C. G. TENGDIN.

HOSIERY FINISHING APPARATUS.

APPLICATION FILED OCT. 5, 1914.

1,166,947.

Patented Jan. 4, 1916.

3 SHEETS—SHEET 1.

Fig. 4.

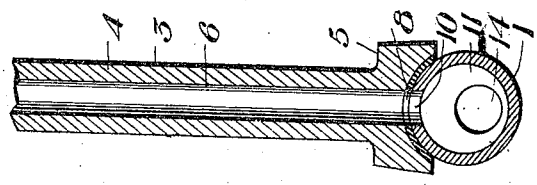
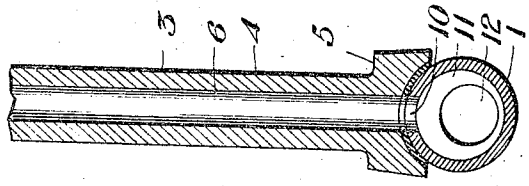


Fig. 3.



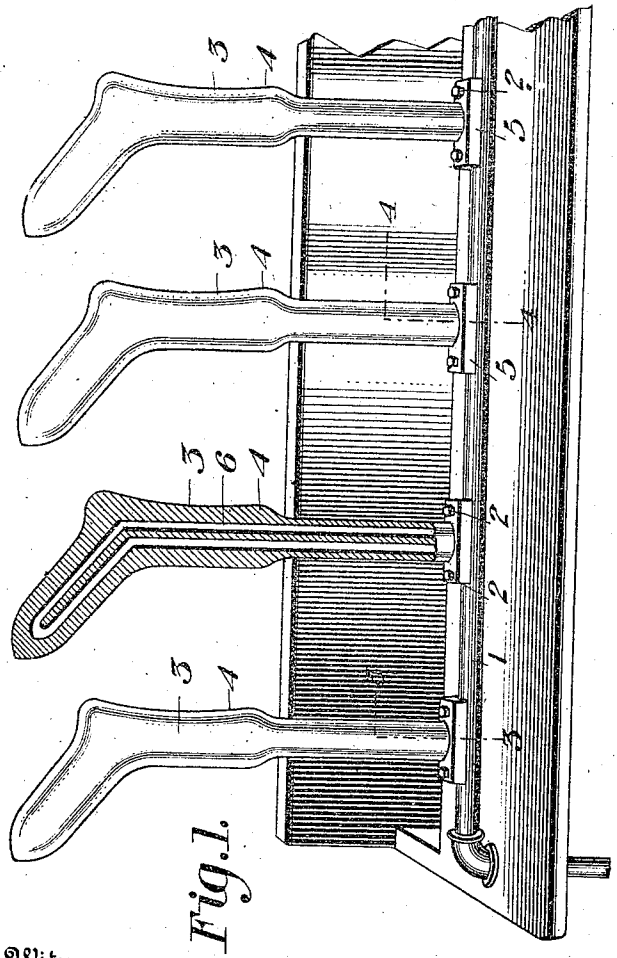


Fig. 1.

