March 27, 1928. 1,663,706

H. E. HOUSEMAN

HOSIERY DRYING FORM

Filed Nov. 6, 1926

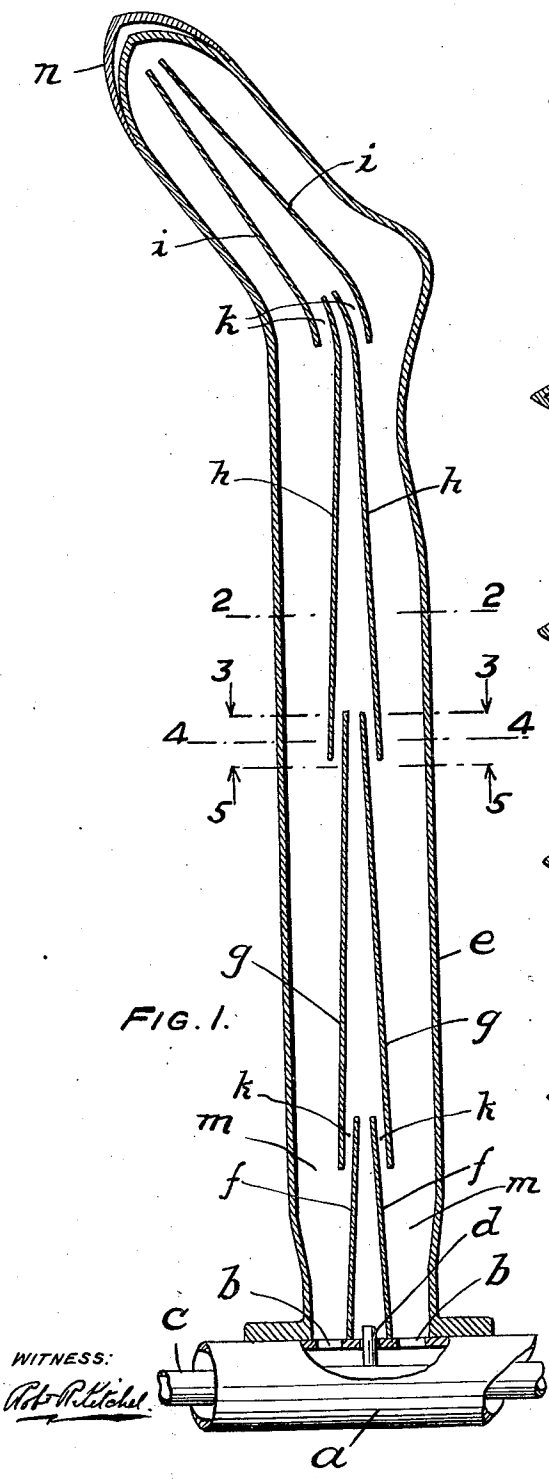

FIG. 1.

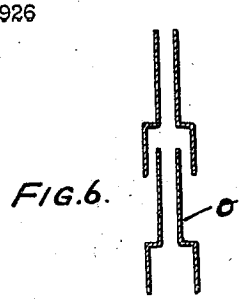

FIG. 6.

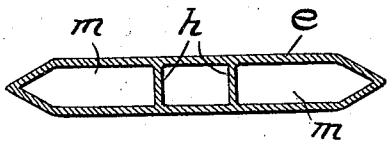

FIG. 2.

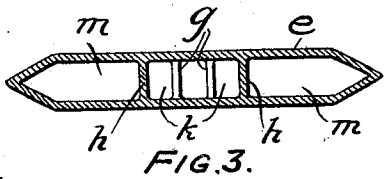

FIG. 3.

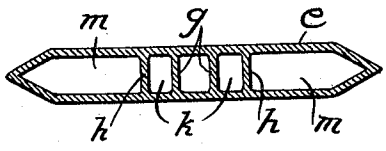

FIG. 4.

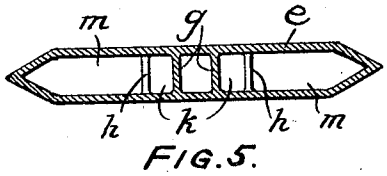

FIG. 5.

WITNESS:

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UNITED STATES PATENT OFFICE.

HAROLD E. HOUSEMAN, OF EDGE MOOR, DELAWARE.

HOSIERY-DRYING FORM.

Application filed November 6, 1926. Serial No. 146,682.

My invention relates to hollow metal forms, particularly those intended for the drying of hosiery by means of steam, although not necessarily limited to such forms.

