March 8, 1932. P. P. LA MONTAGNE ET AL 1,848,486

HOSIERY DRYING STRUCTURE

Original Filed April 5, 1927 2 Sheets-Sheet 1

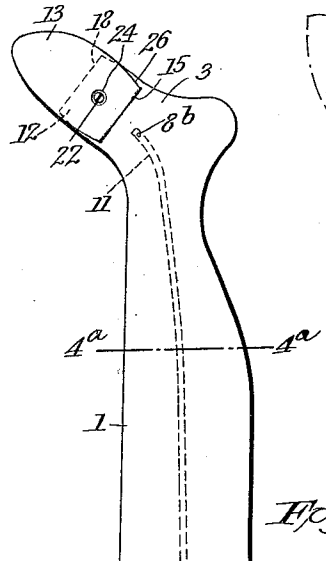


Fig. 1.

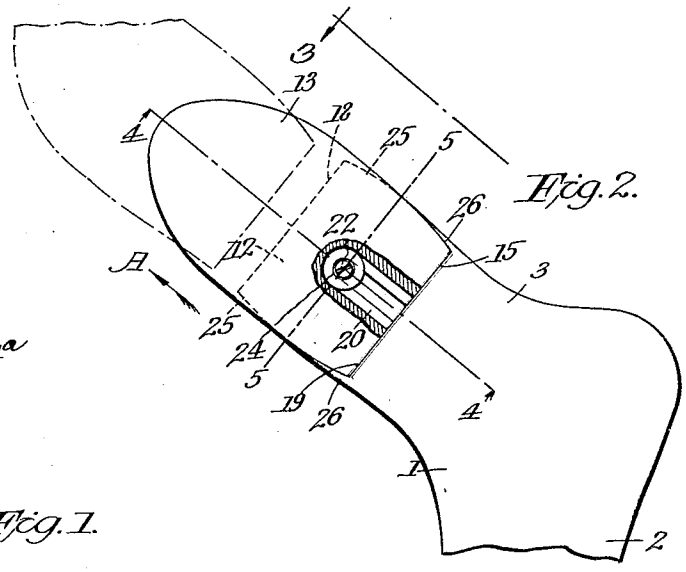


Fig. 2.

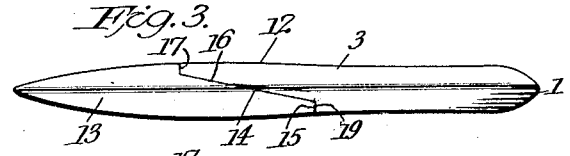


Fig. 3.

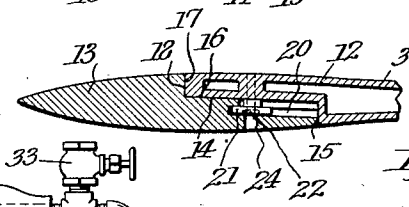


Fig. 4.

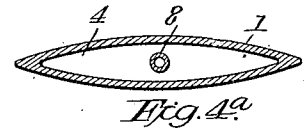


Fig. 4a.

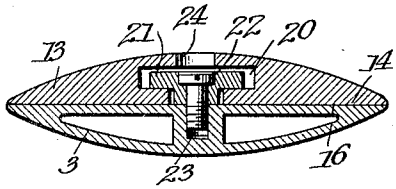


Fig. 5.

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HOSIERY DRYING STRUCTURE

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Fig. 6.

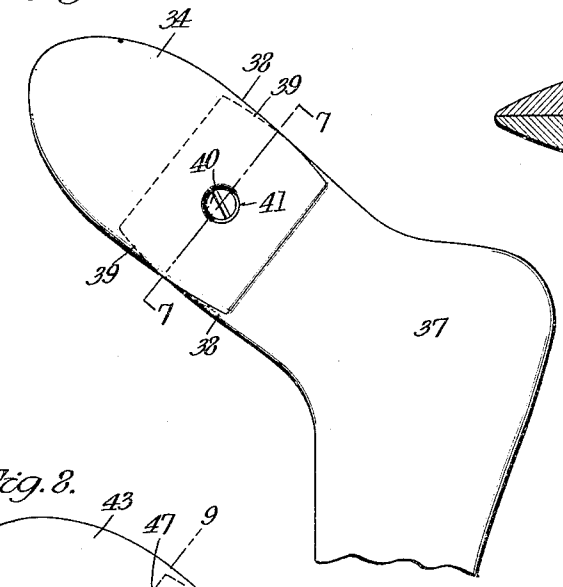


Fig. 7.