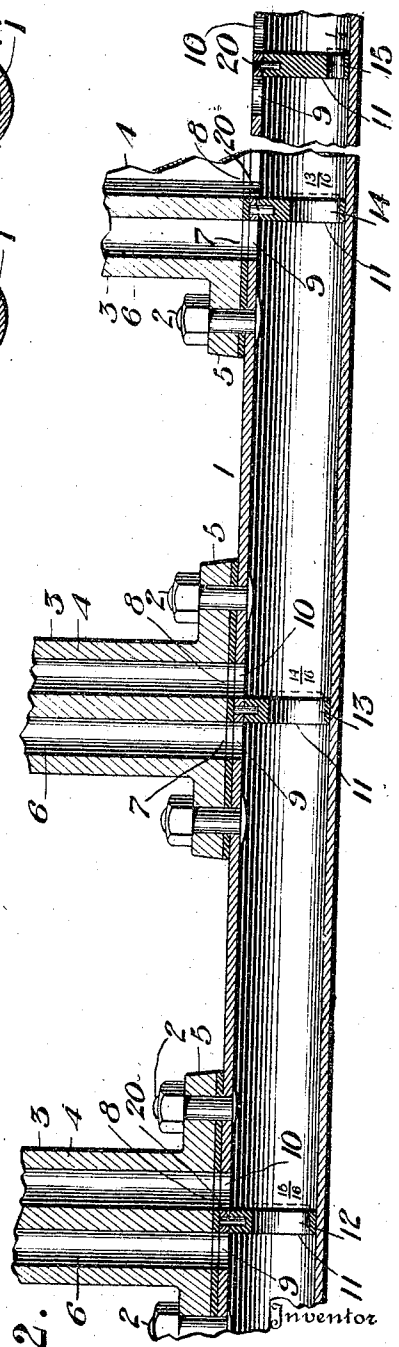


Fig. 2.

Witnesses

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3 SHEETS—SHEET 2.

Fig. 5.

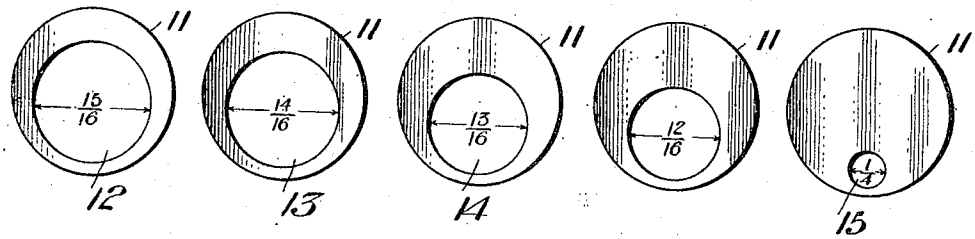


Fig. 6.

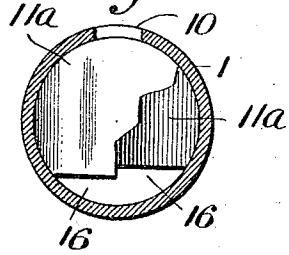


Fig. 7.

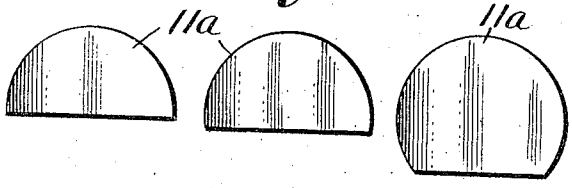


Fig. 8.

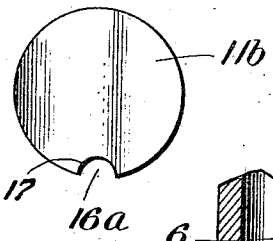


Fig. 9.

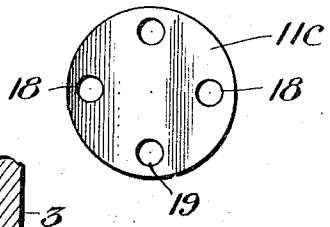
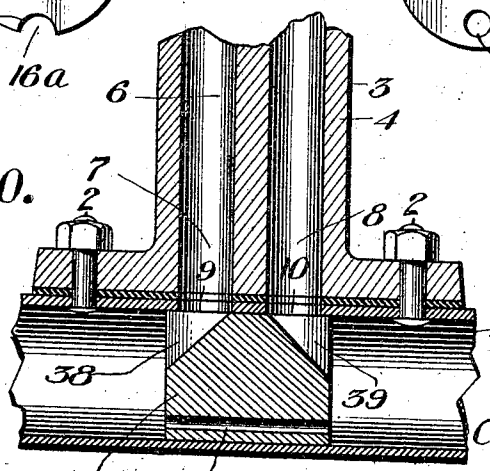


Fig. 10.



Witnesses

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3 SHEETS—SHEET 3.