Forms of this character have been made completely hollow; or they have been provided with a longitudinally extending partition terminating a greater or less distance from the toe end of the form and permitting a fluid circulation up through one half of the form and down through the other half; or a steam inlet pipe has been provided that extends through the form and terminates a greater or less distance from the toe end of the form. The different known types of hollow steam heated forms are all, with the exception of the completely hollow form, operative under all conditions, but some of them fail to operate with maximum efficiency under any condition, while none of them operates with real efficiency under all conditions.

The object of my invention is to provide a new form that is particularly adapted for internal steam heating and that will operate efficiently under all conditions and for all purposes. The peculiar advantages of my improved drying form, as well as its construction and mode of operation, are fully explained in connection with the description of the embodiments of my invention shown in the annexed drawings, in which—

Fig. 1 is a longitudinal sectional view of a hollow metal drying form embodying my invention in a preferred form.

Figs. 2, 3, 4 and 5 are cross-sections through Fig. 1 on the lines 2—2, 3—3, 4—4 and 5—5 respectively.

Fig. 6 is a diagram of a modified arrangement of steam-conveying channels.

The shell *e* of the hosiery drying form is shown as conveniently mounted on a pipe *a*, which functions as both an air-escape pipe and a pipe for carrying off exhaust or condensed steam, and with which the interior of the shell communicates by means of holes *b*, *b* in pipe *a*. Extending within pipe *b* is a steam-supply pipe *c*, which is provided with a nozzle *d* that also communicates with the interior of shell *e*.

Extending between opposite walls of the shell are two wings *f*, *f* forming between them a steam-conveying channel which communicates with nozzle *d* and which extends longitudinally partly through about the center of the form (that is, short midway between the reduced opposite ends of the form) for a distance which may be varied within wide limits. The total length of the channel must be, however, substantially less than the distance to which it is desired to effectively convey the steam at the start of the drying operation; and inasmuch as it is desired to convey the steam to almost the extreme toe-end of the form, the upper or outlet end of the channel *f* should terminate at a substantial distance from the toe end of the form. Preferably, the upper or outlet end of channel *f* terminates relatively near the lower end of the form. Preferably, also, the wings *f* converge from the inlet of the channel toward its outlet, as shown in Fig. 1; although it is permissible, but less desirable, to form the lower end of the channel by means of parallel wings relatively widely spaced apart, and to form the upper end of the channel by means of parallel wings separated by a substantially narrower space, as shown at *o* in Fig. 6; and still other obvious modifications are permissible, as will be understood from the explanation of the mode of operation hereinafter made.

In the type of form adapted for most uses, the upper end of the lower steam-conveying channel will terminate relatively near the bottom of the form, as shown in Fig. 1. Whatever the length of channel *f* may be, there is arranged, above the channel *f*, another pair of wings of similar contour, such as *g*, the lower ends of which extend outside the upper ends of the wings *f* and are also spaced from wings *f* so as to afford openings, on opposite sides of the channel formed by wings *f*, between wings *f* and the chambers *m*, *m* formed between the channels and the opposite edges of the form. Preferably, also, the lower extremities of wings *g* extend substantially below the upper extremities of wings *f*, so as to provide two vertically extending passages *k*, *k* of substantial length connecting channel *g* with the chambers *m*, *m*.

The channel *g*, whatever the length of channel *f* may be, may extend all the way to the toe of the form; but, in the type of form adapted for general use, one or more other similarly formed channels will be provided. In Fig. 1, I have shown a third channel *h*, arranged above channel *g*, and having the same arrangement with respect

to channel g as channel g has with respect to channel f; and a fourth channel i, arranged above channel h, and having the same arrangement with respect to channel h, as channel h has with respect to channel g, or channel g with respect to channel f. The uppermost channel, whatever the number of the channels may be, terminates, preferably, a very short distance from the toe end of the form.

