This invention relates to base and heating apparatus of a unitary type for use with equipment employed in renovating, shaping, pressing, and finishing clothing or garments.

In my co-pending application entitled "Garment Air Steam Finisher," Serial No. 568,024, filed February 27, 1956, I have outlined the type of equipment involved and have shown upper supporting, shaping and finishing equipment to be used with a unit such as that here involved. This invention thus relates to equipment employed in the garment finishing operations as accomplished by expanding a permeable fabric bag, such as of nylon, as a form for the clothing and then forcing hot air and steam through the nylon form to process the clothing which is being positioned thereon.

An object of my present invention has been to provide an improved base unit for garment equipment of the type here involved;

Another object has been to devise an improved heating and base standard construction for supporting garment shaping and forming apparatus and for supplying steam and air thereto;

A further object of my invention has been to devise new and improved heating procedure and equipment for supplying steam and air to a clothing processing machine; these and other objects of my invention will appear to those skilled in the art from the illustrated features thereof.

In the drawings, Figure 1 is a top plan view of a steam and air unit of my invention;

Figure 2 is a section in elevation taken along the line II—II of Figure 1;

Figure 3 is a horizontal section on the scale of Figures 1 and 2 taken along the line III—III of Figure 2 and illustrating a bottom steam coil assembly of the unit;

Figure 4 is a greatly enlarged vertical fragmental section taken along the line IV—IV of Figure 3 of the drawings;

Figure 5 is a fragmental top plan view on the scale of Figure 4 showing the upper expanded metal plate of Figures 3 and 4, and Figure 6 is a similar fragmental view showing a lower expanded plate of the construction of Figure 4;

Figure 7 is an enlarged isometric view in elevation of a steam-flow deflection baffle employed with a steam unit of the device shown; and

Figure 8 is a schematic showing of steam lines and equipment employed with the heating coil systems and the steam unit employed in the base device or unit of Figures 1 and 2.

In carrying out my invention, I provide a pair of cooperating heating coils located in a housing and positioned beneath a circulation fan to heat air introduced into the device and drive it upwardly from an upper end of its housing. Also, a steam unit is positioned centrally of the housing and near its upper end for supplying relatively dry steam upwardly and centrally with respect to the supply of hot air.

Referring particularly to Figures 1 and 2 of the drawings, I have shown a heating unit 10 that has a vertical housing made up of a reinforced wire screen member 11a, an perforate band 11, a bottom angle rim 12, and an perforate upper cylindrical wall 13. It will be noted that the members 11 and 13 may be secured together as by suitable metal bolts 14. A lower heating part or coil 20 extends in a substantially horizontally plane with its coils in a spaced apart and spiral relationship. Steam is introduced into this coil from an upper coil 23 by an inlet pipe 26a. Used steam is finally exhausted from the unit 10 through the outlet pipe 26b, see also Figures 3 and 8 of the drawings.

As shown, the coil system 20 rests on a bottom plate 16 and between it and a top plate 17. These plates are shown as formed of expanded metal such as indicated in Figures 5 and 6. In Figure 4 the convolutions of the coils 20 have a wire mesh 15 interleaving along their upper sides to form an additional air rate of flow regarding means. Since size of the openings or the mesh of the expanded lower metal member 16 is much greater than that of the upper member 17, and further since the mesh of 15 is intermediate between the two, I have been able to provide a much more effective heating of air which enters the unit through 11a, see Figure 2, and is rising upwardly through the housing of the unit. The mounting of the plates 16 and 17 may be reinforced, as shown in Figure 4, by bolt nut assemblies 16'.

A fan bearing housing 18 is carried by the plates 16 and 17 and an upper plate 22 of the second coil assembly 23. A fan shaft 25 extends through the bore of the housing 18 and at its lower end carries a pulley 26 which is driven by a belt 27, see Figure 2. As shown in Figure 1, the belt 27 is driven by a motor unit 28 that is secured by a bracket means 28a along the outside of the housing of the unit 10. Bottom and top bushings 29a and 29b cooperate respectively with bottom closure plate 31 and fan hub 35a. The closure plate 31 may be secured in position by bolts 33a and the fan hub 35a may be secured for rotation with the shaft 25 by setscrews 34.