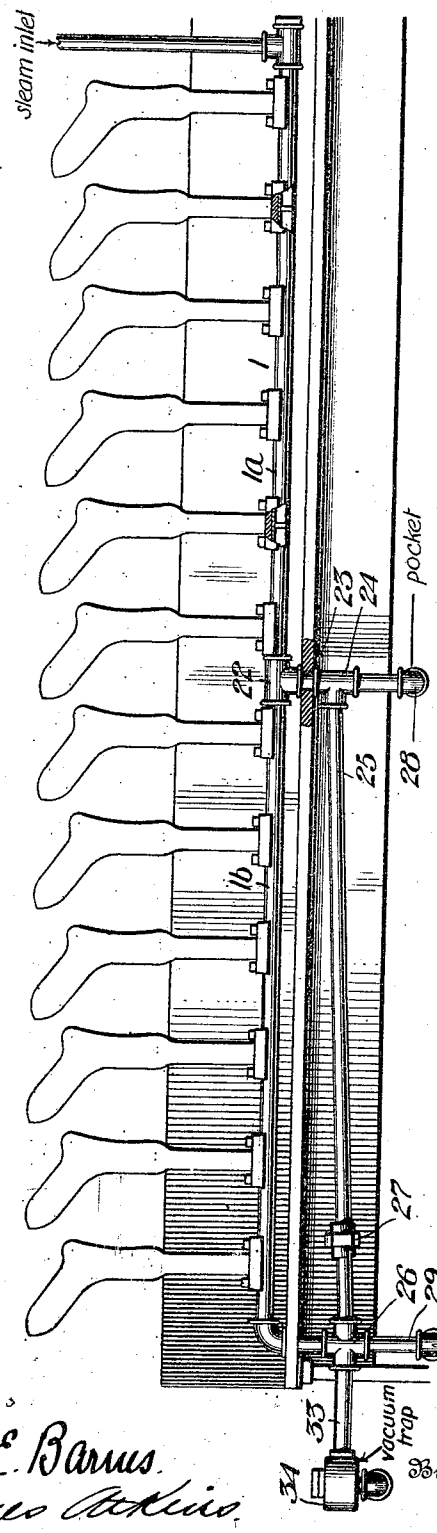

Fig. 11.

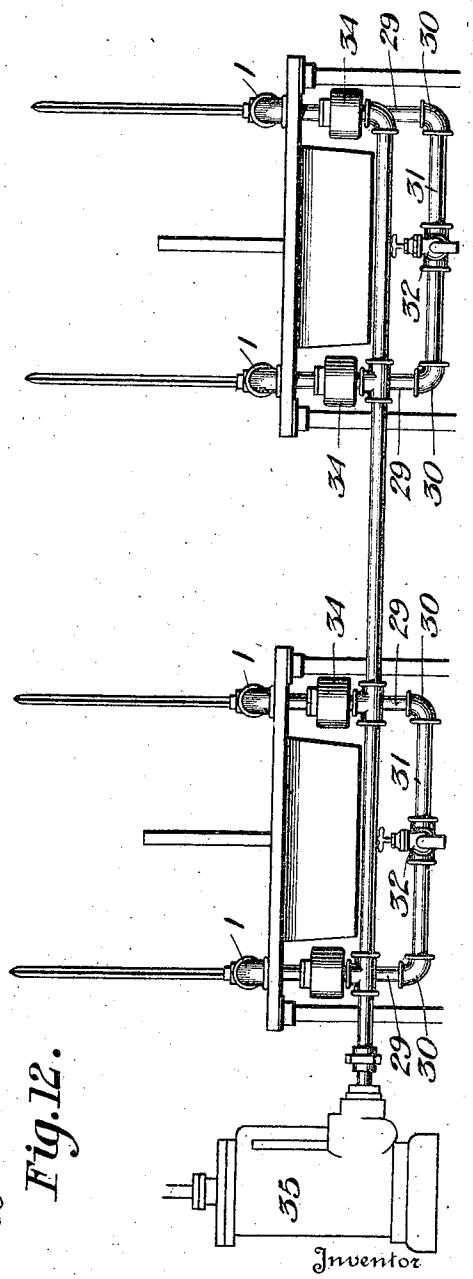

Fig. 12.

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UNITED STATES PATENT OFFICE.

CHARLES G. TENGDIN, OF KANKAKEE, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO PARAMOUNT HOSIERY FORM DRYING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

HOSIERY-FINISHING APPARATUS.

1,166,947. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed October 5, 1914. Serial No. 865,168.

To all whom it may concern:

Be it known that I, CHARLES G. TENGDIN, a citizen of the United States, residing at Kankakee, in the county of Kankakee and State of Illinois, have invented certain new and useful Improvements in Hosiery-Finishing Apparatus, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to fabric finishing apparatus and more especially to structure employed for drying, finishing and shaping hosiery and the like.

