Aug. 26, 1958 J. G. WALSER, JR 2,849,167

TURNING DEVICE

Filed Feb. 25, 1957

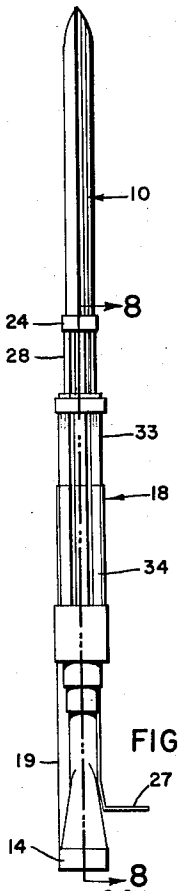


FIG. 7

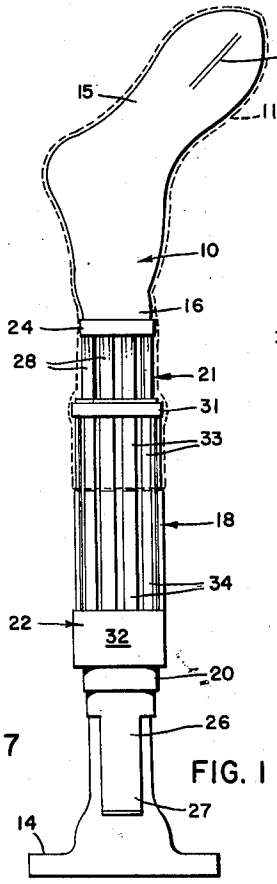


FIG. 1

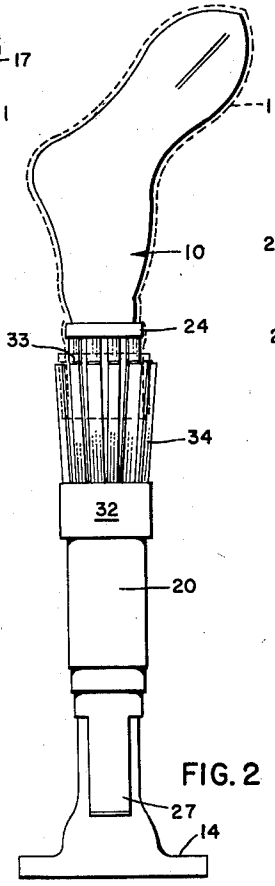


FIG. 2

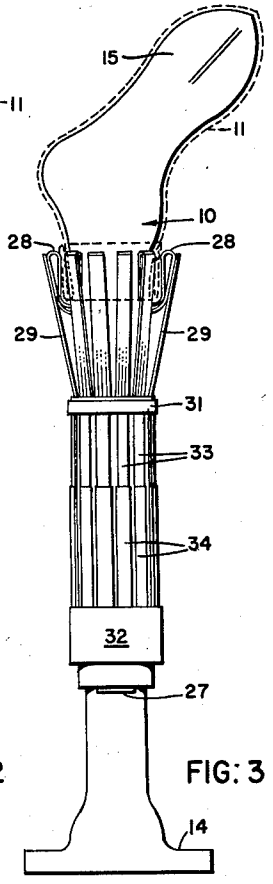


FIG. 3

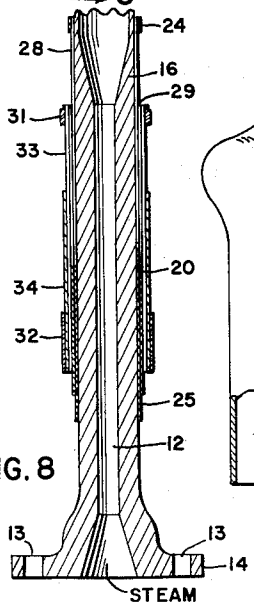


FIG. 8

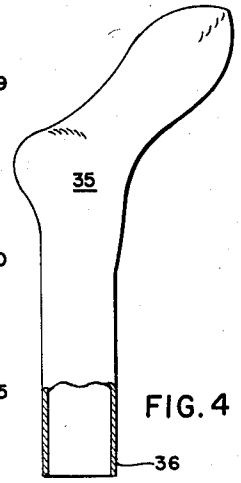


FIG. 4

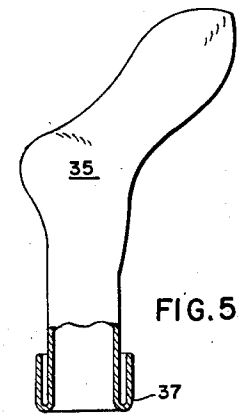


FIG. 5

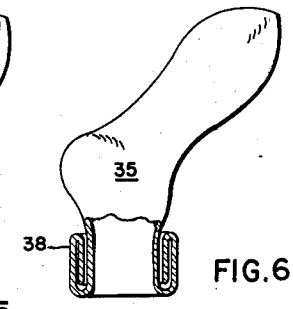


FIG. 6

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United States Patent Office 2,849,167
Patented Aug. 26, 1958

2,849,167

TURNING DEVICE

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Application February 25, 1957, Serial No. 641,954

10 Claims. (Cl. 223—37)

The present invention relates to turning devices and more particularly to a folding apparatus for turning the cuff portion of a stocking or the like.

It is the conventional practice in the hosiery industry to turn back or fold down the cuff or upper portion of anklets, bobby-socks, or campus-length stockings one or more turns prior to packaging and placing the knitted goods on the market. This operation at present is laborious and costly since the turning operation involves manually placing each individual stocking cuff portion on a supporting board to permit an operator to turn the cuff portion backwardly one or more times. Thereafter, in a separate operation called "pairing" the stockings must be matched according to similar cuff length for final mating in pairs.

Turning and mating operations are performed normally at a remote location from the boarding operation during which operation the stockings are shaped on a heated stocking form either by means of an aqueous medium or an electrically heated board.

It is, therefore, an objective of this invention to provide a device for folding or turning the cuff portion of stockings.

Another objective of the present invention is the provision of a form having a mechanism attached thereto for turning back the cuff portion of hosiery accurately to form a single or multiple fold.

