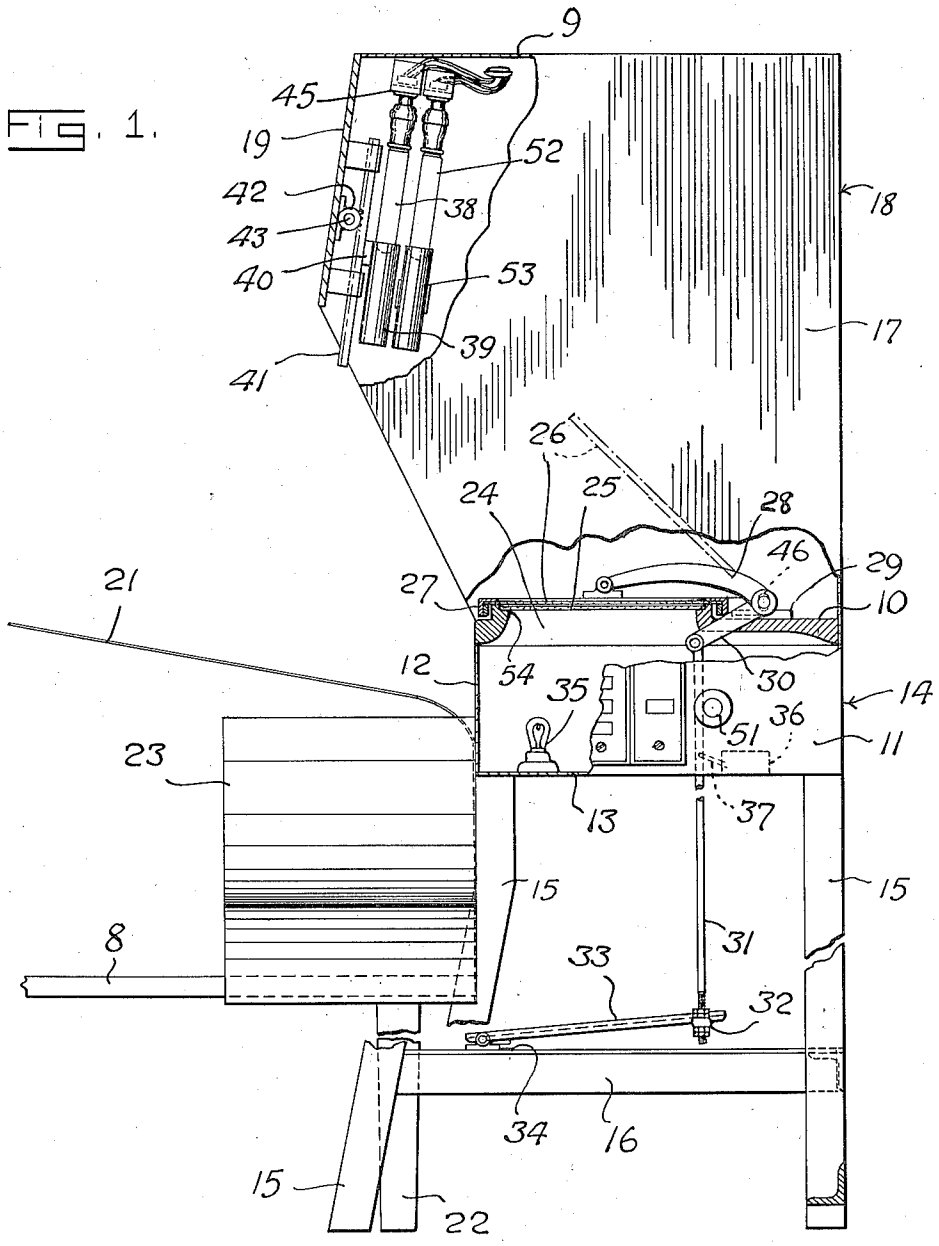
Nov. 3, 1936. R. K. BOADWEE ET AL 2,059,308

APPARATUS FOR INSPECTING FABRIC

Filed Feb. 10, 1934 3 Sheets-Sheet 1

Fig. 1.



