Dec. 10, 1935. E. R. AMMON 2,023,946

TOE STRETCHING MECHANISM FOR HOSIERY INSPECTION DEVICES

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Fig. 1.

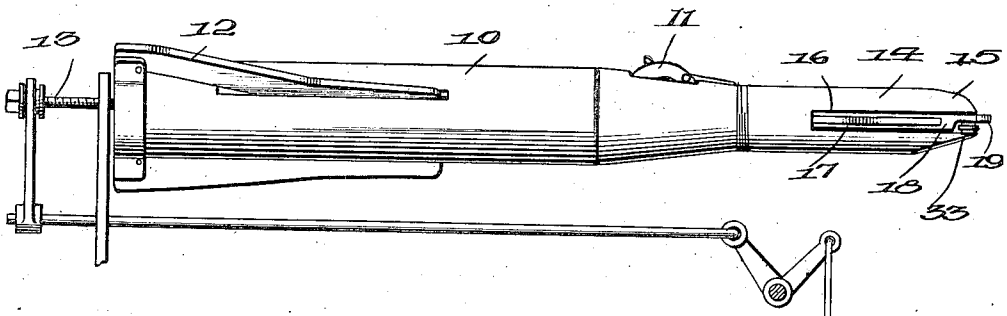


Fig. 11.

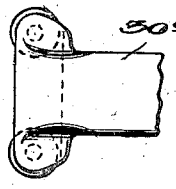
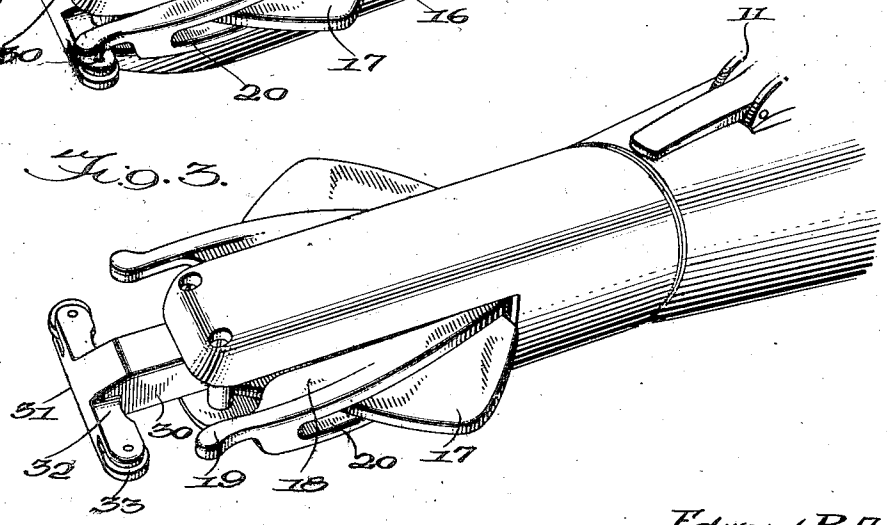


Fig. 2.

Fig. 3.



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Fig. 4.

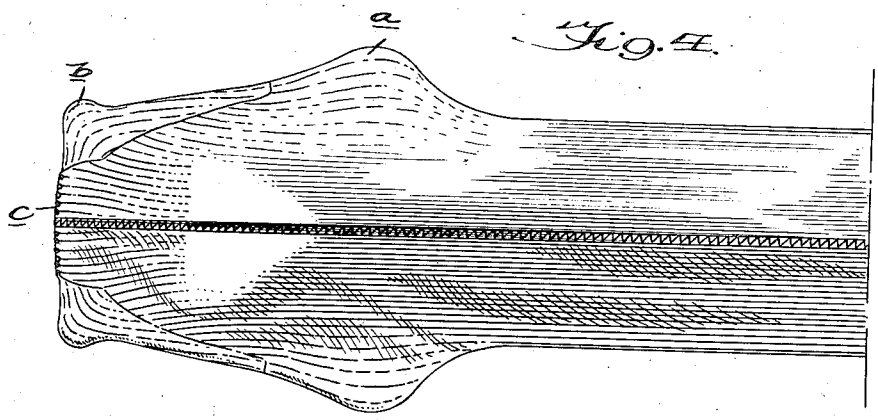


Fig. 5.

