

Sept. 30, 1941.

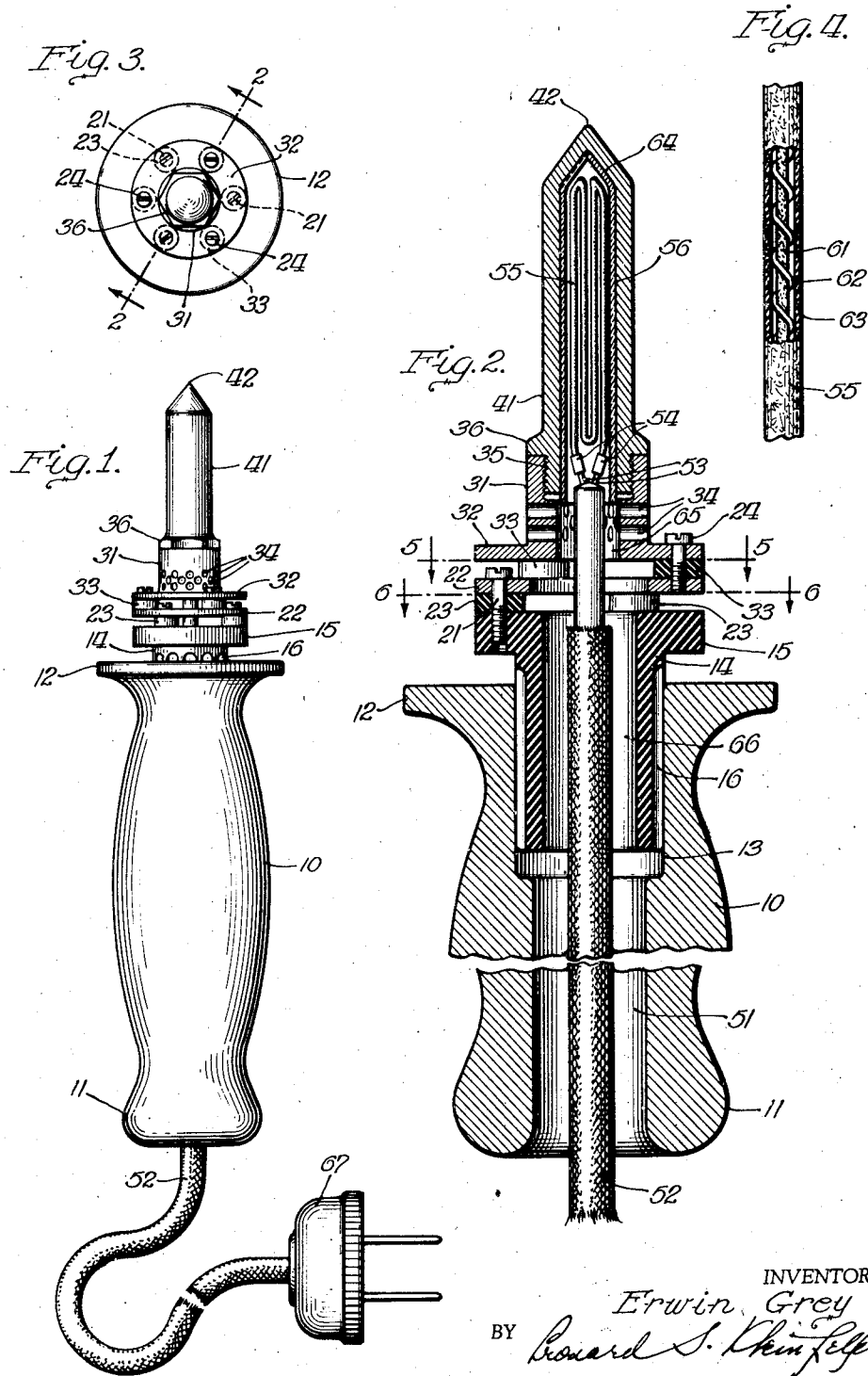
E. GREY

2,257,376

LOOP SPREADING TOOL

Filed April 13, 1940

2 Sheets-Sheet 1



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Fig. 5.