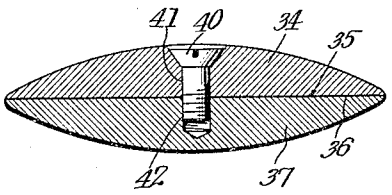


Fig. 8.

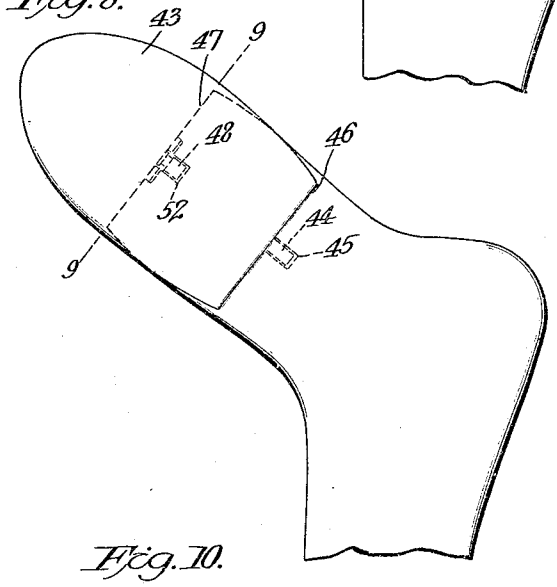


Fig. 9.

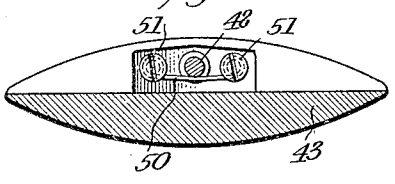
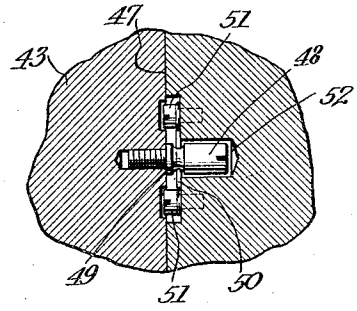


Fig. 10.



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1,848,486

UNITED STATES PATENT OFFICE

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HOSIERY DRYING STRUCTURE

Application filed April 5, 1927, Serial No. 181,215. Renewed June 11, 1929.

This invention relates, primarily, to a hosiery drying structure; it essentially involves a drying and shaping form; and it contemplates a type of form adapted to have cooperatively associated with it any of a plurality of differently sized toe-elements whereby one structure, by reason of the interchangeability of a set of toe-elements, is adapted for treating hosiery of several different sizes.

The fundamental object of our concept is to provide a structure of great simplicity but which, including as it does intermating elements, is adapted to effect requisite heating of the elements for efficient functioning thereof.

Another object, and one of importance, is to provide a form which is hollow and thus includes a chamber undivided by any partition or similar instrumentality but in which chamber is mounted an air conduit which, adjacent its upper end, is in communication with the chamber so that air is efficiently conducted from the chamber, with the result that the capacity of that chamber to contain substantially nothing but the heating medium is maintained at its maximum, there being means associated with the form for conducting condensate therefrom; this construction promoting a maximum of efficiency of heat transference from the form to a removable toe-element securable thereto.

Another object within the contemplation of our concept is to provide a structure comprising a leg-portion and a toe-portion, these being hollow to house a thermal fluid, the heating efficiency of which is promoted, as aforementioned, by a conduit within the form and in communication with the chamber therein and adapted to conduct air from the chamber; the toe-portion of the form being provided with an element-engaging face adapted to be intermated with a substantially corresponding face on the toe-element; and with these is associated a device for securing the toe-element to the toe-portion conveniently and expeditiously and yet in a manner which insures an intimate contact between the portion and element, thereby to promote heat transference from the toe-portion to the element, resulting in the latter being quickly heated when the heating medium is initially introduced into the form and, then, in the same being maintained at the requisite drying temperature thereafter.

Another object of the invention, and one of great practical importance, is the formation of the mating surfaces of the toe-portion and toe-element aforementioned in such manner that no sharp corners exist at the crease-producing edges of the form against which a stocking may become wrinkled and thereby snagged or torn in the boarding operation.

Our inventive-concept involves other objects and features, and these will be more or less apparent from the description which follows.