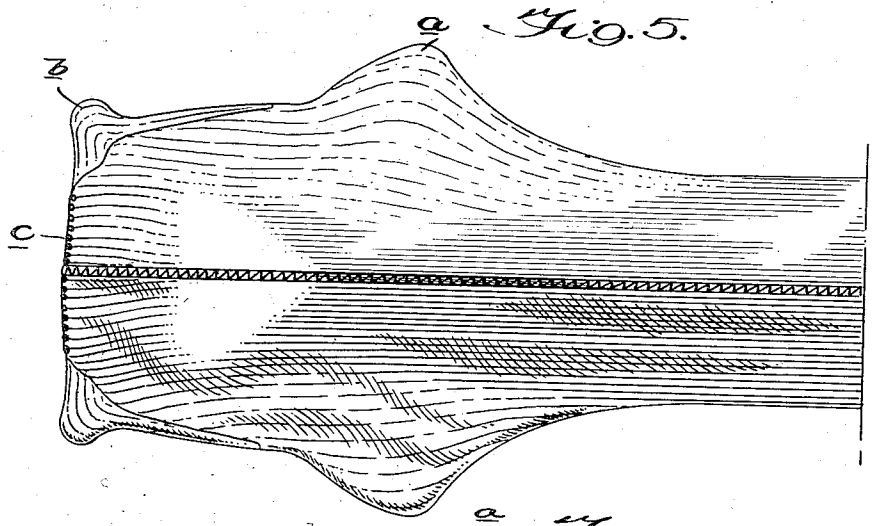
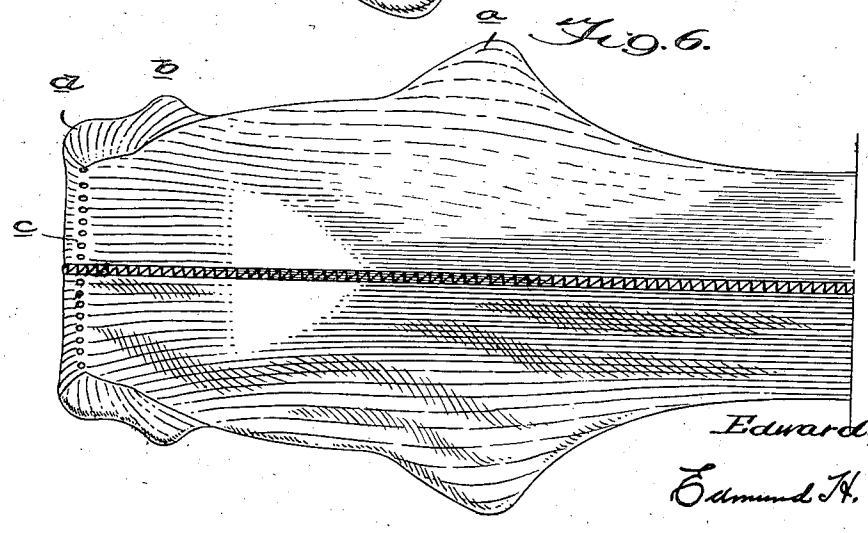


Fig. 6.



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Fig. 7.

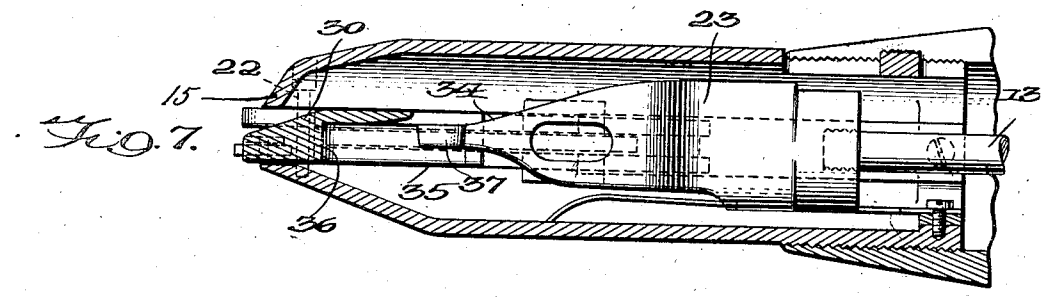


Fig. 8.