A further objective of this invention is to provide a cuff-turning apparatus for accurately folding back a predetermined portion of a stocking cuff.

Yet another object of this invention is to provide a mechanism for use in combination with a stocking form used in boarding operations wherein the cuff portion of a stocking placed on the form may be turned back to form a single or multiple fold.

Still another object of this invention is the provision of a turning device which may be automatically operated for turning back the cuff portion of hosiery placed upon a heated form during the boarding operation.

A further object of this invention is the process of turning back a stocking to form a folded cuff portion during the boarding operation.

Other objects and many of the attendant advantages of this invention will become more readily apparent from the following description taken in conjunction with the accompanying drawing in which like characters of reference designate corresponding parts throughout the several views, and wherein:

Fig. 1 is a side elevational view of a turning device mounted on a boarding form embodying the inventive concept and illustrating a stocking to be folded in outline form in the initial position;

Fig. 2 is a side elevational view similar to Fig. 1 illustrating the stocking in outline form with the device actuated to form a first stocking cuff fold;

Fig. 3 is a view in side elevation similar to Figs. 1 and 2 illustrating the stocking in outline form with the device actuated in a third position to form a second cuff fold;

Figs. 4, 5 and 6 are views in side elevation illustrating the stages of cuff turning coresponding to the positions assumed by the stocking in the positions of the device illustrated in Figs. 1, 2 and 3, respectively;

Fig. 7 is an end elevational view of Fig. 1; and

Fig. 8 is a longitudinal sectional view taken substantially along the plane of section line 8—8 of Fig. 7.