We are aware that it has heretofore been proposed to provide hosiery drying forms with detachable toe-elements; but, in actual practice with these, a real problem is presented in connection with adequate heating of the toe-element. Provision for the requisite heat transference to the toe-element has not, as far as we are advised, been sufficiently developed. Besides, the maintenance of the temperature of the thermal fluid within the form has not been achieved. Perceiving this problem, our efforts have been directed to its solution, with the result that we have, in our proposed structure, omitted the chamber-dividing partition heretofore used and have provided the air-conduit already mentioned, so that, at all times, air is eliminated from the chamber and the heating fluid, in full capacity, is maintained therein and, particularly, in the toe-portion of the form, in consequence of which it functions, to a much greater extent than heretofore in other structures, to transfer its heat to the toe-element, Besides, the latter is cast solid, and provision is made for precluding any air spaces between it and the toe-portion.

In order that the invention may be more readily comprehended, we have revealed in the accompanying drawings several embodiments thereof; but even these are to be understood as merely illustrative, inasmuch as we contemplate other embodiments and utilizations of our concept, and we also intend

it to be understood that even the embodiments here shown are susceptible of a wide range of modification and variations without departing from the underlying principles and salient features of our invention.

In these drawings:

Figure 1 is a view in front elevation (partly in section) of a preferred type of construction embodying our concept; there being associated with the same an efficient system for supplying a heating-medium to the form and for conducting air and condensate therefrom;

Figure 2 is a fragmentary view, on a considerably enlarged scale, of the foot-portion of the form and showing, particularly, the preferred manner of securing an interchangeable toe-element to the foot-portion, and the relative widthwise dimensions of these;

Figure 3 is a view in the direction of the line 3 of Fig. 2 and showing, especially, the shape and relation of the mating faces of the toe-element and the foot-portion;

Figure 4 is a fragmentary view in longitudinal section showing the device for securing and maintaining the toe-element and foot-portion in intimate contact;

Figure 4^a is a view in transverse section of the form, on the line 4^a—4^a, Fig. 1, showing in particular the relative diametral dimensions of the airtube and, also, the relation of it to the interior walls of the form.

Figure 5 is a view in transverse section on the line 5—5, Fig. 2;

Figure 6 is a fragmentary view, in front elevation, corresponding to Fig. 2, and showing a modified type of toe-element and means for securing it to the foot-portion;

Figure 7 is a view in transverse section, enlarged, on the line 7—7, Fig. 6;

Figure 8 is a view similar to Fig. 6, showing another modification of the toe-element and the means for mounting it on the foot-portion of the form;

Figure 9 is a view in transverse section, on the line 9—9, Fig. 8; and

Figure 10 is a fragmentary view, in section, of the element-securing device of the type shown in Figs. 8 and 9.

Referring to the drawings and to the preferred embodiment illustrated in Figs. 1 to 5, the reference-character 1 designates, generally, a hosiery drying and shaping form which, in this instance, is of the style and dimensions to "board" ladies' hosiery; but it is to be understood that a half-hose form, a form for boarding children's stockings, and other types of forms, are within the contemplation of our concept.

The form 1 in this instance includes a leg-portion 2 and a foot-portion 3; these being hollow to provide an elongated chamber 4 adapted to house a heating-medium, such as steam, introduced into the chamber 4 by a pipe or other form of conduit 5 on which the form is mounted and the base of which is provided with a passage 6 communicating with the chamber 4 and the interior of the pipe 5, the latter being provided with openings 7 and 7^b through which the steam passes from the pipe into the passage 6 and, thence, into the chamber 4.

It will be noted that the form is, in this instance, unprovided with a partition or similar instrumentality, as in constructions now extensively in use in hosiery mills. It has been the general theory, and perhaps an erroneous one, that it is desirable, for the efficient heating of the form, to maintain it at a required hosiery-drying temperature, that the steam should "circulate" in the form, in the sense that it would "flow" up one side of the partition and down the other; but we have discovered—and our concept is in part at least predicated upon the discovery—that more efficient results are, in some situations at least, effected if a different method of handling the thermal fluid within the form is employed. In this connection, the desideratum is to conduct any air that initially is in, or which eventually accumulates in, the form, therefrom expeditiously, and, likewise, any condensate that may accumulate in the chamber, the consideration being to maintain within the chamber practically nothing but the heating-medium whereby it may function to heat the form so that the latter may accomplish its purpose of drying the stocking superposed thereon.