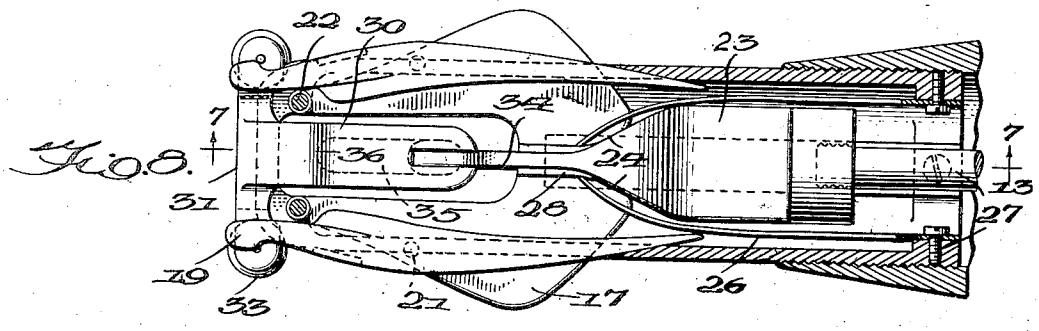


Fig. 9.

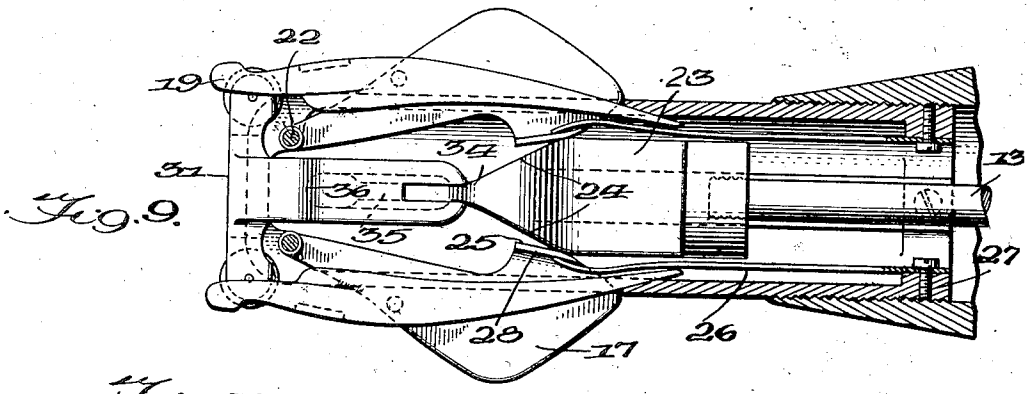
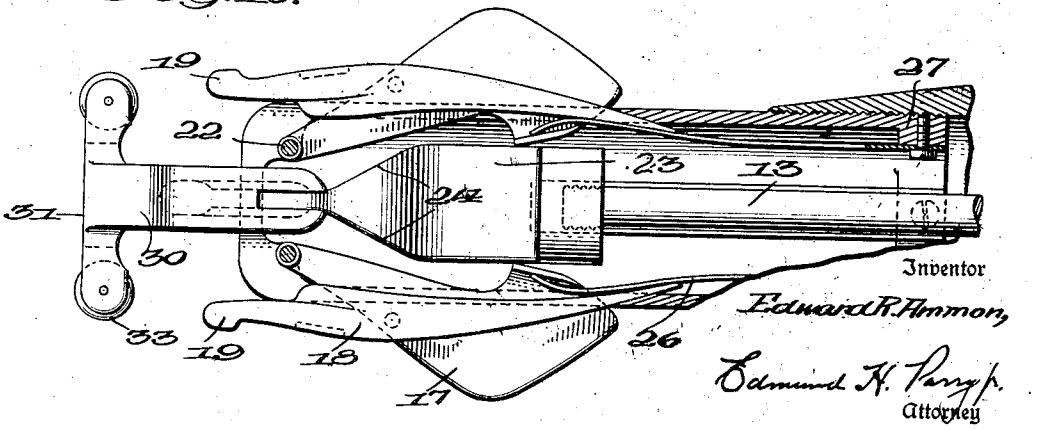


Fig. 10.



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UNITED STATES PATENT OFFICE

2,023,946

TOE STRETCHING MECHANISM FOR HOSIERY INSPECTION DEVICES

Edward R. Ammon, Reading, Pa.