An intermediate heating chamber is provided between the coils 20 and 23 since the upper coil 23 has its convolutions disposed in an inverted cone-shaped path. That is, the coil 23 is somewhat of a helical-cone shape and is enclosed by a cone-shaped side plate 21 and a horizontally positioned top plate 22. These plates 21 and 22 may also be of expanded metal with openings throughout the same size or of decreasing size in the same manner as the unit of the lower assembly. In addition, I may provide a mesh screen between the layers of the coils 23. When the fan blades 33 are rotated in the direction shown by the arrows a of Figure 1, air is drawn in from the outside through the screen and sucked up through the heating coils 20 and 23 into an intermediate chamber, as indicated by the arrows a of Figure 2. The slowing-down and differential retarding action of the use of meshes or grating openings of decreasing sizes provides a greatly increased heating action of the air which is furthered by the spacing between the cone-shaped wall 21 and the horizontal wall 17. By way of example, such a duel set of heating coils have been found to increase the efficiency of the heating action in the neighborhood of 25% or more.

The openings in the bottom plate 16 may be of about ½ an inch width while those of the plate 17 may be of about ¼ an inch, so as to hold back upwardly-moving air and impart a maximum heat to it from the steam coils over which it circulates or moves.

The housing of the unit 10 is shown in Figure 2 as provided with a ring member 36, an outwardly projecting bar member 36a, and an upwardly projecting and outwardly positioned top rim band 37. These members
may be secured, as shown, as by weld metal w to form an integral construction. A turn seat 38 for a rotatable base rim or wheel (see my co-pending application) is provided by the members 36 and 37. This is the rim which is employed to support a bottom of an inflatable fabric bag and any means which is to be rotatable with the upper portion of the apparatus or equipment.

As shown in Figure 1, a series of radial connector fins 39 project from the inside of the ring member 36 and centrally support a steamer body 40. The high side of the fins 39 is indicated by 39a. This is the proper high side for a clockwise rotation of the fan blades 33, as indicated by the arrow e of Figure 1. A central support rod or post for the upper portion of the apparatus, such as disclosed in my co-pending application, is indicated by 42. Its lower end is mounted within a central bore 40a of an abutment wall of the steamer and the rod is supported by upper and lower bushings 41a and 41b and on a socket ball 43. It is customary for the center post 42 and the base rim (not shown) to rotate together for moving the upper portion of the apparatus to a suitable position to finish a particular type of garment. The steamer also has an arc shaped bore 40a which extends from one side to the other of the abutment wall 47. An evaporator ring 45 is welded in position at the upper portion of the bore 40a and within a transverse groove thereon.

A baffle member or plate 50 of interrupted cylindrical shape has spacer ribs 50b about its inner surface to engage the inner wall of the bore 40a and define a restricted steam flow space 50c therebetween, see particularly Figures 1, 2, 7 and 8. A suitable moisture collecting means, such as Fiberglas or mineral wool d, is shown positioned in Figure 2 below the lower edges of the baffle 50 to receive condensation therefrom, as well as from the main chamber, itself. It will be noted that vertical edges 50c of the baffle 50 (Figure 7) have a spaced-apart relationship substantially corresponding to the width of the cross wall 47 as shown in Figure 1. In addition, steam jet slots or grooves 50d extend along such edges and contribute to a so-called sheet discharge of steam from within the spacing 50c into the main chamber defined by the bore 40a. Steam is introduced through inlet 49 directly into the restricted chamber 50 as shown in Figure 2. A bleeper port 49a (see Figure 8) is shown in the inlet pipe 49 for delivering steam directly into the main chamber 40a to further the drying of the steam before it issues from the steamer 40.

A perforated steamer disk 46 is positioned in a counter bore 49 of the body 40 to direct steam upwardly from the main steam chamber. To further the drying and heating of the steam within the main chamber of the steamer device, I have provided a secondary heater chamber in the abutment wall 47 which is formed by a bore 47a and which is supplied with a through-flow of steam from inlet 54 through outlet 55. This chamber is closed by a screw plug 48, and the outlet 55 is connected to the inlet 23 of the upper or hotter coil 23 by piping 47b. The steam flows downwardly through the coil 23, through its outlet 23a, into the inlet 20a, and through the coils of the assembly 20 to finally discharge through the outlet 20b.

In Figure 8 of the drawings, I have shown auxiliary equipment which may be connected for utilization with the steam heating system. It will be noted that the steam outlet 20b is connected through a trap 57 and a check valve 58 to the steam discharge 59. It will also be noted that the steam line enters inlet 60, passes as indicated by the arrows, through a separator unit 61. It will be noted that the unit has a baffle 63 and an inspection plug 62. Steam, after having passed around the baffle 63, flows into line 64 through a steam gun 65, and a steam valve 66 into the chamber 40a of the steamer 40. Other steam from the moisture separator 61 flows downwardly through piping 69 and concentrator assembly 70 into the inlet 54 of the secondary heating chamber, as defined by the bore 47a.