Referring to the drawings and particularly to Figs. 1 and 7 there is broadly shown therein a hosiery-receiving form **10**, conventionally referred to as a "board," on which form a knitted stocking **11**, shown in outline form only as positioned on the board for clarity, is placed to finish the stocking by the application of heat obtained from an aqueous medium, such as steam, under approximately 10 to 30 p. s. i. g. pressure which flows through the interior **12** of the board when it is mounted on a suitable steam table header line (not shown) and bolted thereto through the openings **13** in the mounting flange **14**. It will be readily apparent that although for the purposes of this specification a steam heated board is described, other type boards such as electrically heated boards and any other type stocking-supporting or cuff-supporting form may be employed. The present mode of application wherein a turning apparatus is combined with a final boarding operation is the preferred form with the ultimate objective of the elimination of additional costly operations normally encountered subsequent to the boarding operation, such as cuff-turning and pairing.

The board **10** is provided with a foot portion **15** and a leg portion **16** arranged in normal relation with the foot portion having standard foot aligning marks **17** inscribed therein. Although conventional existing boards or forms may be employed it is desirable to use a modified board wherein the leg portion is decreased to accommodate the turning apparatus **18** without appreciably increasing the final perimeter of the form whether a device is attached to the form for producing a single or a double fold is achieved as will be described more fully below.

The stocking cuff turning apparatus **18** for performing a double-turned cuff of the type illustrated in Fig. 6 will be described initially. An oval-shaped guide tube **20** is supported on the board by fastening to the vertical strip **19**, the lower end of which is secured to the flange **14**, so as to retain the tube in spaced relation to the form leg portion to provide an annular cavity therebetween to accommodate the introduction of an inner sleeve member assembly **21** for slidable movement in the cavity. An outer sleeve assembly **22** is mounted on the exterior of the guide tube **20** for slidably bearing thereon between limits.

Inner sleeve member assembly **21** is positioned adjacent to the leg portion of the form and has a collar band **24** stationarily fastened in a suitable manner to the leg portion in a preselected position determined by the final cuff-turn location of the stocking. A movable collar band **25** is spaced axially from the band **24** and like band **24** encircles the form. Band **25** has an actuating lever **26** connected thereto with a projecting hand grip **27** to facilitate the movement of the movable collar band **25** within the guide tube **20**. A plurality of flexible and preferably resilient strip members **28** extend from the fixed collar band to the movable collar band and are fastened at each end of the strips to the collar bands.

The flexible strip members **28** when assembled form a sleeve that encloses the board for a predetermined length depending upon the length of the cuff-fold desired. Spacing between flexible strips may be varied provided adequate support is furnished as the cuff is to be turned so as to prevent collapse of the cuff at any location about

the form thus causing undue drag and bias on the other flexible members. It has been found that thin strips of brass, strips of heat-resistant synthetic rubber, polyethylene having appreciably high heat resistance and other materials are satisfactory for transmitting the resultant wave action to the cuff portion of the stocking as well as conduct adequate heat to perform the boarding operation.

While the sleeve members may be made of strips or other desirable shapes, in some applications additional support for the reach between collar bands is necessary to provide auxiliary support as the flexible strips move outwardly and upwardly to form a moving and decreasing loop, as shown in the final position in Fig. 3. One means for increasing the support and to urge the flexible strips inwardly as the sleeve moves upwardly is to fasten a plurality of backing strips **29** at one end to the movable collar band **25** with the other end free to move outwardly but to resiliently urge the strips inwardly. The length of the backing strips will extend to a position intermediate the flexible strip length. As is evident from Fig. 3, as the inner sleeve is moved upwardly the individual strips move outwardly and are urged upwardly by the backing strips to form the resulting loop in the strip.

The outer sleeve member **22** is provided with a fixed collar band **31** that is supported in spaced relation to the form to permit sliding movement of the inner sleeve components therethrough. Band **31** overlies the inner sleeve but is staggered from band **24** a predetermined distance. A movable collar band **32** is spaced axially from the fixed band for sliding movement upwardly on the guide tube **20**. A flexible sleeve made of flexible and preferably resilient strips **33** of a suitable material are fastened at the ends thereof to the collar bands **31** and **32** as on the inner sleeve collar bands. Also, a plurality of backing strips **34** are fastened at one end of each to the movable collar band **32** and each strip **34** urges its corresponding flexible strip **33** inwardly toward the form upon vertical displacement of the movable collar toward the fixed collar.