Application April 25, 1933, Serial No. 667,886

11 Claims. (Cl. 223—77)

The present invention relates to an improvement in hosiery inspecting devices, more particularly of the type adapted for inspecting full fashioned hose.

Such devices in general include expanding stretchers in or forming a part of some kind of supporting frame or form which are operative to engage and stretch the stocking fabric in the areas in which the defects are likely to occur.

The present invention has for its principal object the provision of stretching mechanism adapted to distend the toe fabric of a stocking so that the fashioning areas on each side of the toe, the toe seam and, especially the looping across the end of the toe will be substantially distended for purposes of inspection.

A novel form of stretching means adapted to distend the toe fabric laterally is provided, the same involving a pair of cooperative elements which work laterally in opposite directions. This feature of my invention is an improvement upon the lateral toe expanding mechanism shown in my prior Patent 1,727,499, dated September 10, 1929.

A further feature of my invention involves provision of a longitudinally movable stretching member particularly adapted to stretch the end portion of the toe so that the looping across the end will be thoroughly distended, while at the same time the whole area of the toe will be subjected to a longitudinal stretch. This feature of the present invention is an improvement upon the longitudinal stretcher of my prior pending application Serial No. 479,757, filed September 4, 1930.

As a further important feature of my invention it is proposed to provide at least one of the stretching members with elements, preferably in the form of rollers, engageable with the stocking fabric and making rolling contact therewith so that the fabric may readily readjust itself during the stretching operation without hinderance from the stretching member. This feature of my invention appears to be broadly new and applicable to other types of stretchers than herein specifically disclosed.

In the accompanying drawings I have illustrated what I now deem to be the improved embodiment of the various features of my invention in association with a supporting form which I have found to be particularly satisfactory.

The invention will now be described with reference to such drawings, wherein:

Figure 1 is a plan view of a complete inspecting device embodying the present invention;

Figure 2 is a perspective view of the toe engaging portion of the device of Figure 1 and showing the various toe stretching means constructed in accordance with my invention;

Figure 3 is a view corresponding to Figure 2 but showing all of the stretching means in fully expanded position;

Figure 4 is a view showing a stocking in place upon the toe engaging end of the form, the stretching members all being retracted as in Figure 2;

Figure 5 is a view like Figure 4 but with the laterally working toe stretching means in expanded position;

Figure 6 is similar to Figure 5, but shows all of the stretching means including the longitudinally movable stretcher in fully expanded position, such view corresponding to Figure 3;

Figure 7 is a view in sectional elevation of the interior of the toe engaging portion of my device, showing particularly the construction of the actuating mechanism;

Figure 8 is an interior view taken at right angles to the view of Figure 7 and showing the detail construction of the various stretching means;

Figure 9 is a view corresponding to Figure 8 but showing the lateral stretching means expanded as in Figure 5;

Figure 10 corresponds to Figure 6, showing all of the stretching means in fully expanded position; and

Figure 11 is a detailed view of the end of a longitudinally movable stretcher, the same being more or less of a modification of the construction shown in the other views.

In Figure 1, I have shown a hosiery inspecting device comprising a frame or form 10, the same preferably, and as shown, comprising a tubular stocking supporting structure in association with which independently constructed stretching members are provided adapted to engage certain designated areas of the stocking. In its general construction the inspecting device is similar to that shown in my prior Patent 1,727,499 and my prior application Serial No. 479,757, above referred to. The welt expanding members 12 together with the actuating means therefor including the longitudinally movable rod 13 are fully explained in the patent and application and need not be discussed in detail herein. The member 11 is adapted to engage the stocking heel and forms the subject-matter of a separate application, Ser. No. 667,887, filed of even date with the present case.

The small end 14 of the form is shaped to en-

gage the stocking toe, and in association therewith are provided a plurality of outwardly movable stretching members, constructed in accordance with the present invention, which serve to distend all of the vital areas of the toe fabric. When the stretching means is to be applied to the form shown the toe end of the form is provided with openings on each side of the form adjacent the end and with an opening through the end extremity 15. As a matter of convenience, the side and end openings may be made unitary by providing a longitudinal bifurcation 16 extending rearwardly from the end of the form for a distance sufficient to accommodate the stretching members now to be described.