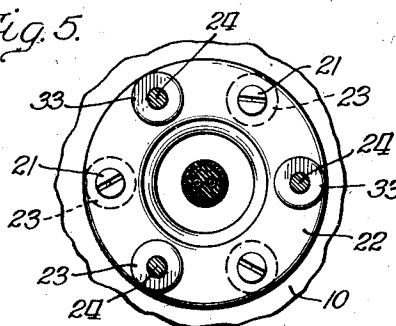


Fig. 6.

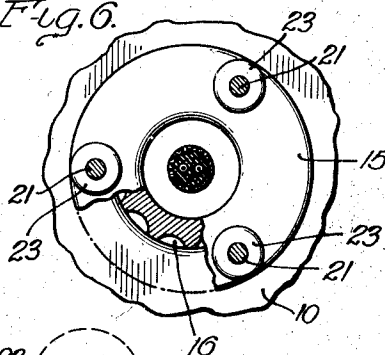


Fig. 10.

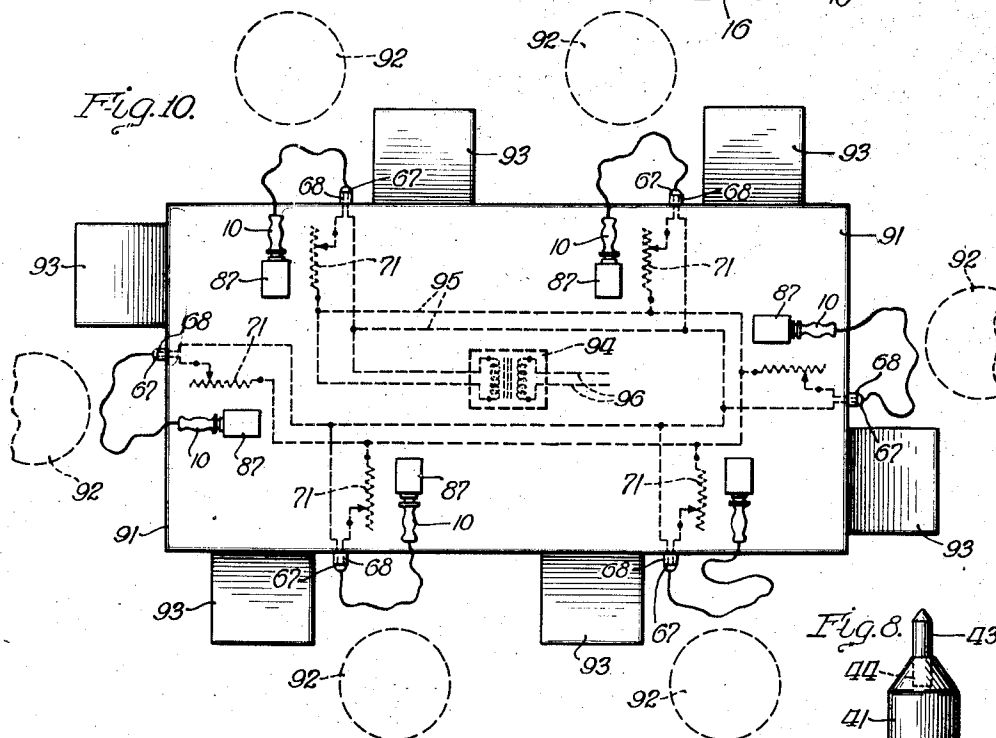


Fig. 9.