Accordingly, we dispose within the chamber 4 an air-conduit—in this instance, a pipe or tube 8—extending from a main conduit 9 (mounted within the steam-conduit or pipe 5) and extending up through the passage 6 and the chamber 4 to a point adjacent the heel-section 10 of the foot-portion 3. The tube 8, at its lower end, is provided with a bulb or enlarged element 8^a which is threaded into the conduit 9, as shown. This tube 8, at its upper end, is provided with one or more apertures 8^b through which air passes into the tube from the chamber 4. The upper extremity of the tube 8 may be bent somewhat, as at 11, so that it will occupy a position substantially midway between the edges of the foot-portion. It is believed to be important that the extremity of the tube 8 shall be not far removed from the upper extremity 12 of the foot-portion, though satisfactory results have been secured by terminating the tube even below the aforementioned heel-section. It has been found in practice that the upper extremity of the form frequently acts to produce an air pocket when the heating-medium is initially introduced into a drying-form; and more or less difficulty has been experienced in eliminating such air pocket. Where the form is of the type which includes a partition, the breaking of the air pocket has, on occasions, consumed considerable time. But,

in our construction, when the air tube 8 terminates at the point where such an air pocket usually exists, the air is quickly and continuously removed therefrom, promoting the action of the heating-medium in heating the foot-portion when the form is first put into use and then maintaining it at a relatively constant temperature. This is exceedingly important in a construction of this kind where it is necessary to transmit the heat from the foot-portion 3 to a toe-element, such as that marked 13, that is removable for interchangeability.

Preferably and as shown in this particular embodiment, the toe-portion 3 is offset to provide a relatively flat element-engaging face 14 and a shoulder 15. The surface of the face 14 and, if need be, of the shoulder 15, is preferably machined so as to make it as smooth and true as possible. It is to be understood that, where we have herein used the expression "machined" as applied to these and other surfaces of the structure, we mean thereby a surface that has been treated in a manner that will insure an intimacy of contact between it and any other mating surface, thus to promote heat transference between the surfaces, as hereinafter more fully explained.

As shown in Figs. 3 and 4, for example, the face 14 is cut at an angle to a medial line extending from edge to edge of the structure. In other words, this face is somewhat diagonal to such a line, and for a reason which will hereinafter be set forth.

The toe-element 13 is, in this instance, solid and, thus, includes no internal chamber. It like the toe-portion, is provided with a relatively flat and machined toe-portion-engaging face 16 which, the same as the face 14, is cut angular to a medial plane extending through the crease-producing edges of the portion. The faces 14 and 16 of the toe-portion and toe-element respectively are preferably relatively broad, flat, and smooth to provide, by their intimate juxtaposition, efficient heat transmission from the former to the latter. The intimate adjunctive contact thereby obtained may best be described as a mating interrelation, and the two faces so contacting as mating faces. The toe-element is also provided with a shoulder 17 with which the edge 18 of the upper extremity of the foot-portion 3 contacts when the toe-element is mounted on the portion. Similarly, the extremity 19 of the toe-element contacts with the shoulder 15 of the toe-portion.

By reason of the particular formation of the contacting surfaces 14 and 16 of the toe-portion and toe-element, respectively, and the shoulders 15 and 17 and the extremities 19 and 18 of these components, interengagement—that is, intermating—of these two components of the structure is provided. These surfaces, when in contact, will be angular to a medial plane containing the crease-producing edges of the two components.

Means are provided for securing and maintaining these components in intimate contact with each other to promote heat transference from the one to the other and, in this instance, such means comprise an elongated T-slot 20 cut centrally of the toe-element, as shown clearly in Figs. 2 and 5, and adapted to receive a washer or disk 21 through which extends a screw or similarly headed instrumentality 22 adapted to be threaded into a hole 23 formed in the toe-portion and extending from the face 14 thereof. To permit turning of the screw 22, by means of a screw driver or similar tool, the toe-element is provided with a recess or aperture 24.

Preferably and as shown in this embodiment, the edges 25—25 of the toe-portion adjacent the extremity thereof, as well as the edges 26—26 of the toe-element, are of relatively different widthwise dimensions so that the edges of these two components are, for a portion of their length, not coincident. The purpose of this construction is to break the joint between the respective extremities of these components and thereby insure that no projections or shoulders shall be presented which would catch the threads of the goods and either damage such goods or interfere with the proper boarding thereof on the form.

