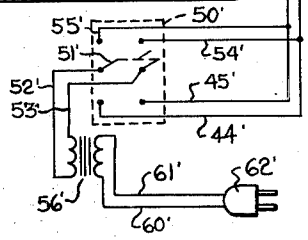
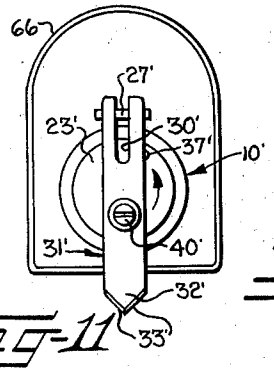


Fig-11



INVENTOR:
HENRY G. MAYER

BY Eaton & Bell

ATTORNEYS

United States Patent Office 2,819,598 Patented Jan. 14, 1958

2,819,598

HOSIERY MENDING DEVICE

Henry G. Mayer, Athens, Ga.

Application June 20, 1955, Serial No. 516,589

13 Claims. (Cl. 66—1)

This invention relates to hosiery mending devices and, more especially, to an improved apparatus for restoring to original condition an area of a knitted fabric in which one or more of the loops thereof has accidentally become abnormally enlarged.

There are various types of devices currently in use for restoring to original condition a knitted fabric, one or more loops of which have become enlarged and adjacent loops reduced. One type of such device comprises a circular series of work-engaging elements which curve outwardly from a common rotating hub. In order that such a device may operate satisfactorily, it is necessary that the outer ends of the work-engaging elements, which are necessarily relatively small or nearly pointed, are arranged so they will travel in a nearly perfect circular path and it is necessary that they be rotated during use in a circular direction opposite from the direction toward which they are curved. Accordingly, this type of device has to be made especially for a right-handed or left-handed operator, or it is necessary that the hub with the circularly arranged work-engaging elements thereon be removed from its supporting shaft and turned around so that the curved free ends of the work-engaging elements extend in the opposite direction and it is also then necessary that a reversible driving means be provided therefor so that the device may be reversibly rotated when used by a left-handed operator as compared to when it is used by a right-handed operator.

It is therefore an object of this invention to provide an improved apparatus for restoring to original condition a knitted fabric, one or more loops of which has become enlarged and adjacent loops reduced, which may be used by either a right-handed or left-handed operator.

It is another object of this invention to provide an apparatus of the character described which is compact, self-contained, easily operated and maintained.

It is another object of this invention to provide an apparatus of the character described comprising a single work engaging element made from a thin relatively broad flat band of rigid material and having a sharpened substantially V-shaped working end with means for driving the operating end of the work-engaging element in an oscillatable manner and in an elliptical path.

It is another object of this invention to provide an apparatus of the character last described wherein means are provided for adjustably varying the stroke of the operating end of the work-engaging element; that is, varying the size of the elliptical path through which the operating end of the work-engaging element passes with reciprocation thereof.

It is still another object of this invention to provide an apparatus of the character described including a hollow handle for supporting a rotatable hub to which a medial portion of the work-engaging element is pivotally connected with the end of the work engaging element opposite from the operating end thereof being slotted and guided on a guide element also carried by the handle.

Three forms of the invention are disclosed herein, one

form of which has an electric motor disposed within the handle for driving the hub to which the medial portion of the work-engaging element is pivotally connected and in another form of which the handle has a housing connected to the end thereof remote from the work-engaging element and within which an electric motor is mounted with a shaft extending from the electric motor axially through the handle and having the hub fixed on the other end thereof and being driven by the electric motor.

The third form of the invention has a work-engaging element whose operating end reciprocates in an arcuate path only, while, in the other two forms, the operating end of the work-engaging element reciprocates in both an arcuate path and an elliptical path.