When the form is cold it is, of course, filled with air, and, as hereinbefore stated, if the form be absolutely hollow, it is practically impossible to displace the air by introducing steam, whether or not a separate hole be provided for the escape of air and condensed steam. The form becomes air-bound; that is, a pocket of air remains in the toe end of the form which acts as a non-conductor of heat and prevents a proper heating of the foot end of the form, which end can only be imperfectly heated by conduction of heat through the metal of the form. In a construction embodying my invention, the steam, flowing through a relatively narrow series of channels, flows rapidly to the toe end of the form and drives the air within the channels ahead of it and into the toe end of the form and also downward through passages k and establishes a downward circulation of air through chambers m, m, within which by far the larger volume of the form is contained. Thereby the air is driven out of the form speedily and thoroughly. By providing a central longitudinal partition in the form, in accordance with forms in general commercial use, and providing a steam inlet communicating with the space on one side of the partition and a fluid outlet communicating with the space on the other side of the partition, the air is eventually expelled, but the circulation on the steam inlet side of the partition is relatively slow and sluggish, owing to the wide space through which it flows. A pipe extending through the shell and terminating near the toe-end is more effective than a partition for insuring the complete displacement and rapid expulsion of the air, but to accomplish this purpose my improvement is even more effective than a pipe, in that the air is not only driven down through chambers m, m by steam, some of which is partially condensed, coming from the top of the form, but it is also driven down by one or more currents of live steam that escape downward through passages k and act as a propulsive force to give added impetus to the air that is flowing downward under the propulsive force of the steam that comes down from the toe end of the form.

After the form is once thoroughly heated, the operation is distinctly superior to that of either a completely hollow form, or a partitioned form, or a form provided with a central pipe. With the last named type of form, the form is unevenly heated, in that all the hottest steam is concentrated at the toe, with the result that the leg portion of the form is heated to a lesser degree and often, in the case of particular makes of stocking, to an inadequate degree. With the partitioned form, one side thereof is obviously heated more highly than the other side with the result that one half of a stocking dries more quickly than the other half. With a completely hollow form, there is a more even distribution of heat, and it probably exhibits advantages over the other forms, but even with this type of form, the leg of the stocking is apt to get hotter than the toe; and moreover it is a wholly impracticable type of form because of the impossibility of completely expelling the air from a cold form.

After the form embodying my invention is thoroughly heated, the flow of steam through the successive channels f, g, h and i is relatively slow and there is no undue concentration of heat at the toe, as when a pipe is used to convey steam to the toe, because there is a constant and copious outflow of steam from the channels into the chambers m, m, at a plurality of points along the length of the form, thereby heating the form with maximum uniformity, even exceeding that which would occur in a completely hollow form if the air could be initially expelled therefrom. There is, of course, no tendency whatever to unequally heat opposite sides of the form, as in the case of a partitioned form.

It is, however, not always desirable to heat the form with absolute uniformity, it being desirable, for example, with some stockings, to apply an excess of heat to the foot and with other stockings to apply an excess of heat to the leg. My invention lends itself admirably to the accomplishment of this purpose, since it is only necessary to so vary the number of wings as to provide passages k at that part of the length of the form which it is desired to somewhat more highly heat, or, equivalently, to provide, at that point in the length of the form, a single pair of passages k of increased cross-sectional area.

The invention is also of particular advantage as applied to that type of form that is provided with a removable toe piece, such as n, Fig. 1. When one toe piece is removed and another substituted, the latter is not only cold, but it encloses a cold air space, and it must be heated by conductivity through metal. In my improved form, there is a greater concentration of heat at the toe than in a partitioned form or in a completely hollow form; and while my improved form, for this one use, exhibits no advantage over a

form provided with a pipe, it avoids the serious objections to a pipe, hereinbefore described, which are attendant on its use after the toe piece is once heated, because then too great a concentration of heat at the toe is decidedly objectionable.

It will thus be understood that my invention, unlike pre-existing types of forms, is designed and adapted to adequately meet all conditions and does not sacrifice one or more advantages in order to secure another advantage.

The form, is of course, capable of modification and it is not intended to confine the invention to any particular embodiment that would be within the scope of the appended claims.

The way in which the form is mounted and the described arrangement of horizontal pipes for admitting steam and exhausting condensate and air are, of course, no part of the present invention, as different operative constructions accomplishing the same purposes are old or can readily be devised.

It will also be understood that while the invention is more especially intended for use in forms that are to be internally steam-heated, they are also adapted for use in connection with any other heated fluid drying agent, as, for example, hot air.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

1. A hollow drying form comprising a shell adapted to the shape of the article intended to be dried, and channels arranged in a series extending from the base of the form toward and terminating short of its closed end and through which heating fluid is adapted to successively pass, the approximating ends of two adjacent channels overlapping and being spaced apart to allow the heating fluid to escape into the interior of the form outside the channels and at points relatively distant from opposite ends of the form.

2. A hollow drying form comprising a shell adapted to the shape of the article intended to be dried, and channels arranged in a series extending from the base of the form toward and terminating short of its closed end and through which heating fluid is adapted to successively pass, the approximating ends of two adjacent channels being of substantially different widths and the narrower end of one channel extending into the wider end of the adjacent channel so as to afford a passage which extends longitudinally of the form.