It will be noted that the head of the screw 22 is of larger dimensions than the aperture 24, and this prevents the screw from being displaced through the aperture.

The operation of the structure so far described will be more or less evident: Assuming that a selected size of toe-element—as, for instance, for the boarding of a size-9 stocking—is mounted on the form, and it be desired to change the form so as to adapt it for boarding a different size stocking—a size-10, for instance—the operator, with a screw driver or the like, gives the screw 22 a quarter of a turn, which releases the washer 21 from its binding engagement with the walls of the slot 20, whereupon the toe-element 13 may be moved in the direction indicated by the arrow A, Fig. 2, until the element is separated from the fastening device, including the washer. Then, to apply the size-10 toe-element, the operator slides the toe-element in the opposite direction from that indicated by the arrow in Fig. 2, with the mating faces 14 and 16 in engagement, until the T-slot is in register with the washer and, then, slides the element farther with the washer in the slot until the mating faces of the shoulders 15 and 17 are in engagement with their respective associated extremities 19 and 18 and the hole 24 is in register with the head of the screw, whereupon the operator gives the screw a quarter of a turn in the opposite direction, this action effecting a binding engagement of the washer with the walls of the T-slot, there-

by effecting securement of the toe-element to the form and at the same time drawing the mating faces in intimate engagement, in which relation they are then maintained by the securing device until it is desired to interchange that particular toe-element with another.

The character of the mating faces, machined as they are, provides a joint between these components to insure maximum heat transmission therebetween so that, as the toe-portion becomes heated by the contained thermal fluid, it quickly and efficiently transmits its heat to the mass of the metal of the toe-element, which then remains heated during the operation of the form.

The element-securing device, comprising the screw 22 coacting with the washer 21 and effecting a binding action between it and the walls of the slot 20, provides an effective mechanical means to hold the two components of the structure in intimate relation, which insures a high degree of transmission of heat and effectually prevents the toe-element from becoming loose on the form during the boarding operation, such as frequently occurs in practice where friction is relied on to hold a detachable toe-portion on a hosiery form. The fact that the screw 22 of this device is well below the plane of the outer surface of the form precludes its contacting with and damaging the stocking while being placed on or stripped from the form. As already mentioned, the joint between the toe and foot members, by reason of their mating surfaces being diagonal to the medial plane that contains the crease-producing edges of the form, prevents the pulling of threads from the stocking during the boarding operation. The fact that the toe-element is of solid material precludes the formation of any air space therein and insures that the element, deriving its heat from the form, functions to produce maximum heating of the element and a consequent satisfactory drying of the toe-section of the stocking.

Initially, when the form, with others associated with it on a table (not shown), is to be placed in operation, steam is turned into the pipe 5 and passes through the passage 6 into the chamber 4. A certain amount of air will, of course, exist in the chamber; but as the steam in the chamber 4 progresses upwardly, its pressure displaces the air from the chamber and forces it through the tube 8 into the conduit 9.

During the operation of the form, and as the boarding progresses, the wet fabric of the stocking tends to develop condensate within the chamber 4 by reason of the momentary cooling of the form, etc. This condensate is discharged from the form through the passage 6 into the space 26 between the external surface of the conduit 9 and the inner wall of the conduit 5. Both of these conduits are, preferably and as shown, in communication with a water-leg 27; the conduit 5 discharging into the condensate-line or member 28 of the leg and eventually into the trap 29 connected therewith; while the conduit 9 discharges into the air-line or member 30 of the leg and then into the trap 29. Between the water-leg 27 and the trap is a connecting pipe 31. The trap may be drained through the pipe 32 of air and condensate. Between the conduit 9 and the member 30 is a manually operated air-relief-valve 33, by which air in the conduit 9 may, whenever desired and particularly while the heating-fluid is first being introduced into the chamber 4 of the respective forms, be released therefrom more readily than might occur if carried through the trap 29.

In Fig. 6, we have disclosed a modified form of construction. This comprises a solid toe-element 34, having a diagonal mating face 35 adapted to be intimately related to a corresponding face 36 on the foot-portion 37 of the form; likewise, the edges 38 and 39, respectively, of the toe-element and toe-portion are of different width-wise dimensions; these features being, in this instance, the same as outlined in connection with those in the preferred construction, already described. In this instance, the securing means comprises a screw or other type of headed member 40 projecting through a screw hole 41 in the toe-element 34 and threaded into a hole 42 in the toe-portion 37. The screw is countersunk so that the outer face of its head occupies a position somewhat below the plane of the outer surface of the toe-element. In some instances, this type of structure is desirable; but, for reasons which we have already specified, it would not, in general use, be as desirable as the one first described.