Heretofore, it has been proposed to mount one or more drying forms or members on a steam-supplying conduit (such as a pipe) in spaced relation. In this instance, the forms are preferably channeled to provide a passage for and circulation of the steam or other heating fluid from the pipe and by which the forms are heated. Each form is provided with an inlet and an outlet-port which communicate or register with spaced apertures in the pipe. Interposed between these apertures is a deflector or plug which subserves the function of directing the steam through the inlet-port in the form. The deflector or plug is of diametral dimensions sufficient to fit rather tightly in the pipe. Each plug or deflector, near or at its periphery, is provided with an aperture or passage. In the structures heretofore used, these apertures, in the several plugs, were of the same size. Primarily, they were designed to permit flow therethrough of water of condensation. Hence, each of the apertures was only large enough to permit passage therethrough of such condensation, and little of the steam.

It has been found in practice that it is, in some instances, desirable to provide for the passage and circulation of relatively large volumes of steam through the deflectors or plugs so that the introduction of steam into the forms which are more remote from the source of supply may be predeterminately and greatly augmented. To this end, I provide the deflectors or plugs with apertures of dimensions ample to permit a predetermined volume of steam to pass therethrough and according to the relative location of the deflector (and its respective form) to the first and last forms of the series.

It is advantageous, too, to graduate the size of the apertures of the series so that that which is contiguous to and controls the flow of the steam to the first form is relatively large; that controlling the next proximate form is relatively smaller; and so on, down the series, to the last, which is of a size relatively small in comparison to the first. These apertured deflectors or plugs, therefore, control the direction, distribution and volume of the steam and according to the position of the deflectors in the series. By their provision, the function of the forms is greatly augmented, their efficiency is increased, and a constancy of heat maintained within each and all of them that is not always possible in the earlier types of structure, already mentioned.

The invention seeks, in general, to provide a hosiery drying-structure which is particularly adapted for use in connection with internally-heated hosiery drying and shaping forms into which steam or other heating fluid or medium is introduced at relatively low pressure from a conduit which is common to a series of such forms and which structure includes means for effecting a proper distribution of the heating-medium without interference with the water of condensation which passes away from the forms by the medium-supplying conduit. The structure, from an operative standpoint, possesses, as demonstrated in actual practice, a high degree of efficiency and durability; and, regarded from a structural standpoint, it is of the greatest possible simplicity.

The invention resides, broadly, in the novel instrumentalities herein disclosed, as well as in their combination and relative aggroupment: all as hereinafter described and as set forth in the annexed claims and wherein the scope of application of the invention is indicated.

In order that the invention may be readily comprehended by those skilled in the art, I have, in the accompanying drawings, illustrated various possible embodiments thereof by way of example: It is manifest and is to be understood, however, that the

sense-concept may be exemplified and embodied in other forms of structure, and as differently applied.

In these drawings: Figure 1 is a fragmentary view, in perspective, of a drying structure constructed in accordance with my invention; Fig. 2 is also a fragmentary view, in vertical longitudinal section thereof, enlarged; Fig. 3 is a view in vertical transverse section on the line 3—3, Fig. 1; Fig. 4 is a similar view, on the line 4—4, Fig. 1; Fig. 5 is a collective view of several of the steam-deflectors or plugs showing the differently dimensioned apertures therein; Fig. 6 is a view in vertical transverse section (certain portions of the structure being broken away) of a modified form of apparatus; Fig. 7 is a collective view of some of the deflectors of this modified form of apparatus, detached; Fig. 8 is a view in elevation of a deflector, detached, of a still different form; Fig. 9 is a similar view of a third modified form of deflector; Fig. 10 is a sectional view of a modified form of deflector in the form of a channeled plug; Fig. 11 is a view in elevation showing a series of the drying forms mounted upon a steam-pipe containing deflector plugs and means for draining the steam-pipe, at a plurality of points, of water of condensation, together with a supplemental pipe connecting with a vacuum-producing device; and Fig. 12 is a view in end elevation of two tables upon which the steam-pipes and forms are supported.

Referring to these drawings, it will be noted that the reference-character 1 designates a conduit shown, in this instance, as a steam-pipe of appropriate form, dimensions and material.