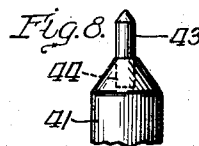
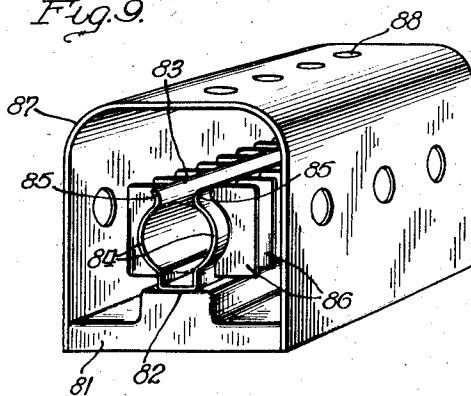
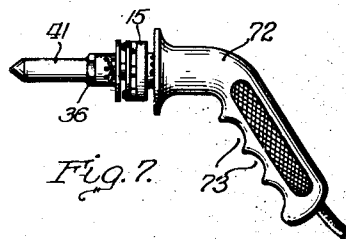


Fig. 7.



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UNITED STATES PATENT OFFICE

2,257,376

LOOP SPREADING TOOL

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Application April 13, 1940, Serial No. 329,418

6 Claims. (Cl. 66—1)

This invention relates to improvements in an instrument commonly known in the knitting art as a "boning tool," but more accurately described as a loop spreading tool and used particularly in the knitting of hosiery, for example, full fashioned hosiery, to spread the loops of a selected wale, or wales of the fabric to facilitate the transfer of said loops to the impaling points of a topping bar or equivalent appliance, which latter operation is termed "topping."

In the knitting of full fashioned hosiery, for example, wherein the leg section is knit on one machine and the foot section on another, the termination of the leg section usually includes a pair of heel tabs, substantially rectangular in area and lying one on each side of the center line of the knitted leg blank, as commonly understood. This leg section must be transferred to the needles of the footing machine whereupon the foot portion is knit as a continuation of the leg portion. To effect this operation a selected walewise row of loops adjacent the inner edge of each heel tab, and a selected coursewise row of loops adjacent the line marking the junction of the center or instep portion of the leg blank with the foot portion, are placed on a topping bar. Said topping bar comprises a metal bar substantially equal in length to the needle bar of the knitting machine and supporting a plurality of impaling points equal to the maximum number of needles employed in knitting the foot portion of the stocking.

In essence, the topping operation consists in manually rotating each heel tab at right angles to its normally knitted position and with the inner edges thereof substantially aligned with the course of the instep portion to be topped, as aforesaid. While in this position the selected wale on each heel tab and the instep course are impaled on the points of the bar, and marginal excess stitches of the instep portion ravelled off.

After such impalement the points are held in engagement with the needles of the footing machine and the leg portion transferred from the points to the needles of the footing machine.

Inasmuch as the edges of the heel tabs are impaled wale-wise and the bights of adjacent loops are rather close together in that direction, it has always been deemed necessary to spread the selected wale by means of a loop spreading instrument in order to open apertures in the loops large enough to render impalement easy. This loop spreading operation is performed by holding the tab as flat as possible on a work table and using a pointed tool moved by hand under pressure down the wale wherein the topping points are to engage, to effect a spreading of the loops. In the case of natural silk, rayon and other fibers known heretofore, such manual distortion of the loops is permanent enough until

the actual topping is performed, as the yarn is not too resilient and the loops will remain in their distorted shape.

Recently there has been introduced to the market a synthetic yarn under the trade-mark "Nylon," capable of being formed of filament spun from any of a number of plastic substances generally termed superpolyamides, but the one having the most desirable characteristics for hosiery yarn is polyhexamethylene adipamide.

At normal temperatures such yarn is somewhat resilient. Accordingly, when the loop spreading operation, as presently known for silk, is performed, the loops are spread coursewise as the tool passes thereover, but will return to their knitted form. For this reason the topping operation is quite difficult and the ordinary loop spreading tool quite uneconomical in use. Being thermoplastic, superpolyamides are affected by heat and slightly soften at temperatures approximating 225° F. to 275° F., a range well below the melting point. Once softened, the loops knitted from said yarns can be deformed and upon the removal of the heating means will retain substantially the deformed shape.