Located on each side of the form rearwardly of the end are a pair of wing-shaped stretchers 17 expansible outwardly from opposite sides through the bifurcation 16. Such elements are shown in my prior Patent 1,729,499. While the wing stretchers serve admirably to effect a lateral distension of the toe fabric rearwardly of the end of the form, I have found that it is also necessary to proper inspection of the stocking to supplement such members by additional lateral stretchers which operate in proximity to the extremity 15 of the form, particularly, with a view of permitting a proper inspection of the fashioning areas located on each side of the toe and for a further purpose to be hereafter discussed. Of course, it would be possible to merely extend the wing elements 17 forwardly, but I find that such an expedient does not produce the desired results. I, therefore, supplement the wing stretcher 17 by additional lateral stretchers 18 which have a tip portion 19 located slightly forward of the toe extremity 15, the same being clearly shown in Figures 2 and 3.

In order to provide a compact construction and for the purpose of simplifying the actuating mechanism for operating the same, the stretchers 17 and 18, which I find it convenient to designate as compound lateral stretchers, may be constructed as shown in the drawings. The member 18 is provided with a longitudinal slot 20 out of which works the wing member 17. To secure a simultaneous operation of the two stretchers the same may be pivotally secured together by pins 21 as shown in Figure 8.

The compound stretchers are secured in the form through pivot elements 22 which engage the forward portions of the wing element 17 as best shown in Figures 8 and 9. To actuate the compound stretchers including the members 17 and 18 a cam member 23 is provided at the forward end of the longitudinally movable actuating rod 13. The cam member is provided with opposing cam surfaces 24 which engage coacting cam surfaces 25 on the inner sides of the wing stretchers 17 as best shown in Figure 9. As the cam member moves forwardly the opposing wing stretchers 17 are moved laterally in opposite directions and, due to the pivotal connection, stretchers 18 including the tip portions 19 are likewise extended. In order to enable the compound stretchers to be maintained normally in retracted position longitudinally extending spring elements 26 secured to the form, as at points 27, may be provided which will coact with shoulders 28 on the wing element 17.

In addition to the compound lateral stretchers just described, I provide a longitudinally movable stretcher 30 projectable outwardly through the extremity 15 of the form. The particular function of such stretcher is the longitudinal distension of the toe and, in cooperation with the tip portions 19 of the lateral stretchers 18, the transverse distension of the toe end and the looping stitching therealong. The longitudinal stretcher as best shown in Figures 3 and 8 preferably presents a straight forward edge 31 having a width somewhat wider than the end of the stocking toe. As a matter of convenience the stretcher 30 may be constructed in a form of a T with a transversely extending portion 32 across its end.

A particularly important feature of the longitudinal stretcher—which may be applied to advantage to some of the other stretching members of the present device or garment stretchers of individually different type—involves provision of stocking engaging surface portions of frictionless character adapted to facilitate the readjustment of the fabric during the stretching operation. To prevent the stretcher from interfering with the distension of the toe fabric across the end of the stocking rolling surfaces are presented by the stretcher 30 to the stocking toe so that as the fabric distends relative to the stretcher the surface will move with the fabric. As a convenient construction the fabric engaging elements may comprise rollers or disks 33 located one on each side of the transversely extending portion 32 of the stretcher 30. As best shown in Figure 3 elements 33 are of a size to engage the toe fabric on the forward end of the stretching member beyond the surface 31 and also beyond the side extremities of the stretcher. That is to say, the only parts of the longitudinal stretcher 30 which engage the toe fabric are the pair of rollers 33.

As above indicated the longitudinal stretcher, through the fabric engaging rollers 33, will cooperate with the tip portions 19 of the two laterally moving stretchers 18. It is advisable that when in retracted position the tip portions 19 overlie the rollers as best shown in Figures 2 and 8, the tip portions preferably projecting slightly forwardly of the rollers. The thickness of the stretchers 19 is therefore reduced in the area of the tip portion as will be seen in Figure 2.