It is another object of this invention to provide an apparatus of the character described wherein the electric motor is a reversible motor and wherein means are provided for effecting rotation of the shaft of the electric motor in either direction, as desired.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

Figure 1 is a top plan view of one form of the invention;

Figure 2 is a side elevation of the structure shown in Figure 1;

Figure 3 is a longitudinally vertical sectional view taken substantially along the line 3—3 in Figure 1 and showing, somewhat schematically, an electrical circuit for the motor;

Figure 4 is a front end view of the device taken on the left-hand side of Figure 2;

Figure 5 is an enlarged elevation, partially in section, taken substantially along the line 5—5 in Figure 2 and showing the rotor or hub to which a medial portion of the work-engaging element is pivotally connected;

Figure 6 is a somewhat schematic view of the work-engaging element showing, in broken lines, various positions occupied by the work-engaging element during the course of movement thereof;

Figure 7 is a schematic view indicating the relative path followed by the pivotal connection between the work-engaging element and the rotor or hub and the operating end of the work-engaging element;

Figure 8 is a top plan view of another form of the improved hosiery mending device;

Figure 9 is a side elevation of the hosiery mending device shown in Figure 8;

Figure 10 is a longitudinal vertical sectional view through the second form of the hosiery mending device taken substantially along line 10—10 in Figure 8 and, showing schematically, a circuit for controlling the flow of current to the electric motor;

Figure 11 is a front end elevation of the second form of hosiery mending device looking at the left-hand side of Figure 9;

Figure 12 is an enlarged elevation similar to Figure 5, but taken substantially along line 12—12 in Figure 9;

Figure 13 is a fragmentary sectional view similar to the left-hand portion of Figure 3 embodying still another form of the invention;

Figure 14 is a front end view looking at the left-hand side of Figure 13.

Referring more specifically to the drawings, the form of hosiery mending device shown in Figures 1 through 7 comprises a hollow body or housing broadly designated at 10 which is conveniently shaped so as to serve as a handle for the operator. The body 10 is of generally tubular construction and its rear portion is provided with a longitudinally extending bore 11 therein which is closed at its rear end by a rear cap member 12. The front end

portion of the body or handle 10 is suitably recessed, as at 13, for reception of a relatively small reversible electric motor 14 which may be secured in the recessed portion 13 of the body 10 by any suitable means such as a pressed fit. The electric motor 14 is preferably of a type such as is used in toy electric trains and such as is manufactured by Pittman Electrical Development Company, Sellersville, Pa., under their model No. DC71A. The front end of the housing or body 10 is partially closed by a relatively thin disk segment 20 which fits snugly in an annular recess 22 formed in the front end of the handle or body 10.

The shaft of the electric motor 14 is indicated at 21 and extends forwardly beyond the front end of the body or handle 10 and has a hub member or rotor 23 fixed thereon, the reduced rear portion of which loosely fits in a bore 24 formed in the disk segment 20.

The handle or body 10 is preferably made from a light weight material, such as wood, plastic, aluminum or the like, and the front end portion thereof has a bracket 26 suitably secured thereto, forwardly from which a relatively small rigid guide element or pin 27 projects. The forward portion of the guide element 27 loosely penetrates a slot 30 in one end portion of a work-engaging element broadly designated at 31. The work-engaging element 31 is preferably made from steel or other rigid material, in the form of a flat relatively elongated plate which is necessarily substantially longer than the diameter of the corresponding end of the handle or body 10 so the operating or working end of the work-engaging element 31 always projects beyond the corresponding edge portion of the handle or body 10.

The operating end of the work-engaging element 31 is pointed or substantially V-shaped as indiiated at 32 and the front and rear edges of the operating end 32 of the work-engaging element 31 are preferably uniformly beveled, as at 33, to provide a relatively sharp edge to the V-shaped operating end of the work-engaging element 31.