In Figs. 8, 9 and 10, we have shown still another modification which includes some of the features described in connection with the first two embodiments; but in this instance, the element-securing means is different. In the first place, the extremity of the toe-element 43 carries a stud 44 adapted to seat in a socket 45 provided in the shoulder-section 46 of the toe-portion of the form. The shouldered section 47 of the toe-element carries a headed stud 48 provided with an annular groove 49 adapted to be engaged by a spring-element 50 mounted between and secured to spaced-apart screws 51—51 in the wall of the extremity of the toe-portion of the form. In this instance, when the toe-element 43 is to be placed on the toe-portion of the form, the operator positions the parts so that the stud 44 will enter the socket 45 while the headed stud 48 enters a socket 52 formed in the shouldered section of the toe-portion. The spring 50 will eventually seat in the groove 49 and hold the stud and, there-

by, the toe-element 43 in position. A pull on the toe-element will effect a release of engagement between the spring 50 and the stud 48 so that the toe-element may be removed.

From the foregoing, it will be perceived that we have devised an efficient hosiery drying structure, including a form adapted to have mounted upon it one or another of a plurality of different-sized toe-elements, easily applied thereto, and efficiently heated thereby, this heating being promoted, as already pointed out, by reason of the intimate relation effected between engaging faces or walls of the toe-portion and toe-element and, also, by reason of the fact that the maximum temperature of the heating-fluid, at a given pressure, will be maintained at all times in the foot-portion, the removal of air, by means of the tube 8, from the toe-portion being quickly and constantly effected, thereby precluding the formation of air-pockets at any point in the chamber 4, so that it will effect a heat transference to the toe-element, in consequence of which that element will be maintained at substantially the same drying temperature as the toe-portion itself.

What we claim is:

1. A hosiery drying structure including, in co-operative association, a toe-portion and a removable toe-element having crease-producing edges and provides with mating faces intersecting and extending slightly angularly to a plane passing through said edges.

2. A hosiery drying structure including, in co-operative association, a toe-portion and a removable toe-element having crease-producing edges and provided with mating faces, the edges of which cross the crease-producing edges at a slight angle.

3. A hosiery drying structure including, in cooperative association, a toe-portion and a removable toe-element having crease-producing edges and provided with mating faces which cross at an angle of inclination a plane passing through said edges.

4. A hosiery drying structure including, in co-operative association, a toe-portion and a removable toe-element having crease-producing edges and provided with mating faces, the complementary ends of which meet inwardly of the crease-producing edges.

5. A hosiery-drying structure including, in cooperative combination, a form made hollow to provide a single chamber for housing a heating-medium provided with crease-producing edges and comprising a toe-portion closed at its upper end and provided with a relatively broad and substantially smooth face; means within the form and communicating with its chamber for conducting air therefrom; a removable toe-element also having a relatively broad and substantially smooth face mating with that on the toe-portion; the mating faces on the toe-portion and toe-element being slightly angular to a plane passing through the crease-producing edges of the form; and coacting means on the foot-portion and toe-element for removably associating and maintaining them in intimate contact with each other to promote heat transference from one to the other.

6. A hosiery-drying structure including, in cooperative combination, a hollow form to provide a single chamber for housing a heating-medium and comprising a leg-portion and a toe-portion, the latter being closed at its upper end; an air-conduit within the leg-portion and extending toward the closed end of the toe-portion; an interchangeable toe-element intermating with the toe-portion; the toe-portion and toe-element each having a relatively broad, substantially smooth intermating face, these faces of the portion and element being in heat-transferring engagement with each other and means associated with the toe-portion and toe-element for removably joining and maintaining them in intimate contact with each other to promote heat transference from one to the other, comprising a slot in the toe-element and a screw-and-washer device on the toe-portion and coacting with the slot.

7. A component for a hosiery-drying structure comprising a removable toe-element having a relatively broad, substantially smooth face provided with a T-slot, and a securing device interengaging with the slotted toe-element and comprising a disk-member and a threaded-member extending therethrough.

In testimony whereof we affix our signatures.

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