A typical cycle of operation using a unit such as herein disclosed may first involve applying dry steam from the unit 40 for about 3 to 5 seconds. Next, hot air and dry steam are applied for 2 or 3 seconds, at which time the air inflates the cloth bag, or forms any connected portions of the garment being finished. Finally, the steam may be turned off and the air continued to dry the garment for about 3 or 4 seconds, after which the garment may be removed.

What I claim is:

1. An improved heating assembly for a garment finishing machine which includes a cylindrical casing; a horizontally disposed steam coil located within said casing and extending transversely of and clear across the interior thereof; a second steam coil in the form of an upwardly expanding spiral located within said casing in axial alignment with said first mentioned coil and extending transversely of and across the interior of said casing; a steamer supported by said casing above said coils; means for delivering processing steam to said steamer; separate means for delivering heating steam to a heating chamber of said steamer and then through first one and then the other of said coils; means for delivering a pair of air upwardly through said casing, through the windings of both said coils and outwardly of said casing around said steamer; and a separate perforated diaphragm above each of said coils for retarding the air flow past the winding of said coils.

2. A heater for a garment finishing machine which includes a casing having an air inlet opening near the base thereof; a horizontally disposed steam coil within said casing and extending transversely of and across the interior thereof; a second steam coil located within said casing axially aligned with said first mentioned coil and extending transversely of and across the interior of said casing; a steamer mounted on said casing above said steam coils; means for delivering processing steam to said steamer; separate means for delivering heating steam to a heating chamber formed within said steamer; means for delivering steam from said heating chamber to and through the uppermost said steam coils and then to and through the lowermost said steam coil; a fan for impelling a flow of air upwardly through said casing and the windings of each of said coils and past said steamer; and means forming a part of said steamer for delivering a divided flow of processing steam from said steamer into the flow of air impelled by said fan.

3. A heating assembly for a garment processing machine comprising a casing having an air inlet opening adjacent the base thereof; a horizontally disposed steam coil within said casing extending transversely of the interior of said casing; a second steam coil in the form of an upwardly expanding spiral located within said casing, axially aligned with said first mentioned coil and extending transversely of the interior of said casing; a steamer supported by said casing above said coils and having a steam delivery chamber and a steam heating chamber formed therein; separate means for delivering steam to both of said chambers; means for delivering steam from said heating chamber in series through said coils; and means for impelling an upward flow of air through said casing, through the windings of both said coils and past said steamer.

4. A heating assembly as defined in claim 3 in which each of said coils is located within a chamber of apertured diaphragms for retarding the velocity of air flowing through said casing and in which the aggregate area of the air delivery apertures formed in the uppermost diaphragm of each such pair is less than the aggregate area of the air delivery apertures formed in the lower diaphragm of each such pair.

5. A heating assembly for a garment pressing machine including a casing having an open top and an air inlet
port adjacent the bottom thereof; a steam coil located within said casing between the top thereof and said port and extending substantially entirely across said casing; a steam manifold on said casing and having an open top steam delivery chamber and a separate heating chamber formed therein; means for delivering steam to said delivery chamber in the form of a sheet-like flow; means for delivering steam to said heating chamber and from said chamber to said coil; and means for impelling a flow of air through said casing and said coil and past said steamer.

6. A heating assembly for a garment pressing machine, including a casing having an open top and an inlet port adjacent the bottom thereof; means for inducing a flow of air from said port and through said casing and out through the open top of said casing; a heating coil located within said casing and extending substantially entirely across the interior thereof; a steamer mounted on said casing in the line of such air flow and having a heating chamber and a separate heating chamber formed therein; a baffle plate located in said delivery chamber in close proximity to a bounding wall of said heating chamber and means for delivering steam to said delivery chamber in a sheet-like flow from the space between said plate and the portion of said bounding wall of said heating chamber adjacent said plate; and means for delivering steam to said coil.

7. A heating assembly for a garment pressing machine including an open top casing having an inlet port adjacent the bottom thereof; means for inducing a flow of air from said port upwardly through said casing and out through the open top thereof; two heating coils located within said casing, one above the other and each extending substantially across the interior thereof; a steamer mounted on said casing in the line of such air flow and having a heating chamber and an arcuate steam delivery chamber formed therein; a baffle plate of arcuate form located in said delivery chamber in close proximity to a curved bounding wall thereof; means for delivering steam to said chamber in sheet-like form from the space between said plate and the adjacent portion of such bounding wall of said delivery chamber; and means for delivering steam to said heating chamber and from said heating chamber through one and then the other of said coils.