The front end of the rotor or hub 23 is provided with a plurality of threaded holes therein which are spaced varying distances from the axis of the rotor or hub 23. There are three such threaded holes shown in Figures 4 and 5 indicated at 35, 36 and 37. Depending upon the length of stroke of the work-engaging element 31 desired by the operator, a shoulder screw may be threaded into any one of the threaded holes 35, 36, 37, or a shouldered pin may be pressed into any one of the holes 35, 36, 37. In this instance, a shoulder screw 40 is shown as being threaded into the hole 35. A medial portion of the work-engaging element 31 is pivotally mounted on the shoulder screw 40 and a washer 41 is preferably provided between the proximal surfaces of the work-engaging element and the hub or rotor 23 in order to permit freedom of relative movement between the hub or rotor 23 and the work-engaging element 31.

The electric motor 14 has a pair of wires or conductors 44, 45 leading rearwardly therefrom through a relatively small bore or opening 46 formed in the rear cap 12. The wires 44, 45 are preferably supported in the opening 46 by means of a grommet 47. The wires 44, 45 extend into a switch housing shown in broken lines in Figure 3 and indicated at 50 and which housing has a double-pole double-throw switch 51 therein which is manually controlled to, at times, establish contact between the wires 44, 45 and respective wires or conductors 52, 53 and which, at other times, is adapted to establish contact between a pair of wires or conductors 54, 55 and the respective wires or conductors 52, 53. The ends of the wires or conductors 54, 55 remote from the switch 51 are connected to medial portions of the respective wires 44, 45. The ends of the wires 52, 53 remote from the switch 51 are connected to opposite ends of the secondary winding of a transformer 56, from opposite ends of the primary winding of which a pair of lead wires or conductors 57, 58 lead to a plug 59 adapted to be connected to a suitable source of alternating current, not shown.

It is apparent that, when the switch 51 establishes contact between the conductors 44, 45 and respective conductors 52, 53, this causes the shaft 21 of motor 14 to rotate in one direction, say, in a counterclockwise direction in Figures 4 and 5. On the other hand, when the switch 51 establishes contact between the conductors 54, 55 and respective conductors 52, 53, the rotor 23 is driven in a clockwise direction in Figures 4 and 5.

In operation, the operator moves the hosiery mending device toward the operator and, if the operator is right-handed, the rotor will be rotating in a counterclockwise direction while, on the other hand, if the operator is left-handed, the rotor will be rotating in a clockwise direction in Figure 4. It will be noted that, in either event, the free end or operating end of the blade or work-engaging element 31 moves in an elliptical path in which the working stroke thereof passes through an arc of movement of a relatively large radius, in the course of which it strikes and then momentarily slides against the row of stitches of the portion of a hose having a relatively large loop therein adjacent which abnormally small loops are present.

As the operator guides the work engaging element along the adjacent "pulled" thread in a stocking, the relatively short stroke of the blade or work-engaging element 31 is such as to avoid unnecessary roughing of the fabric while, on the other hand, the work-engaging element rapidly delivers a series of light blows and subsequent sliding movements against the shortened reaches of each of the reduced loops adjacent an abnormally long loop to thereby cause some material to be withdrawn from an adjacent loop and added to the reduced loop thus contacted. Of course, that area of the fabric which includes the pulled and reduced loops is maintained under light tension during the mending operation.

This portion of the fabric is usually stretched over a so-called mending cup and mending cups are usually of relatively small convenient size and, accordingly, the short stroke of the improved mending apparatus provides more working space on a cup of a given size without damaging the work by the blade or work-engaging element 31 touching the edges of the cup. This has been one difficulty encountered with the types of mending devices having a circular series of curved prongs or work-engaging elements thereon. Also, since a single blade or work-engaging element is used, it is apparent that this obviates the necessity of carefully alining the operating ends of a plurality of work-engaging elements which are circularly arranged as has heretofore been the case.