It will be apparent that the backing strips or fingers **29** and **34** may be eliminated in some applications where a sufficiently rigid strip **33** may be used at the lower end of the sleeve member and the upper portion of the strip will be sufficiently flexible to follow a defined path to form a loop that will turn a stocking cuff wrong-side out for a predetermined length without rolling the cuff.

In operation a knitted stocking **35** of campus length is placed on the board **10** as shown in outline form in Fig. 1, with Fig. 4 illustrating the disposition of the stocking without a fold in the removed section of the cuff **36**. Both inner and outer sleeve members remain in the extended position shown in Fig. 1 preparatory to the reception of the stocking **35** thereon. After the boarding cycle is completed the movable collar band **32** is moved upwardly to a top limit during which movement the flexible strips **33** move outwardly and are urged upwardly with the cuff thereon with the cuff following the loop or wave contour prescribed by the strips **33** and the cuff portion being turned back on the stocking. Obviously when only one fold is desired the stocking may be removed and will have the single fold **37** illustrated in Fig. 5 in stocking **35**.

Single folds similar to that shown in Fig. 5 are normally required only in anklet stockings or in infants' stockings. Where only single folds are desired the inner sleeve member **21** may be eliminated entirely but this is not a condition for operation.

With a single fold **37** already formed, the collar band **32** is retracted from the position shown in Fig. 2 to the position illustrated in Fig. 3. In Fig. 2 the turned cuff **37** rests completely on the flexible strips **28** of the inner sleeve member preparatory for the next sequence. Upon elevating the lever arm **27** the movable collar band **25** of the inner sleeve is displaceable vertically whereby the flexible strips **28**, assisted when necessary by the backing strips **29**, will turn the cuff again to form a double-turned cuff **38** as shown in Fig. 6. The disposition of the flexible strips **28** will assume the position shown in Fig. 3 which is illustrative of the type loop that is formed in formation of the first fold as the flexible strips **33** are moved radially and upwardly. Upon retraction of the collar band **25** to the position shown in Figs. 1 and 2, the double-folded stocking may be removed from the board.

It will be readily apparent that suitable markings may be placed on the flexible members to serve as indicia for determining the length of fold desired. Each length of fold utilizing this apparatus will be uniform thereby eliminating the need for pairing as the folded lengths will be standard for each setting. Although the apparatus has been described as a manually operated apparatus, it is contemplated that the apparatus will be mechanized and common actuating linkage will be applied to a battery of boarding forms to make the turns simultaneously and in sequence.

Obviously many modifications and variations may be made in the construction and arrangement of the individual sleeve members and the flexible strip and collar bands as well as modifications made to the actuating means in the light of the above teaching without departing from the real purpose and spirit of this invention. It is, therefore, to be understood that within the scope of the appended claims many modified forms of the present inventive concept as well as the use of alternatives may be reasonably included and modifications are contemplated.

What is claimed is:

1. A turning apparatus for folding back the cuff portion of a stocking comprising a stocking receiving form on which a stocking may be placed in extended condition, an outer sleeve member and an inner sleeve member mounted for vertical movement on said form, said inner sleeve member extending beyond said outer sleeve member, each of said members having an upper and a lower collar band spaced axially from each other, said upper collar bands of the inner and outer sleeve members being stationary, and each of said lower collar bands being guidably displaceable sequentially toward the corresponding upper collar band, and a plurality of axially extending flexible members reaching between the upper and lower collar bands and affixed thereto, said flexible members being free for a vertical reach to be displaced radially upon displacing the lower collar band toward the upper collar band, fingers supported on the lower collars of each sleeve member and reaching to a length intermediate the extent between the collar bands for urging the flexible members toward the form whereby upon displacing the outer sleeve lower collar vertically a first cuff fold is formed and upon displacing the inner sleeve lower collar band upon retraction of the outer sleeve lower collar band a second cuff fold is formed.