Mounted on this pipe and secured thereto in any suitable manner—such as by bolts 2—is a series of drying forms or members 3, preferably of the construction shown. These each comprise a body-portion 4 and a base-portion 5. The body-portion is provided with a channel 6 which leads from an inlet-port 7 in the base-portion to an outlet-port 8 therein. The channel may, if desired, be in the form of a pipe (not shown) molded or otherwise embedded in the mass of metal of which the form is constructed. Preferably and as shown, the inlet and outlet-ports 7 and 8 in each form register with apertures 9 and 10, respectively, in the pipe 1.

Disposed between each pair of inlet and outlet-ports is a deflecting instrumentality or plug 11 which, in this instance, is in the form of disk of diametral dimensions sufficient to have a close fit within the pipe. One of the primary functions of these plugs is to deflect the steam and direct its passage and circulation through the aperture 9 in the pipe, thence through the inlet 7 in the base-portion and from which it passes through the channel 6, thence through the outlet 8, and, finally, through the aperture 10, into the pipe. During such passage, a portion of the steam may have condensed so that water would also pass from the form into the pipe 1. It is, therefore, necessary to provide means for permitting a flow of this water of condensation along through the pipe and to a point of discharge. Such means may reside in different types of structure: In the type illustrated in the embodiments of Figs. 1 to 5, this means is shown as an aperture 12 formed in the lower portion of the first disk 11 near its periphery and designed in part for the passage of the water of condensation. It will be noted that the diameter of this aperture is relatively larger than the aperture 13 in the second disk; also, that the aperture 14 in the third disk is relatively smaller than the aperture 13; and, finally, that the aperture 15 in the last disk is of the smallest diameter. Thus, it will be seen that in the series of disks, the apertures are graduated in size.

I have referred to these apertures as being designed, in part, for the passage of the water of condensation. But, in the present instance, they have a further and equally important function, to-wit, to permit the passage therethrough of a predetermined volume of steam or other heating medium, the volume thereof being greatest at the first disk, and of less volume at each successive disk: In this way, there will be practically as much steam supplied to the last form of the series as to the first; and, moreover, it will be steam which has not necessarily passed through one or more of the preceding forms. In structures heretofore employed—those having only water-passages in the disks—such apertures, not being of relatively great diameter, did not permit any great volume of steam to pass therethrough. In practice, I have found the best relative dimensions of the apertures to be $\frac{15}{16}$ of an inch for the first disk; $\frac{14}{16}$ for the second; and so on; these being preferably reduced approximately $\frac{1}{16}$ of an inch for each successive disk until, in a series of twelve, the final disk would be a quarter of an inch in diameter. Hence, the volume of steam passing through the first disk will be as of $\frac{13}{16}$ of an inch dimension while that passing through the next to the last would be as of $\frac{5}{16}$ of an inch dimension. In this way, steam will be supplied to the last drying form which is fresh and of practically the same volume and temperature as that to the first; hence, the last form will be as adequately heated as the first, which is not always feasible in the earlier structures mentioned above.

It will, of course, be understood that each disk must present a surface of sufficient area to effect a deflection of the required volume of steam to the form which it controls. In

this arrangement of instrumentalities, I am enabled to utilize exhaust as well as live steam.

In Figs. 6 and 7, I have shown the disks 11^a as formed with a flat edge to provide, in conjunction with the wall of the pipe, an opening or aperture 16. The size of these openings is graduated similarly to those in the preferred form, already described.

In lieu of making the apertures through the disks somewhat removed from their peripheries, I may, as shown in Fig. 8, provide the disk 11^b with a peripheral, semicircular incut 16^a so that its wall 17 and that of the pipe will form an aperture. In the claims, hereto appended, it is to be understood that where I refer to apertured deflectors or deflectors with apertures, I mean that such expressions shall include these different forms, shown in Figs. 6 to 10.

The types of structure, already described, contemplate a single aperture or opening. It is within the contemplation of my invention, however, to provide disks 11^c with a plurality of steam apertures, such as 18, shown in Fig. 9. These steam-passages are preferably disposed remote from the water-passage 19. The volume-controlling capacity of the steam-passages 18 may be determined by their dimensions or by their number. In other words, there may be, in a series of twelve disks, a disk provided with twelve apertures; and so on, down through the series, there being one less. Or, the number and dimensions may be varied; that is to say, the first disk may have only one aperture of relatively large size; the next have two apertures of relatively reduced size; and so on.