8. A heating assembly as defined in claim 7 in which one of said coils is in the form of an inverted cone and is located between the other coil and said steamer and receives steam from said heating chamber and delivers such steam to the other coil.

9. A heating assembly for a garment pressing machine including an open top casing having an inlet port adjacent the bottom thereof; means for impelling a flow of air through said port and upwardly through said casing; two heating coils located within said casing, each extending transversely thereof and one in the form of an inverted cone; a steam manifold on said casing and having a heating coil located above said coils in the line of air flow from said casing and having a curved steam delivery chamber formed therein embracing an abutment wall integrally formed with the housing of said steamer; a heating chamber formed within said abutment wall; an evaporator ring located within said heater and extending from said heating chamber to said steam delivery chamber; means for delivering steam to said delivery chamber, and therefrom in the form of a divided flow into the air flow issuing from said casing; and means for delivering steam to said heating chamber and therefrom to said coil in the form of an inverted cone and therefrom to the other of said coils; and means for delivering the flow of air as such flow passes through at least one of said coils.

10. A heating assembly for a garment pressing machine including an open top casing having an inlet port adjacent the bottom thereof; means for impelling a flow of air through said port and upwardly through said casing and each extending transversely thereof and substantially entirely across the interior thereof; a steamer casing mounted on said first mentioned casing and having a curved chamber formed therein; a radially extending abutment wall formed integrally with said steamer casing and embraced by said chamber; a heating chamber formed in said abutment wall and forming a support post rotatably mounted in a bore of said wall; and separate means for delivering steam to said chambers and from said heating chamber to said coils.

11. A heating assembly as defined in claim 10 in which each of said heating coils is confined between flow-retarding diaphragms and in which one such coil is provided with an additional flow-retarding diaphragm interleaving with and partially surrounding windings of said coil, and extending transversely across said first mentioned casing.

12. A heating assembly for a garment pressing machine including a casing having an open top and an inlet opening for admitting air to the lower portion thereof; a steam coil located within said casing and extending transversely across said casing; perforated diaphragms enclosing said coil and extending across the interior of said casing and in which the aggregate area of the perforations in the lowermost diaphragm are of greater area than the aggregate area of the perforations in the uppermost diaphragm; a steamer mounted on said casing above said coil and having a steam delivery chamber and a separate heating chamber formed therein; means for delivering steam to said heating chamber and said coil; means for delivering steam to said delivery chamber; and a fan for impelling a flow of air through said casing.

13. A heating assembly for a garment pressing machine including an open top vertically extending casing having an opening for admitting air to the lower portion of said casing; a coil of pipe located in said casing and extending transversely thereof; a steamer supported by said casing, located above said coil, and having a heating chamber and a separate open top steam delivery chamber formed therein; means for delivering a sheet-like stream of steam into said delivery chamber; separate means for delivering steam to said heating chamber; from said heating chamber into said coil; and means for creating a flow of air upwardly through said casing and said coil and past and in contact with said steamer.

14. A heating assembly for a pressing machine including an open top casing having an opening for admitting air to the lower portion thereof; means for impelling a flow of air into and upwardly through and out of said casing; axially aligned and operatively connected heating coils located within said casing in the line of air flow therethrough; a steamer supported by said casing axially aligned with and above said coils and in the line of air flow traversing said casing, said steamer having a heating chamber formed therein and a separate arcuate steam delivery chamber located therein and embracing said heating chamber; means for delivering steam to said heating chamber; separate means for delivering steam to said delivery chamber; means for delivering a divided flow of steam from said delivery chamber into the air flow issuing from said casing; and means for delivering steam from said heating chamber to said coils.

15. A heating assembly for a garment pressing machine, including an open top casing having an inlet port formed in the lower portion thereof; means for inducing a flow of air inwardly through said port and upwardly through said casing and out through the open top thereof; axially aligned, interconnected heating coils located one above the other and both extending substantially entirely across said casing within the line of air flow thereof; a casing-supported steamer located above said coils and within the line of air flow traversing and issuing from the upper end of said casing, said steamer having a heating chamber and a separate open top, arcuate steam delivery chamber formed therein, with said steam delivery
chamber embracing said heating chamber; separate means for delivering steam to said delivery chamber and to said heating chamber and from said heating chamber, first to one and then to the other of said heating coils; means mounted on the steamer and having a plurality of steam delivery apertures formed therein and positioned over the open top of said delivery chamber for dividing the flow of steam issuing from said delivery chamber; and an evaporator ring for delivering heat from said heating chamber to said delivery chamber.