2. A turning apparatus for folding back the cuff portion of a stocking in combination with a contour boarding form with foot and leg portions and having means for heating associated with the form, said turning apparatus comprising a pair of overlapping sleeve members having substantially the contour of the leg portion of the form, the inner of said sleeve members extending beyond the outer sleeve member a selected length, each of said sleeve members having a stationary and a movable collar band, said stationary collar bands being mounted in spaced relation toward the foot portion of the form, and cuff-engaging flexible members reaching between the individual collar bands for fastening thereto to formulate a form-encompassing sleeve, said flexible members moving outwardly and toward the foot portion of the form for turning the cuff portion of a stocking each time a mov-

able collar band is displaced toward the stationary collar band.

3. A stocking cuff turning apparatus of the character described for use in combination with a stocking receiving form, said apparatus comprising an inner and an outer sleeve, said sleeves being fixed at one end and movable at the other end and overlapping each other in staggered relation, each of said sleeves extending along the form to receive the cuff portion of a stocking thereon, said sleeves having a length intermediate the sleeve length formed of a flexible material for outward flexure upon displacing the movable end of the sleeve toward the fixed end whereby the cuff portion of a stocking may be turned back on itself a predetermined length each time a sleeve movable end is displaced toward a fixed end.

4. A stocking cuff-turning apparatus for use in combination with a cuff-receiving form, said apparatus comprising a form, encircling sleeve means mounted on the form, said sleeve means including a first fixed and a second movable collar band spaced axially from each other, flexible means extending between the collar bands for fastening thereto, said flexible means being displaceable outwardly and in a wave-like manner to fold over on itself toward the first fixed collar band upon displacement of the second movable collar theretoward, and means for displacing the movable collar band toward the fixed collar band.

5. A stocking cuff-turning apparatus for use in combination with a cuff-receiving form on which the cuff portion of a stocking may be supported during cuff folding, said apparatus comprising sleeve means mounted on the form and having a fixed and a movable end and an intermediate portion including an expandible, flexible material over which the stocking cuff may cling, and an actuating means for displacing the movable band toward the fixed band whereby the flexible material may urge the cuff portion outwardly and to fold over on itself by means of a wave action of the flexible material.

6. A cuff-turning apparatus for stockings comprising a cuff-receiving form, a pair of sleeve members mounted on said form in overlapping staggered relationship, said sleeve members having flexible extending elements, corresponding ends of said sleeve members being fixed and

the other ends being movable relative to the form whereby upon displacing the other end of one sleeve member toward the fixed end of a single cuff fold is formed and upon displacing the other end of the other sleeve member toward its fixed member a second cuff fold is formed in the same stocking.

7. A cuff-turning apparatus for stockings comprising, in combination, a stocking-receiving boarding form, a first band member encircling said form and being supported thereon in a fixed position, a second band member slidably mounted in spaced axial relation to said first band member, and flexible means of selected length fastened to the band members, said flexible means being displaceable outwardly from said form to form a loop as said second band member is slidably moved toward said first band member.

8. The art of boarding and folding the cuff portion of stockings which comprises the steps of placing a stocking on a boarding form, boarding the stocking, folding back the top portion of the stocking on itself to form the cuff portion of the stocking with the stocking remaining in situ on the form.

9. The art of boarding and folding the cuff portion of stockings which comprises the steps of placing a stocking on a boarding form, boarding the stocking, sequentially folding the stocking cuff portion back on itself to form a multiple fold with the stocking in situ.

10. The art of boarding and folding the cuff portion of stockings which comprises the steps of placing a stocking on a boarding form, boarding the stocking, folding back the top portion of the stocking on itself to form the cuff portion of the stocking with the stocking remaining in situ on the form, and removing the folded stocking from the form.

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