I am aware that a loop spreading tool using a heated point is available but possesses several shortcomings which the present invention is intended to overcome. Briefly, some of these objections to the prior device are that the handle is not designed for proper gripping and the operator's hand may slide off against the hot tip; adequate means are not provided for conducting heat away from the handle portion so that it becomes too hot for comfort; and means are not provided for easy removal of the tip for re-grinding.

Accordingly, it is the principal object of this invention to provide in a loop spreading instrument a handle primarily designed for the intended object, and which will permit the operator's hand to be in a comfortable and safe position.

It is a further object to provide in a loop spreading tool means to conduct stray heat rapidly away from the operator's hand.

An additional object is to provide in a loop spreading instrument a tip so constructed that it may be easily removed without damage for re-sharpening of the point and so constructed that it may be easily held in the hand for such operation.

Additional objects will appear as the description proceeds.

In the drawings:

Figure 1 is a side elevation of my loop spreading tool;

Figure 2 is a cross sectional view on the line 2—2 of Figure 3;

Figure 3 is a plan view taken from Figure 1;

Figure 4 is a detail of the element wire;

Figure 5 is a cross sectional view on the line 5-5 of Figure 2;

Figure 6 is a cross sectional view on the line 6-6 of Figure 2;

Figure 7 shows a modified type of handle;

Figure 8 shows a modified tip for the tool;

Figure 9 is a perspective view of a holder for the tool; and

Figure 10 is a plan view in diagrammatic form, of a work table employing my loop spreading tool.

Referring to Figures 1, 2 and 3, 10 represents the tool handle which may be of wood, plastic, or any equivalent material of poor heat conducting quality, and having the contour shown. It is preferably provided in the back with a bulged portion 11 and forwardly with a flanged portion 12, the bulge 11 acting to retain one edge of the operator's hand and the flange 12 the other edge, since the tool is usually gripped like a dagger. Preferably flange 12 is extended to as large a diameter as is practical to insure that the operator's hand can not slide into contact with the hot portion of the tool, as substantial pressure is applied thereto when in use.

Frictionally held in a hole 13 formed in the inner end of the handle 10 is a bushing 14, preferably of fiber or other material of poor heat conductivity, substantially cylindrical in form and flanged at 15. That portion of the bushing 14 in engagement with the hole 13 is provided with a plurality of longitudinal flutes 16, terminating as shown just above the inner end of flange 12 and extending through to the opposite extremity of the bushing. Joined to the flange 15 by screws 21 (Figure 6) is the annulus 22, preferably of metal and of somewhat extended area with respect to its cross section, i. e. thin and flat, and held in spaced apart relation with said flange 15 by spacing washers 23 of fiber or other material of poor heat conductivity.

Attached to the annulus 22 by screws 24 is the substantially cylindrical tip holding member 31 preferably of metal, and formed at its inner extremity with a flange 32 through which screws 24 pass to support said member 31 with respect to annulus 22. Spacing washers 33 (Figure 5) similar to 23 serve to locate member 31 axially with respect to annulus 22.

The entire periphery of the member 31 in a zone adjacent the flange 32 is provided with a plurality of holes 34, in this case three rows in staggered relation. The outer extremity of the member 31 threadedly engages at 35 the metal tool tip 41, substantially cylindrical, and terminating in a conical working point 42. Tip 41 is provided with a hexagonal shoulder 36 to facilitate removal and replacement of the tip by means of a standard wrench.

The angle of said tip may vary depending on the operator's preference and/or the custom in a particular mill. Some prefer a conical extremity with a rather acute angle and some with the angle more obtuse, but in any event the extreme terminus of the tip would be slightly rounded as shown, to obviate the possibility of the tool digging into the fabric and tearing the same. The preferred radius on the extreme tip would be a function of the gauge of the goods being treated, so that it may enter the loops of the wales to be worked upon and spread them without unduly distorting the adjoining wales. Some operators may prefer a tip such as is shown in Figure 8, in which an extension 43 substan-

tially smaller in diameter than the tip 41, is driven into a hole 44 or otherwise fastened in the said tip. Such a narrow extended tip would allow a more unobstructed view of the work.