INVENTOR

Russell K. Boadwee & Warren P Seem

BY

W. Wallace White

ATTORNEY

Nov. 3, 1936. R. K. BOADWEE ET AL 2,059,308

APPARATUS FOR INSPECTING FABRIC

Filed Feb. 10, 1934 3 Sheets-Sheet 2

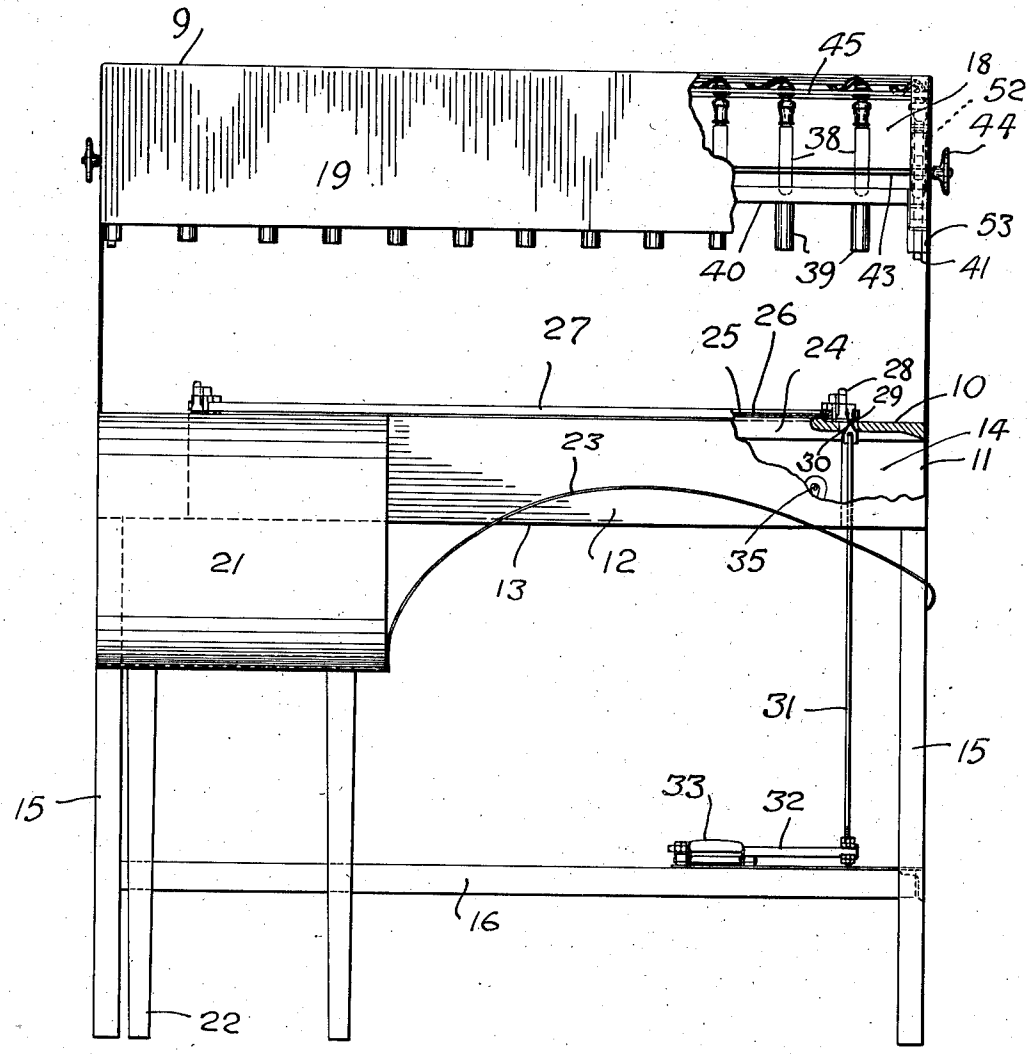


FIG. 2.