To actuate the longitudinally movable stretcher 30 the cam member 23 which operates the compound lateral stretchers 17 and 18 may be provided with a forwardly extending projection 34 of reduced size. In order to obtain a thorough distension of the toe fabric, I find it desirable that the compound lateral stretchers be expanded prior to the time the longitudinal stretcher becomes operative. I, therefore, provide a lost-motion connection between the longitudinal stretcher 30 and the operative extension 34 of the longitudinally movable cam 23. As shown in Figure 7 the stretcher 30 is provided with a longitudinally extending recess 35 having a forward shoulder 36. An enlargement 37 on the forward end of the cam projection 34 rides in such recess, and after the lateral stretchers have been expanded the portion 37 will engage the shoulder 36 of the longitudinal stretcher and thereafter cause the longitudinal stretcher to be projected outwardly. The operation of this portion of the device will be understood by comparing Figures 8, 9 and 10 which show the successive stages of operation of the compound lateral stretchers and the longitudinal stretcher as the actuating rod 13 and the cam 23 is moved forwardly.

In order that the operation of my toe stretching mechanism, as described, may be fully understood, the successive operating stages of the

stretching mechanism shown in Figures 8, 9 and 10 will now briefly be considered in connection with the corresponding views of Figures 4, 5 and 6 which show the manner in which the stocking is distended by the several stretchers. In Figure 8 all of the stretching members are shown in fully retracted position. Thus, in Figure 4 it will be noted that the toe portion of the stocking is substantially unexpanded, but it will be noted further that the laterally movable wing stretchers 17 engage the stocking toe at a point *a* substantially rearwardly from its end and the rollers 33 engage the fashioning areas along each side of the toe adjacent the end at point *b*. In Figure 9 the actuating rod has advanced cam member 24 forwardly to expand both of the compound lateral stretchers, it being noted that the tips 19 of stretchers 18 have moved laterally beyond the extremities of the rollers on the longitudinal stretcher 30. The results are shown in Figure 5, wherein it will be noted that the wing members 17 have subjected the rear portion of the toe to a substantial lateral stretch, serving not only to provide a distension of this fabric but also to prevent the toe portion from sliding forwardly on the form under the influence of the other toe stretchers. The tips 19 now engage the sides of the heel adjacent the end at point *b* and have caused a material stretch in these areas. Also they have caused a preliminary transverse distension of the looping *c* across the end of the toe. Referring now to Figure 10, I find that the longitudinal stretcher 30 has moved forwardly to its extended position to effect a longitudinal stretch in the stocking toe. The results are indicated in Figure 6. By reason of the longitudinal distension in the toe fabric between point *a* where the wing stretchers operate and the forward end, the fabric is stretched forwardly to some extent. As the stretcher 30 moves forwardly the rollers 33 thereon ride against the toe fabric and cause a substantial transverse stretch along the toe looping *c*. By reason of the fact that the rollers make frictionless contact with the fabric surface, it will be understood how the end of the toe fabric will be spread out as the longitudinal stretcher 30 is advanced to the position shown in Figure 10.

The transverse dimensions of the longitudinal stretcher 30 will be determined primarily by the degree of stretch desired across the toe looping. The member may be made narrower or wider according to taste. In Figure 8 the member 30 is of substantial width, the rollers extending transversely beyond the tips 19 of the lateral stretchers 18. As desired the stretcher may be made substantially narrower as shown in the embodiment of Figure 11 wherein it will be noted that the distance between the rollers of the stretcher 30*a* is substantially less than in the stretcher 30 of Figure 8. The narrower the stretcher 30*a* at its forward end the greater the stretch obtainable in the toe extremity with the least amount of power applied to the actuating rod 13.

It will be evident from the preceding description that I have provided a toe inspecting device for stockings, particularly suited to those of the full fashioned type, subjecting all of the vital areas of the toe fabric to both a lateral and longitudinal stretch, the lateral and longitudinal stretching members cooperating to this end as well as subjecting predetermined areas to especially great distension. The employment of rollers to facilitate the readjustment of the fabric during the stretching operation is of great benefit as applied to stretching devices in general.

It is obvious to those skilled in the art that the several features of the invention are capable of a considerable range of modification and equivalency without going beyond the scope of the invention. I do not therefore intend to limit myself in practice to the particular details shown and described, but claim my invention within the broader limits as defined by the appended claims.

I claim:

1. A hosiery inspecting device including a supporting form having an end portion adapted to receive the stocking toe, and stretching members having fabric engaging tip portions extending forwardly and adjacent the end extremity of the form on opposite sides thereof, and means for moving the tip portions laterally to subject the end portion of the stocking toe to a transverse stretch.