3. A hollow drying form comprising a shell adapted to the shape of the article intended to be dried, and channels arranged in a series extending from the base of the form toward and terminating short of its closed end and through which heating fluid is adapted to successively pass, the approximating ends of two adjacent channels being of substantially different widths and the wider channel having a wing extending along a part of the length of the narrower channel and spaced therefrom so as to afford a passage of substantial length extending lengthwise of the form.

4. A hollow drying form comprising a shell adapted to the shape of the article intended to be dried, and channels arranged in a series extending from the base of the form toward and terminating short of its closed end and through which heating fluid is adapted to successively pass, the outlet end of a channel nearer the base of the form being substantially narrower than, and above the level of, the approximating end of an adjacent channel nearer the closed end of the form so as to provide means for the escape of fluid into the interior of the form between its upper and lower ends in a direction opposite to that of the inflowing heating fluid.

5. A hollow drying form comprising a shell adapted to the shape of the article intended to be dried and channels arranged in a series extending from the base of the form toward and terminating short of its closed end and through which heating fluid is adapted to successively pass, the outlet end of a channel nearer the base of the form being substantially narrower than the approximating end of an adjacent channel nearer the closed end of the form and projecting into the inlet end of the second channel a substantial distance so as to afford a fluid-escape passage of substantial length extending lengthwise of the form in a direction opposite to that of the inflowing heating fluid.

6. A hollow drying form comprising a shell adapted to the shape of the article being dried, and pairs of wings extending between opposing walls of the shell and arranged to form channels a series of which extends from the base of the form toward and terminates short of its closed end and successively through which channels the heating fluid is adapted to flow, the wings forming the outlet end of a channel nearer the base of the form extending into the inlet end of the next adjacent channel nearer the closed end of the form and spaced from the wings of the second channel so as to afford a pair of passages extending lengthwise of the form toward its base.

7. A hollow drying form comprising a shell adapted to the shape of the article being dried, and pairs of wings extending between opposing walls of the shell and arranged to form channels a series of which extends from the base of the form toward and terminates short of its closed end and successively through which channels the

heating fluid is adapted to flow, the wings of each pair being relatively widely separated at the fluid-entering end of the channel formed thereby and being relatively narrowly separated at the fluid-discharging end of such channel, the pair of wings forming the outlet end of a channel nearer the base of the form being spaced apart a substantially smaller distance than the pair of wings forming the inlet end of the adjacent channel, the adjacent extremities of the two pairs of wings being positioned to provide a pair of passages each formed between opposite wings of the two channels and opposite walls of the shell.

8. A hollow drying form comprising a shell adapted to the shape of the article intended to be dried, and two series of wings extending between opposite walls of the form on opposite sides of its longitudinal center line, the wings of each series being spaced apart to form fluid passages adapted to promote the uniform circulation of the heating fluid throughout the interior of the form.

9. A hollow drying form comprising a shell adapted to the shape of the article intended to be dried, and two series of wings extending between opposite walls of the form on opposite sides of its longitudinal center line, the wings of each series being so disposed that adjacent ends of adjacent wings overlap and are spaced apart to form fluid passages of substantial length measured longitudinally of the form.

10. A hollow drying form comprising a shell adapted to the shape of the article intended to be dried, and two series of wings extending between opposite walls of the form on opposite sides of its longitudinal center line, the wings of each series being so disposed that the lower end of one wing extends along, and outside of, and is spaced from, the upper end of the wing below it.

11. A hollow drying form comprising a shell adapted to the shape of the article to be dried, and two series of wings extending longitudinally of the form between opposite walls thereof, the wings of each series being spaced apart to form fluid passages adapted to promote the uniform circulation of the heating fluid throughout the interior of the form.

12. A hollow drying form comprising a shell adapted to the shape of the article to be dried, and two series of wings extending longitudinally of the form between opposite walls thereof, the wings of each series being so disposed that adjacent ends of adjacent wings overlap and are spaced apart to form fluid passages of substantial length measured longitudinally of the form.

13. A hollow drying form comprising a shell adapted to the shape of the article to be dried, and two series of wings extending longitudinally of the form between opposite walls thereof, the wings of each series being so disposed that the lower end of one wing extends along, and outside of, and is spaced from, the upper end of the wing below it.

In testimony of which invention, I have hereunto set my hand, at Philadelphia, Pennsylvania, on this fifth day of November, 1926.

HAROLD E. HOUSEMAN.