INVENTOR

Russell K. Boadwee & Warren P. Seem

BY

J. Wallace White

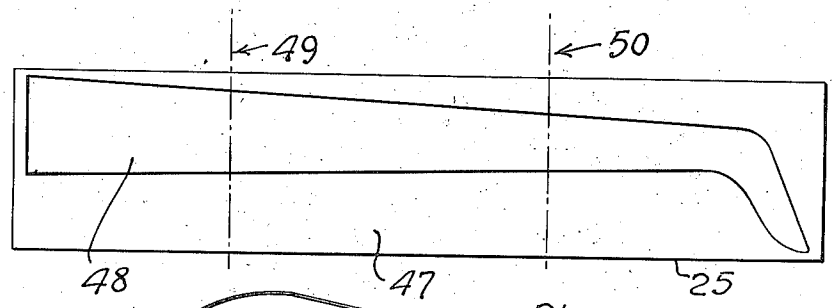
ATTORNEY

Nov. 3, 1936. R. K. BOADWEE ET AL 2,059,308

APPARATUS FOR INSPECTING FABRIC

Filed Feb. 10, 1934 3 Sheets-Sheet 3

FIG. 3.



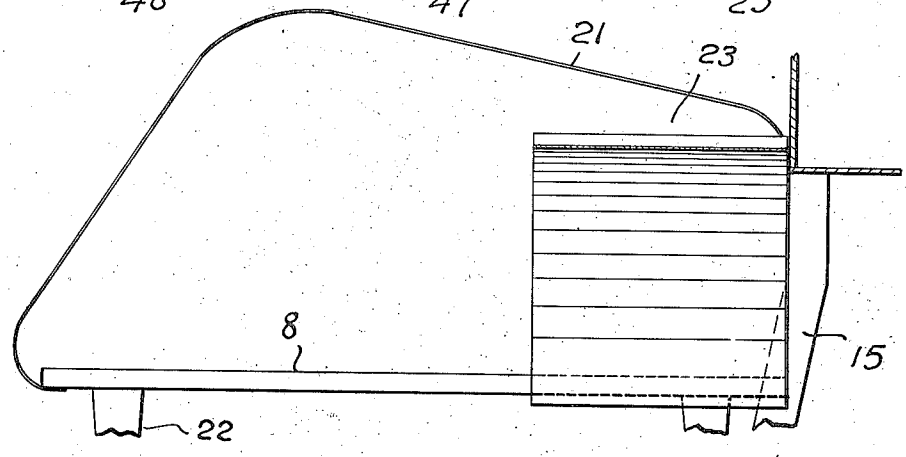


FIG. 4.

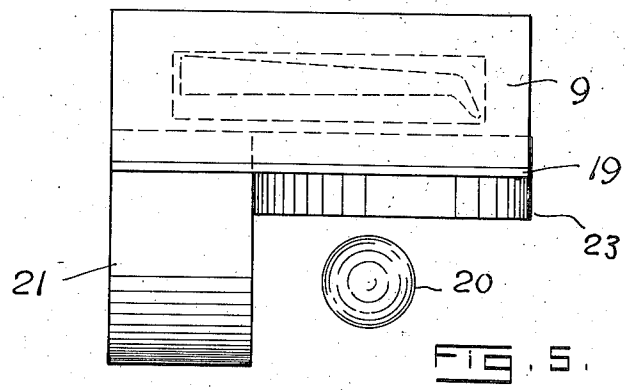


FIG. 5.

INVENTOR

Russell K. Boadwee & Warren P. Seem

BY

ATTORNEY

Patented Nov. 3, 1936 2,059,308

UNITED STATES PATENT OFFICE

2,059,308

APPARATUS FOR INSPECTING FABRIC

Russell K. Boadwee, Yonkers, and Warren P. Seem, Richmond Hill, N. Y., assignors to Julius Kayser & Co., New York, N. Y.