2. A hosiery inspecting device including a supporting form having an end portion adapted to receive the stocking toe, laterally movable stretchers lying on opposite sides of the form having fabric engaging tips projecting forwardly of the end extremity of the form, and means for actuating said stretchers.

3. A hosiery inspecting device including a supporting form having an end portion adapted to receive the stocking toe, laterally movable stretchers located on opposite sides of said end having forwardly extending tip portions presenting fabric engaging surfaces, and a cooperative flat ended longitudinally movable stretcher projectable forwardly beyond the end of the form and between the tips of the opposite lateral stretchers, and means for actuating the longitudinal and lateral stretchers.

4. A hosiery inspecting device including a supporting form having an end portion adapted to receive the toe of a stocking, laterally movable stretchers located on opposite sides of the form having fabric engaging extremities which extend forwardly beyond the form end, a flat ended longitudinally movable stretcher projectable forwardly from the form end between the extremities of the laterally movable stretchers, said longitudinal stretcher having fabric engaging surface portions which in cooperation with the extremities of the lateral stretchers will subject the end of the stocking toe to a transverse stretch.

5. A hosiery inspecting device including a supporting form having an end portion adapted to receive the stocking toe, laterally movable stretchers located on opposite sides of the form having forwardly extending fabric engaging tip portions adjacent the form end, a longitudinally movable stretcher projectable outwardly from the end of the form between the tip portions of the lateral stretchers carrying fabric engaging rolling elements adapted to facilitate ready readjustment of the fabric relative to the longitudinal stretcher when the latter is actuated, and means for actuating the longitudinal and lateral stretchers.

6. A hosiery inspecting device including a supporting form having an end portion adapted to receive the stocking toe, compound stretching means located on opposite sides of the form adjacent said end, each of said means including a stretching member having a tip portion which lies opposite the extreme end of the form and a cooperative stretching member located rear-

wardly thereof, the tip portion of the first stretcher being engageable with the toe fabric adjacent the end and the second stretcher being adapted to engage the foot portion of the stocking at a point spaced from the toe end, and means for expanding the compound stretching members laterally.

7. A hosiery inspecting device including a supporting form adapted to receive a stocking, openings on opposite sides of the form, compound stretching means projectable laterally outwardly through said openings, said compound means each comprising a pair of stretching members, each having a fabric engaging surface, one of said members being pivotally supported in the form and the other member having a pivotal connection with the first member, and actuating means within the form engageable with one of the members of each of the opposite compound stretching means for actuating all of the stretching members.

8. A hosiery inspecting device including a supporting structure having an end portion adapted to receive the toe of a stocking, laterally movable stretching means engageable with the toe adjacent its end, and a longitudinally movable stretcher projectable forwardly to stretch the end of the toe, and actuating means for expanding the longitudinal and lateral stretchers, the actuating means having a lost-motion connection with the longitudinal stretcher permitting the projection of the longitudinal stretcher to be delayed until the actuating means has projected the lateral stretching means.

9. A hosiery inspecting device including a supporting form and having stocking toe stretching means, said means comprising oppositely disposed laterally movable stretchers engageable with the toe rearwardly of its end, additional oppositely disposed laterally movable stretchers engageable with the toe immediately adjacent its end, a longitudinally movable stretcher provided with fabric engaging rolling elements projectable forwardly to stretch the end of the toe, and actuating means to expand the longitudinal stretcher and the several lateral stretchers.

10. A hosiery inspecting device including a stocking supporting form having an end portion adapted to receive the stocking toe, said end portion being bifurcated to provide an end opening and oppositely disposed side openings adjacent the end, a pair of stretching members pivotally connected with each other and having a pivotal connection with the form projectable outwardly through one of the side openings, a similarly constituted pair of stretching members projectable outwardly through the other side opening, a longitudinally movable stretcher having surface portions making rolling contact with the stocking toe projectable outwardly through the end opening, and actuating means within the form for expanding the lateral and longitudinal stretchers.

11. A hosiery inspecting device including a form adapted to support a stocking with its toe portion in position to be stretched, and toe stretching means mounted for longitudinal movement outward of the toe end of the form comprising a stretching member having a narrow end terminating in abrupt side corners for stretching the transverse looping across the extremity of the stocking toe, rollers positioned at said corners over which the toe looping is stretched as the member is projected longitudinally, and actuating means for projecting the toe stretching member.

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