The pointed operating end 32 of the work-engaging element 31 engages such a relatively small area of the work as to insure that only a very few loops need be engaged thereby during the course of restoration of an abnormally large loop to its normal size and thereby avoids distorting loops which have not been pulled or loosened. Also, the beveled pointed operating end 32 of the work-engaging element 31 is so shaped as to insure that it will not engage or ensnare the yarn in a pulled loop and cause it to break, which difficulty has been encountered in using other types of hosiery mending devices. It is also much simpler for the operator to maintain the single pointed end 32 of the operating element 31 in proper alinement with the course of the knitted fabric than would be the case if circularly arranged elements were used. Of course, the sharpened operating end 32 of element 31 is necessarily of lesser thickness than the width of a course of knit fabric.

Second form of hosiery mending device

In Figures 8 through 12 there is shown a second form of hosiery mending device which is similar to the form of hosiery mending device shown in Figures 1 through 7. Accordingly, those parts shown in Figures 8 through 12 which are substantially the same or identical to corre-

sponding parts shown in Figures 1 through 7 will bear the same reference characters with the prime notation added to avoid repetitive description.

The form of the invention shown in Figures 8 through 12 differs primarily from the form shown in Figures 1 through 7 in that the motor is mounted in a housing removably attached to the rear end of the handle or body of the device. To this end, the body **10'** of the device shown in Figures 8, 9 and 10 has a longitudinally extending bore **60** therein, opposite ends of which have mounted therein a pair of bushings or bearings **61, 62.** A drive shaft **63** is journaled in the bearings **61, 62** and extends forwardly therefrom and has the hub or rotor **23'** fixed thereon. The rear end of the body **10'** has a reduced tubular threaded portion **65** thereon which is threaded through one wall of a motor housing **66,** thus securing the motor housing on the reduced threaded portion **65** of the body **10'.**

The motor housing **66** may be of a foraminated material or may be suitably perforated to permit air to flow past a reversible electric motor **67** snugly positioned within the housing **66.** The electric motor **67** has a threaded shaft **70** thereon which is coupled to the rear end of the drive shaft **63** by means of a threaded sleeve **71.** It is thus seen that the electric motor **67** and the housing **66** may be readily detached from the body **10'** and one end of a flexible shaft, driven by a suitalbe motor, may be coupled to the rear end of drive shaft **63** in lieu of the electric motor **67,** if desired.

The electric motor **67** also has a pair of conductors or wires **44', 45'** leading therefrom which extend through the rear wall of the housing **67** and are connected in a circuit identical to the circuit shown in Figure 3 and the parts of which shall bear the same reference characters as like parts shown in Figure 3 with the prime notation added to avoid repetitive description.

Third form of hosiery mending device

In Figures 13 and 14 there is shown a third form of hosiery mending device which is also similar to the first and second forms of devices shown in Figures 1 through 7 and 8 through 12, respectively. The third form of hosiery mending device differs from the first and second forms only in the particular structure of the blade or work-engaging element. It will be apparent, as the description proceeds, that the form of blade or work-engaging element shown in Figures 13 and 14 may be readily substituted for the blades **31, 31'** in the forms of the invention shown in either Figures 1 through 7 or Figures 8 through 12. In this instance, the blade or work-engaging element is shown in Figures 13 and 14 as though applied to the form of apparatus disclosed in Figures 1, 2, 3, 4 and 5. Accordingly, the structure shown in Figures 13 and 14 which is identical to that shown in Figures 1, 2, 3, 4 and 5 will bear the same reference characters with the exception of the blade or work-engaging element which, in Figures 13 and 14, is broadly designated at **75.**

Generally, the blade or work-engaging element **75** is of substantially the same configuration as the blades **31** and **31'** in that it is made from steel or other rigid material in the form of a flat relatively elongated plate which is necessarily substantially longer than the diameter of the corresponding end of the handle or body **10** so the operating or working end of the work-engaging element **75** always projects beyond the corresponding edge portion of the handle or body **10.** As in the previously described forms of the invention, the operating end of the work-engaging element **75** is pointed or substantially V-shaped, as indicated at **76,** and the front and rear or inner and outer edges of the operating end **76** of the work-engaging element **75** are preferably uniformly beveled, as at **77,** to provide a relatively sharp edge to the V-shaped operating end of the work-engaging elemen: **75** and so that the V-shaped operating end **76** of the work-engaging element **75** is of lesser thickness than the width of a course of knit fabric.