Application February 10, 1934, Serial No. 710,736

6 Claims. (Cl. 88—14)

This invention relates to a method of and apparatus for inspecting, examining or grading knitted or woven fabrics and other like articles, and more particularly knitted hosiery, the invention being an improvement in or development of the invention described in the specification of our patent application Serial No. 675,288 filed June 10, 1933, of which the present application is a continuation in part.

In the knitting of sheer or fine gauge hosiery the unavoidable variation in the thickness of the thread frequently results in the formation of streaks or bands extending from side to side of the stocking blank or around the leg of the wearer and in practice it is usually necessary to discard an appreciable number of stockings due to these objectionable streaks or bands. It was formerly usual to examine such goods by holding the stockings up to the light or over a white surface thus magnifying the streaks or bands due to the passage of light and because the fabric was doubled, with the result that stockings were frequently classified as irregulars and were discarded although the streaks or bands would not actually have been apparent upon the leg of the wearer.

One object of our present invention is to provide an improved method and apparatus, of the class described in our prior application, for the examination of knitted or woven fabrics and more particularly for the examination and grading of silk hosiery. Another object is to provide an improved method of inspecting a fabric by placing same beneath a translucent screen, by illuminating the fabric from above and from below and by regulating and controlling the light values to facilitate proper inspection of the different parts of the fabric.

With these and other objects in view our invention consists in the novel construction and arrangement hereinafter described illustrated in the accompanying drawings and particularly pointed out in the appended claims, it being understood that various changes may be made without departing from the spirit of the invention or sacrificing any of the advantages thereof.

In the drawings:

Fig. 1 is a side view of the apparatus partly broken away so as to show parts of the interior construction and drawn partly in section;

Fig. 2 is a front view of the apparatus partly broken away and partly in section;

Fig. 3 is a plan view showing the plate or screen to support the stockings or other articles to be inspected;

Fig. 4 is a detail side view showing a portion of the structure incompletely illustrated at the left hand side of Fig. 1; and

Fig. 5 is a plan view drawn to a reduced scale showing the complete apparatus.

The apparatus comprises a box-like structure having a table or top 10, side or end walls 11, front wall 12, a bottom 13 and a back 14 which latter is preferably hinged or removable to give ready access to the interior and the structure is suitably mounted on four legs 15 having a lower bracing frame 16. Mounted above the said box-like structure is an upper hood or casing open at its lower front part and comprising side or end walls 17, a back 18, a top or roof 9 and a front panel or strip 19 at the upper part of the hood.

The front of the said hood between the lower edge of the strip 19 and the front of the table 10 is open so as to give, to an inspector seated upon a stool or chair 20, Fig. 5, a clear and uninterrupted view of the table 10.

To the left hand side of the chair 20 there is provided a bracket or shelf 21 secured at its rear extremity to the wall 12 and at its front extremity supported by a frame 8 having legs 22 while in front of the chair 20 there is a shelf 23 suitably supported on the front of the apparatus in such manner that the shelf 21 is conveniently located for the support of the articles to be inspected while the shelf 23 is in a position convenient for the reception of the article after inspection.

The said table 10 is formed with an opening 24 having at its upper extremity a plate or screen 25 of translucent glass preferably commercially known "Pinklite Flash Glass" and adapted to engage or close over the said plate 25 is a translucent plate or screen 26 which may be formed of the same type of glass and is mounted in a frame 27 carried by arms 28 pivotally mounted in brackets 29 at the rear of the table 10. The commercially known "Pinklite Flash Glass" is a pink tinted glass flashed on one side with white opal, the white opal screening out the minor details of a tested stocking, diffusing the light rays and accentuating the objectionable lines and bands, while the tinting of the glass is for the purpose of screening off both extremes of the visible spectrum or the violet, blue, and red rays, to obviate the necessity of changing the screen for the inspection of different colored hosiery. One of the arms 28 has connected thereto a lever arm 30 which latter is attached by means of a link rod 31 to a side extension 32 on a treadle or foot board 33 pivotally mounted on the underframe 16 with a coil spring 34 at the pivot so that the treadle 33, lever arm 30 and arms 28 are