The disks are, preferably and as shown, held in position against movement due to the pressure of the heating fluid by pins 20 which extend through the wall of the pipe 1 and into the disks.

As will now be clear, the conduit or pipe not only constitutes a single instrumentality which is common to a plurality of drying forms for supplying thereto a heating medium in proper volume and of adequate temperature, but it also constitutes a single means, common to the several forms, for draining the forms of all water of condensation. In other words, the conduit subserves the dual functions of supplying and draining the forms; and the deflectors perform the functions of deflecting and controlling the passage and circulation of the heating medium through the pipe and forms.

In order to make the structure more effectual, I may—in lieu of making the steam-pipe in a single section as heretofore—constitute the same of two or more sections, as shown, for example, in Fig. 11. In this instance, two sections 1^a and 1^b are provided. Interposed between the sections is a T-joint 22. Threaded into this is a short pipe 23, which leads into a T-joint 24 in which is mounted a supplemental pipe 25 that extends into a four-way coupling 26, with which, also, the pipe 1^b connects. Interposed between the joint 24 and coupling 26 is a union 27. Carried by the joint 24 is a pocket 28 into which the water of condensation from pipe-section 1^a drains, and which may lead into a common drain-pipe (not shown). Also connecting with the four-way coupling 26 is a pipe 29 extending into an elbow 30 into which is threaded a pipe 31, which connects with the common drain-pipe. A faucet 32 is also provided to draw off the water of condensation when desired. Leading out of the four-way coupling 26 is a short pipe 33 which extends into a vacuum trap 34 that, in turn, is connected to a vacuum pump 35. The vacuum apparatus is utilized to effect proper circulation of the heated fluid through the pipes and forms. By providing the supplemental drain-pipe 23 and circulation-pipe 25, not only is the circulation of the condensation augmented but the vacuum on the series of forms to the right of the T-joint 22 is made more direct so that that on the series of forms on each of the sections 1^a and 1^b is made practically the same.

It is to be understood that, in illustrating the deflectors as in the form of disks, I do not limit myself thereto, since such deflectors might be in the form of cylindrical plugs 36 provided with an elongated water-passage 37, an inclined inlet-channel 38, and an inclined outlet-channel 39, as shown in Fig. 10.

From the foregoing, it will be seen that I have devised a drying-structure which is simple and compact in construction and which is well adapted to subserve its designed functions in an efficient and accurate manner.

As, obviously, many changes can be made in the constructions hereinabove described and many widely different embodiments of the invention can be made without departing from the spirit thereof, it is intended that all matter contained in the foregoing and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Moreover, it is to be understood that the language used in the appended claims is intended to cover not only all of the specific features of the invention but the generic features thereof as well.

What I claim is:

1. A hosiery drying apparatus comprising a conduit provided with a series of pairs of spaced apart inlet and outlet apertures, and a series of deflectors disposed within the conduit, each deflector being interposed between the apertures of a pair and in close proxim-

ity to one of said apertures so as to deflect fluid directly therethrough, each of said deflectors being provided with an aperture of diametral dimensions relatively different from that of a proximate deflector.

2. Hosiery drying apparatus comprising a conduit provided with a series of pairs of spaced apart inlet and outlet apertures, a series of drying forms mounted on the conduit and each provided with an inlet and an outlet registering with the inlet and outlet apertures in the conduit, and a series of fluid-deflecting and controlling members disposed within the conduit, one between each pair of apertures therein, and in close proximity to one of said apertures thereof so as to deflect fluid directly therethrough, the successive deflectors being provided with passages of graduated diametral dimensions.

3. Hosiery drying apparatus comprising a series of hollow heating forms, each provided with an inlet and outlet, a conduit communicating with the forms, having an inlet and an outlet aperture in register with the inlet and outlet in the form, and a series of fluid-directing and controlling members arranged in said conduit in spaced relation and each in juxtaposition to said inlet in the conduit so as to arrest and direct a predetermined volume of fluid therethrough, and provided with a fluid-controlling passage of diametral dimensions relatively different from those of proximate members, whereby a predetermined and relatively smaller volume of fluid is permitted to flow through the passages of the successive controlling members.