Instead of being provided with a slot in the upper portion of the blade or work-engaging element **75,** it will be noted that the rounded free end of the guide element **27** serves as a pivot shaft or pin on which the upper portion of the work-engaging element **75;** that is, that portion thereof remote from the operating end **76** thereof, is pivotally mounted. On the other hand, the medial portion of the work-engaging element **75** is not pivotally connected to the hub member or rotor **23,** as in the first and second forms of the invention, but, instead, the medial portion of the blade or work-engaging element **75** is provided with a longitudinally extending slot **80** therein which is loosely penetrated by the shoulder screw **40.** The slot **80** is necessarily so located and of such length as to permit rotation of the shoulder screw **40** with the rotor **23** relative to the blade **75** in Figures 13 and 14.

It is thus seen that rotation of the rotor or hub member **23** and the shoulder screw **40** in either direction in Figure 14 will reciprocate the operating end **76** of the work-engaging element or blade **75** only in an arcuate path as opposed to the elliptical path through which the operating ends of the blades **31** and **31'** pass during the course of reciprocation thereof (Figure 7).

The third form of invention shown in Figures 13 and 14 is used in the same manner as the first and second forms of the invention, it being noted that the blade and the handle which supports the device are generally moved toward the operator during the actual operation of restoring pulled threads in knitted fabric.

It is thus seen that I have provided three forms of an improved hosiery mending device which are simply and economically constructed and which are of relatively small light-weight construction so they may be carried in a lady's handbag, for example, and which can be used in an automobile or in one's home as well as being used in a commercial hosiery manufacturing plant. It should be noted that in each form of the invention, since the motor is positioned in or on the handle, it provides sufficient weight to the device so that the heart-beat or a slight nervous condition of the operator will not affect the operator's hand and will thereby assist the operator in maintaining the work-engaging element of the corresponding hosiery mending device in alinement with the correspoding course of the fabric.

In the drawings and specification there have been set forth preferred embodiments of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. Apparatus for restorig pulled threads in knitted fabric comprising, in combination, a shaft adapted to be rotated about its longitudinal axis, a hub fixed on said shaft and rotatable therewith, a flat relatively thin elongated blade pivotally mounted on the outer end of said hub in eccentric relation to the axis thereof, one end of said blade being substantially pointed and the other end thereof having a longitudinally extending slot therein, means supporting said shaft for rotation therein, and a guide element carried by said means and extending through said slot whereby rotation of said hub transmits reciprocatory movement to the pointed end of said blade about a substantially elliptical path.

2. Apparatus for restoring pulled threads in knitted fabric comprising, in combination, a shaft adapted to be rotated about its longitudinal axis, a hub fixed on said shaft and rotatable therewith, a blade pivotally mounted on the outer end of said hub in eccentric relation to the axis thereof, one end of said element being substantially pointed and the other end thereof having a longitudinally extending slot therein, means supporting said shaft for rotation therein, and a guide element carried by said

means and extending through said slot whereby rotation of said hub transmits reciprocatory movement to the pointed end of said element about a substantially elliptical path.

3. A structure according to claim 2 wherein the blade is pivotally connected to a medial portion of the hub by means of a shoulder screw adapted to loosely penetrate a medial portion of said blade, and the outer end of said hub having a plurality of threaded holes therein spaced varying distances from the axis of the hub whereby the shoulder screw may be engaged with any one of the threaded holes to correspondingly permit variations in the size of the elliptical path of movement of the pointed end of the blade.