normally in their upper position with the plate 26 in its frame 27 raised clear of the plate 25 in the table 10. The treadle 33 is within convenient reach of the foot of the inspector seated on the chair 20 and depression of the treadle closes the plate 26 over the plate 25 to the position shown in full lines at Fig. 1 while release of the treadle permits the plate 26 to rise under the action of the spring 34 into the position shown in dot-and-dash lines at Fig. 1. On the bottom 13 beneath the table 10 a suitable group of lamps 35 are mounted in such manner as to properly illuminate the underside of the plate 25, these lights being controlled by a switch 36 automatically actuated by means of a connection 37 cooperating with the link 31 so that current is supplied to the lamps 35 only when the plate 26 is closed or is approaching the closed position over the plate 25. The lamps 35 may be regulated by means of a rheostat 51 so that the intensity of the light beneath the plate 25 may be modified to give the desired illumination.

In the hood or upper structure a row of lamps 38 are provided for the illumination of the upper surface of the plate 26 when the latter is closed over the plate 25 and in order to effectively and accurately control the intensity of the light thrown by the lamps 38 upon the plates 26, a series of masking tubes 39 are provided, these tubes being carried on a cross bar 40 supported by a pair of toothed racks 41 engaged by pinions 42 mounted on a spindle 43 extending through the end walls 17 of the upper structure and having control handles or knobs 44 by means of which the said tubes 39 may be conveniently actuated so as to obscure the light from the lamps 38 to a greater or less extent to accurately regulate the light intensity. At each end of the row of lamps 38 a fixed lamp 52 is suitably supported and two independently adjustable masking tubes 53 are provided for these lamps 52, the said tubes 53 being clamped in suitable guides in the walls 17.

The lamps 38 are suitably mounted in slots or guides in a cross rail or bar 45 (see Fig. 2) and are suitably clamped therein and the tubes 39 are also mounted on the cross bar 40 by clamping in a suitable slot in such manner that the lamps 38 and tubes 39 may be adjusted from side to side of the apparatus in such manner that the intensity of the light at various points may be modified for the purpose hereinafter described. The lamps 35 beneath the plate 25 may be provided with individual controls whereby the light intensity at different parts of the underside of the plate 25 may be modified.

In operation, the inspector seated upon the chair 20 receives a stocking from the shelf 21 and spreads same upon the plate 25 while the plate 26 is in its raised position. The inspector then depresses the treadle 33 so as to lower the plate 26 into close engagement with the article upon the plate 25 and as the plate 26 is lowered over the article the switch 36, automatically lights the lamps 35 and thus illuminates the underside of the plate 25.

In order that the plate 26 may close smoothly over the article upon the plate 25 in spite of slight variations in the thickness of such article, the pivots of the arms 28 may be formed with somewhat elongated or enlarged openings as shown at 46, Fig. 1, and to permit of close engagement of the plates 25, 26 the frame 27 of the latter plate is recessed so as to fit over a raised frame or ridge 54 carrying the plate 25.

The apparatus is adapted for use in detecting certain flaws or imperfections in knitted or woven fabrics and more particularly in silk stockings of fine gauge and the arrangement of the translucent plates 25, 26 and of the lights 35, 38, 52 ensures that the inspector can detect only such faults or imperfections as would be really objectionable and other faults or imperfections although clearly visible under certain conditions are shielded from the inspector's view.