As shown, the handle 10 is provided with an axial hole 51 through which passes the electrical connecting cord 52, the said hole being substantially larger than the diameter of the cord for a purpose to be described. The conductors 53 of the cord 52 are clipped at 54 to the extremities of the heating element 55 which in this instance comprises two parallel loops of resistance wire laid within a hole 56 formed inside the tip 41.

In Figure 4 there is shown a greatly magnified section of a preferred form of element wire consisting of an asbestos string axis 61 about which is helically wound nichrome or equivalent high resistance wire 62 and the whole sheathed in asbestos tubing 63. A mica shield 64 affords additional insulation between the element 55 and the metal tip 41. It will be noted that a hole 65 is provided in the member 31 and another hole 66 in the member 14 to accommodate the connecting cord 52, and both substantially larger than the connecting cord. Connecting cord 52 terminates in a standard plug 67 for connection to any well known receptacle as for example, 68 in Figure 10.

From the preceding it will be apparent that the tool is designed with a view to rapid radiation of heat from those places where it is most likely to cause discomfort to the operator, that is to say the flange 32, the ring 22 and the flange 15 all act as radiating fins by presenting a relatively large area to the surrounding atmosphere. Conduction of heat from the member 31 through its flange 32 to ring 22 is inhibited by the fiber washers 33 and from the ring 22 to the flange 15 by the fiber washers 23. Furthermore, the said two pairs of washers are in staggered relation (as shown in Figure 3) to present a circuitous path through which the heat must travel in order to reach the bushing 14. Flutes 16 and holes 13, 34, 51, 65 and 66 allow cool air to circulate through the handle and around the various parts to accelerate the dispatch of heat therefrom. In brief, every provision has been made for the thorough cooling of all parts of the tool not employed for the immediate work and thereby result in greatest comfort to the operator.

Current passing through the connecting cord 52 and the element 55 will produce the desired temperature in the point 42, that is to say, in a range from 225° F. to 275° F., for Nylon yarn, and in the case of other thermoplastic yarns which are capable of being operated upon by this tool, the temperature may be in lower or higher ranges. To attain variation in temperature I prefer to insert a simple rheostat 71 (Figure 10) in one side of the line serving the plug 68, said rheostat being adjustable to suit the particular demands of the work.

In Figure 7 I have shown a modified form of handle 72, in the nature of a pistol grip provided with finger engaging depressions 73, permitting a more positive holding action and preferred by some operatives.

To receive the tool when not in use there may be provided the holder assembly shown in Figure 9, comprising a base portion 81 of fiber or other non-scorching material fixedly supporting the bifurcated clip member 82 formed of resilient metal to a substantially cylindrical contour and forming a longitudinal opening 83, into which the tip 41 may be inserted preparatory to being en-

gaged by the curved sides 84 of the member 82. The edges 85 of the opening 93 are preferably curved outwardly to facilitate insertion of the tool into said holder. Arranged at spaced apart intervals along the two sides of the holder 82 are the cooling fins 86 of thin metal; and to protect the entire holder from actual contact with the operator's hand is the hood 87 provided with ventilating holes 88. When the tool is not in use it is pressed through the opening 93 and between the gripping sides 84 and retained there until again desired for use. Fins 86 tend to radiate the heat from the tool and prevent it from reaching too high a temperature inasmuch as in the normal use of the tool the work absorbs heat therefrom and maintains it at the predetermined operating temperature.