4. Apparatus for restoring pulled threads in knitted fabric comprising, in combination, a shaft adapted to be rotated about its longitudinal axis, a hub fixed on said shaft and rotatable therewith, a blade pivotally mounted on the outer end of said hub in eccentric relation to the axis thereof, means supporting said shaft for rotation therein, and a guide element carried by said means and engaging one end portion of said blade whereby rotation of said hub transmits reciprocatory movement to the other end of said blade about a substantially elliptical path.

5. Apparatus for restoring pulled threads in knitted fabric comprising an elongated body member, a shaft projecting from one end of said body member, an electric motor carried by said body member for imparting rotation to said shaft, a hub fixed on said shaft, a blade having a medial portion thereof pivotally connected to the outer end of said hub in off-center relation thereto, one end of said blade having a relatively sharp work-engaging surface thereon, and means for guiding the portion of said blade remote from the end thereof having the work-engaging surface thereon at a point spaced radially from the axis of the hub whereby rotation of said hub imparts substantially elliptical movement to the end of the blade having the work-engaging surface thereon.

6. A structure according to claim 5 wherein said shaft is journaled in and extends longitudinally of said body member, a housing removably secured to the end of said body member remote from said hub, an electric motor in said housing, and the said electric motor being coupled to the shaft.

7. A structure according to claim 5 wherein said body member is hollow and said motor is fixed within said body member.

8. A structure according to claim 7 wherein said motor is of the reversible type, and a double throw switch interposed in an electrical circuit to said motor for energizing the motor for rotation of said shaft in either direction.

9. Apparatus for restoring pulled threads in knitted fabric comprising, in combination, a shaft adapted to be rotated about its longitudinal axis, a hub fixed on said shaft and rotatable therewith, a flat relatively thin elongated blade, means loosely connecting a medial portion of said blade to the outer end of said hub in eccentric relation to the axis thereof, one end of said blade being substantially pointed, means supporting said shaft for rotation therein, and a guide element carried by said last-named means and loosely penetrating said blade at a point remote from the pointed end thereof for restraining the corresponding portion of said blade from rotation relative to the means supporting said shaft and whereby rotation of said hub transmits reciprocatory movement to the pointed end of said blade.

10. Apparatus for restoring pulled threads in knitted fabric comprising, in combination, a shaft adapted to be rotated about its longitudinal axis, a hub fixed on said shaft and rotatable therewith, means supporting said shaft for rotation therein, a guide element carried by said means and extending outwardly therefrom, a blade having one of its end portions pivotally mounted on said guide element, said blade having a longitudinally extending slot therein, means closely penetrating the slot in said blade and projecting outwardly from the outer end of the hub and in eccentric relation to the axis of said hub whereby rotation of said hub transmits reciprocatory movement to the other end of said blade in a substantially arcuate path.

11. In a structure according to claim 10, the end of said blade remote from that portion connected to the guide element being substantially V-shaped.

12. A structure according to claim 11 having beveled relatively sharp edges on the substantially V-shaped end of the blade.

13. Apparatus for restoring pulled threads in knitted fabric comprising a shaft adapted to be rotated on its longitudinal axis, a hub fixed on the shaft and rotatable therewith, means supporting said shaft for rotation therein, a first pin projecting outwardly from, and in eccentric relation to the axis of, said hub, a second pin carried by said supporting means and extending in spaced substantially parallel relation to said hub and said first pin, a relatively thin and elongated work-engaging element made from rigid material pivotally mounted on one of said pins and having a substantially longitudinally extending slot therein loosely penetrated by the other of said pins whereby rotation of the hub transmits reciprocatory movement to said element, and said element having a relatively sharp work-engaging surface on one end thereof disposed radially outwardly of said hub.

References Cited in the file of this patent

UNITED STATES PATENTS

2,668,428	Smith	Feb. 9, 1954
2,712,743	Susemihl	July 12, 1955
2,713,783	Zane et al.	July 26, 1955