In the inspecting or grading of silk stockings, it is desirable that the inspection of the instep and lower leg portions of the stocking should be more severe than that of the upper leg portion, and the light values in this apparatus are regulated so that this result is obtained. The lamps 38 being brighter at the points where the test is intended to be less severe or the lamp 35 may be less bright at these points or if so desired, both the lights 38 and the lights 35 may be varied for this purpose. Fig. 3 shows the plate 25 with a masked portion 47 surrounding an unmasked portion 48 over which the inspector places the stocking to be examined or graded and the light values are so regulated that the portion of the stocking lying to the left of the line 49 is lease severe, the part lying to the right of the line 50 is most severe and the portion between the lines 49 and 50 is so illuminated that the inspection varies in severity from one line to the other either uniformly or step-by-step as may be desired.

When the inspector places upon the plate 25 the article to be examined, the plate 26 is in its raised position and illumination of the plate 25 from below would clearly show up faults or imperfections in the article with the result that the inspector would unconsciously search for these faults or imperfections after the closing or lowering of the plate 26 and in order that the inspector may not be prejudiced by this preliminary view of the article before the lowering of the plate 26, the automatic switch 36 is provided so that there is no illumination of the article from below until after the lowering of the plate 26 which thus interposes an opaque screen between the article and the eyes of the inspector before the underlight is applied.

Although the drawings and above specification disclose the best mode in which we have contemplated embodying our invention, we desire to be in no way limited to the details of such disclosure for in the further practical application of our invention, many changes in the form and arrangement may be made as circumstances require or experience suggests without departing from the spirit of the invention within the scope of the appended claims.

What we claim is:—

1. In an apparatus of the character described, a translucent screen having a masked portion and an unmasked portion, the latter conforming substantially to the outline of a knitted stocking, said unmasked portion adapted to receive thereon the stocking to be tested, a translucent glass paralleling said screen and adapted to cover the unmasked portion thereof and hold therebetween in flattened condition the stocking to be tested, and means for subjecting the top surface of said glass and the under surface of said screen to illuminations of predetermined degrees of luminosity whereby to insure detection by the inspector of only a certain degree of unevenness in the stocking being inspected.

2. A cabinet for use in the inspection and grad-

ing of hosiery and other articles comprising a table, an opening therein, a fixed translucent screen in said opening, a frame movably mounted on said table and surrounding said opening, a translucent screen in the frame to engage closely against the first mentioned screen, means for illuminating the under side of the fixed screen, means supported on the cabinet for illuminating the upper surface of the translucent screen, and adjustable shields for varying the intensity of the latter illuminating means.

3. A cabinet for use in inspecting and grading hosiery and other like articles comprising a translucent plate fixedly arranged in the cabinet, a translucent plate movably mounted in the cabinet for superposition upon the fixed plate for holding the article therebetween, means for illuminating the under side of the article, a series of lamps mounted on a wall of said cabinet for illuminating the upper side of the article, a series of movable tubes fitting over said lamps, means for adjusting said tubes to control the intensity of the light, and means connected to the movable plate and including a spring acting for normally forcing said movable plate away from the fixed plate, and a mechanism for bringing the plates together against the action of the spring.

4. A cabinet for use in the inspection and grading of hosiery and other articles comprising a table, an opening therein, a fixed translucent screen in said opening, a translucent screen movably mounted on the table and adapted to be brought into engagement with the fixed screen, means for illuminating the under side of the fixed screen, means supported on the cabinet for illuminating the upper surface of the translucent screen, and adjustable shields for varying the intensity of the latter illuminating means.

5. Apparatus for inspecting and grading hosiery comprising a hosiery supporting plate, a translucent opening in the plate having a shape conforming to the portion of the hosiery to be inspected, a translucent plate for covering the hosiery while being inspected and means for illuminating the plates from above and below so that relatively unimportant unevennesses and bands are not visible to the inspector.

6. A cabinet for use in the inspection and grading of hosiery and other like articles comprising a colored translucent plate for supporting the articles to be tested, a translucent plate for engaging and covering the article being tested, independent lighting means for both plates, and means for regulating the lighting means to disclose unevenness only beyond a predetermined degree, and the lights being so regulated as to disclose at one end of said plates unevennesses that would not be visible at the opposite end.

RUSSELL K. BOADWEE.
WARREN P. SEEM.