A preferred method of using the tool in a hosiery mill would be to provide a table 91, as shown in Figure 10, adapted to accommodate a plurality of operatives, in this case six, designated diagrammatically by the dotted circles 92. Each operator would be provided with a ledge 93 projecting from the side of the table, either horizontal or at a slight downward angle with respect to the table surface, depending upon the preferred technique in the particular mill. Ledges 93 may be covered with any material which presents a suitably resilient surface, is heat proof, and will not become roughened after long use to present snagging hazards to the goods. For example, I have found that artificial sole leather as used on shoes presents an excellent working surface. The receptacles 68 are arranged along the sides of the table as shown and the holder assemblies at some convenient point for each operator, either atop or under the table 91. In order to confine the element 55 solely within the tip 41 and not permit it to extend into the handle 10 and cause discomfort to the operator, it is preferred to use a relatively low applied voltage, for example, from 6 to 25 volts. By so doing the length of element necessary is materially reduced over what would be required for operation at standard voltage of, say, 110 volts. Furthermore, notwithstanding the aforesaid advantage, low voltage operation is of vital importance from a safety standpoint, as even 110 volts can prove dangerous to human life under certain commonly encountered conditions. For this purpose I prefer to use a transformer 94, the secondary side of which is connected to bus wires 95 to which the rheostats 71 and receptacles 68 are connected in parallel in a well-known manner. Incoming current, for example, at 110 volts, would be applied on the conductors 96 and the transformer located below the table surface, together with the wiring and rheostats, so as to allow a table surface as unobstructed as possible for piling the processed and unprocessed goods.

Improvements in a tool of the class described as herein disclosed are not necessarily limited to one heated by electricity as it will be apparent that they are equally applicable to an implement heated by gas or other heat producing medium, or to an implement formed at the tip with a nozzle to emit hot air, steam or equivalent heated fluid.

Although the tool herein described is primarily of use in textile work for the operation outlined, it is not my intention to limit the same thereto, as it is capable of other uses, for example, the creasing of textile fabrics comprising thermoplastic yarns, thermoplastic materials in sheet or

other form and in any instance wherein a heated tool for creasing or similar processes would be desired. It will be comprehended, furthermore, that the instrument is capable of a wide range of modification in its components without departing from the scope of the appended claims.

I claim:

1. An implement of the class described comprising in combination a handle including a substantially cylindrical palmar and digital gripping surface and a flared flange at the inner extremity thereof; a working tip; heating means for said tip; and means interposed between said handle and tip to dissipate non-useful heat, said means comprising axially spaced radial fins maintained in spaced-apart relation by staggered supports whereby to provide a circuitous extended heat-traversing path between said tip and handle.

2. An implement of the class described; including a handle; a tip for operating on the work affixed to said handle and comprising a substantially cylindrical member of relatively greater length than diameter, said tip including a butt portion threaded to engage a correspondingly threaded portion on said handle, a collar integral with said tip and of polygonal peripheral contour for engagement by a removing tool, said collar being adapted to abut said handle to frictionally lock said tip and handle in engagement.

3. In combination a tool of the class described, including a tip for operating on the work; heating means for said tip; a handle to carry said tip; and a receptacle for supporting said tool when out of use, comprising a resilient gripping means for intimately embracing said tip and provided with members to dissipate waste heat from said tip and thereby maintain a reasonable uniform operating temperature thereof.

4. In an implement of the class described; a handle; a tip for operating on the work; heating means for said tip; supporting means for said tip interposed between said tip and handle and of relatively low heat conductivity, said supporting means comprising a bushing inserted in said handle and provided with a plurality of ventilating channels located intermediate said bushing and handle and substantially in alignment with the central axis of said implement.

5. In an implement of the class described; a handle; a tip for operating on the work; heating means for said tip; supporting means for said tip interposed between said tip and handle and of relatively low heat conductivity, said supporting means comprising a bushing provided with a plurality of axial flutes distributed around the periphery thereof, said handle having a hole therein to receive said bushing and frictionally retain the same by engagement of the wall thereof with the lands between flutes whereby to form a plurality of ventilating channels between said bushing and handle.

6. In an implement of the class described; a handle; a heated tip for operating on the work; and means interposed between said handle and tip for supporting the latter, comprising a plurality of annular fin-like members extending radially from the axis of the implement for radiating non-useful heat from said implement and a group of spacers intermediate each pair of said members; the individual spacers of a group being offset circumferentially with respect to the spacers of the next adjacent group.

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