4. Hosiery drying apparatus comprising a series of hollow heating forms, each provided with an inlet and outlet, a conduit communicating with the forms and provided with apertures spaced apart to register with said inlet and outlet, and a series of fluid-directing and controlling members arranged in said conduit in spaced relation and each in close proximity to said inlet and outlet in each form, and each member being provided with an aperture formed therein remote from said aperture in the conduit and of relatively smaller dimensions than those of a proximate member, whereby a predetermined and relatively decreased volume of fluid may flow through the apertures of the successive controlling members.

5. Hosiery drying apparatus comprising a series of hollow heating forms, each provided with an inlet and outlet, a conduit communicating with the forms and provided with apertures spaced apart to register with said inlet and outlet, and a series of fluid-directing and controlling members arranged in said conduit in spaced relation and each in close proximity to said inlet and outlet in each form. the series of members being provided with apertures having their walls at a distinct angle to the walls of the apertures in the conduit and of progressively increased dimensions, whereby a predetermined and relatively decreased volume of fluid may flow through the apertures of the successive controlling members.

6. Hoisery drying and shaping apparatus including a conduit provided with a series of spaced-apart apertures, a series of channeled drying and shaping forms mounted on the conduit and each provided with inlet and outlet-ports in register with each of said pair of apertures in the conduit, a series of fluid-directing and controlling plugs disposed in said conduit in spaced relation, one to each form, each plug having a deflecting wall substantially parallel to the walls of the apertures in the conduit and to the walls of the channel in the form and provided with an aperture, the apertures of the series of plugs progressively decreasing in diametral dimensions, whereby a predetermined and relatively decreased volume of fluid may flow through the apertures of the successive controlling members, and means for maintaining said plugs in spaced relation and in juxtaposition to the apertures in the conduit.

7. Hosiery finishing apparatus comprising a combined steam-supplying and fluid-draining conduit provided with a series of pairs of spaced apart apertures, and a series of steam deflecting and directing elements disposed in said conduit in spaced relation, said elements being provided with steam and fluid apertures of progressively decreasing diametral dimensions, whereby a predetermined and relatively decreased volume of fluid may flow through the aperture of each successive deflecting element.

8. Hosiery finishing apparatus including an elongated, single steam-supplying and fluid-draining pipe provided with a series of spaced apart apertures, a series of steam deflecting elements disposed in said pipe in spaced relation and provided with apertures, that in one element being of relatively greater diametral dimension than those of other of the series, whereby a predetermined and relatively decreased volume of fluid may flow through the aperture of each successive deflecting element.

9. In hosiery finishing apparatus, a steam-pipe provided with a series of ports, a series of channeled hosiery shaping forms on said pipe and each having a channel registering with said ports, steam deflectors disposed between the inlet and outlet of each channeled form, and provided with a passage for the flow of water of condensation, certain of said apertures being of relatively large diametral dimensions to permit passage therethrough of steam, and means for maintaining said deflectors in spaced relation and adjacent said inlets and outlets of the channeled forms.

10. Hosiery drying and shaping apparatus including a main conduit provided with a series of spaced-apart apertures, a series of channeled drying and shaping forms mounted on the conduit and each provided with inlet and outlet-ports in register with each pair of apertures in the conduit, a series of fluid directing and controlling plugs disposed in said conduit in spaced relation and provided with apertures of relatively different diametral dimensions, and means for draining said conduit of the water of condensation after passing through the apertures in said plugs.

11. Hosiery drying and shaping apparatus including a main conduit provided with a series of spaced-apart apertures, a series of channeled drying and shaping forms mounted on the conduit and each provided with inlet and outlet-ports in register with each pair of apertures in the conduit, a series of fluid directing and controlling plugs disposed in said conduit in spaced relation and provided with apertures of relatively different diametral dimensions, means for draining said conduit of the water of condensation after passing through the apertures in said plugs, including a plurality of supplemental conduits connected to said main conduit, and a vacuum producing apparatus common to said supplemental conduits.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES G. TENGDIN.

Witnesses:
ELSA RIECK,
FRANK MCGARRY.