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[54] **GARMENT FINISHING APPARATUS WITH SLEEVE EXPANDERS**
 10 Claims, 7 Drawing Figs.

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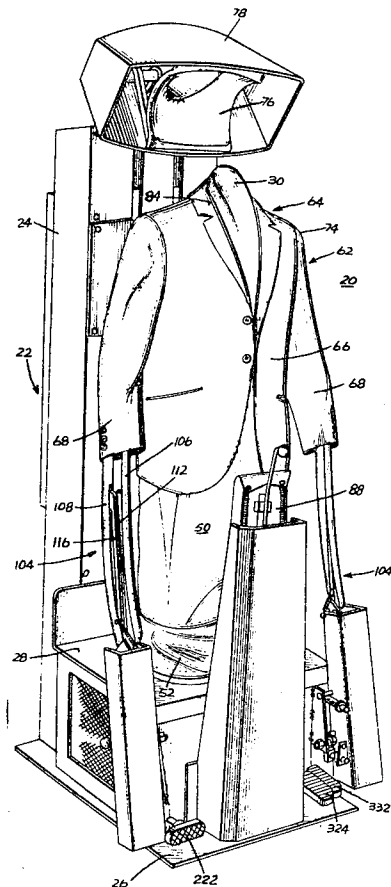
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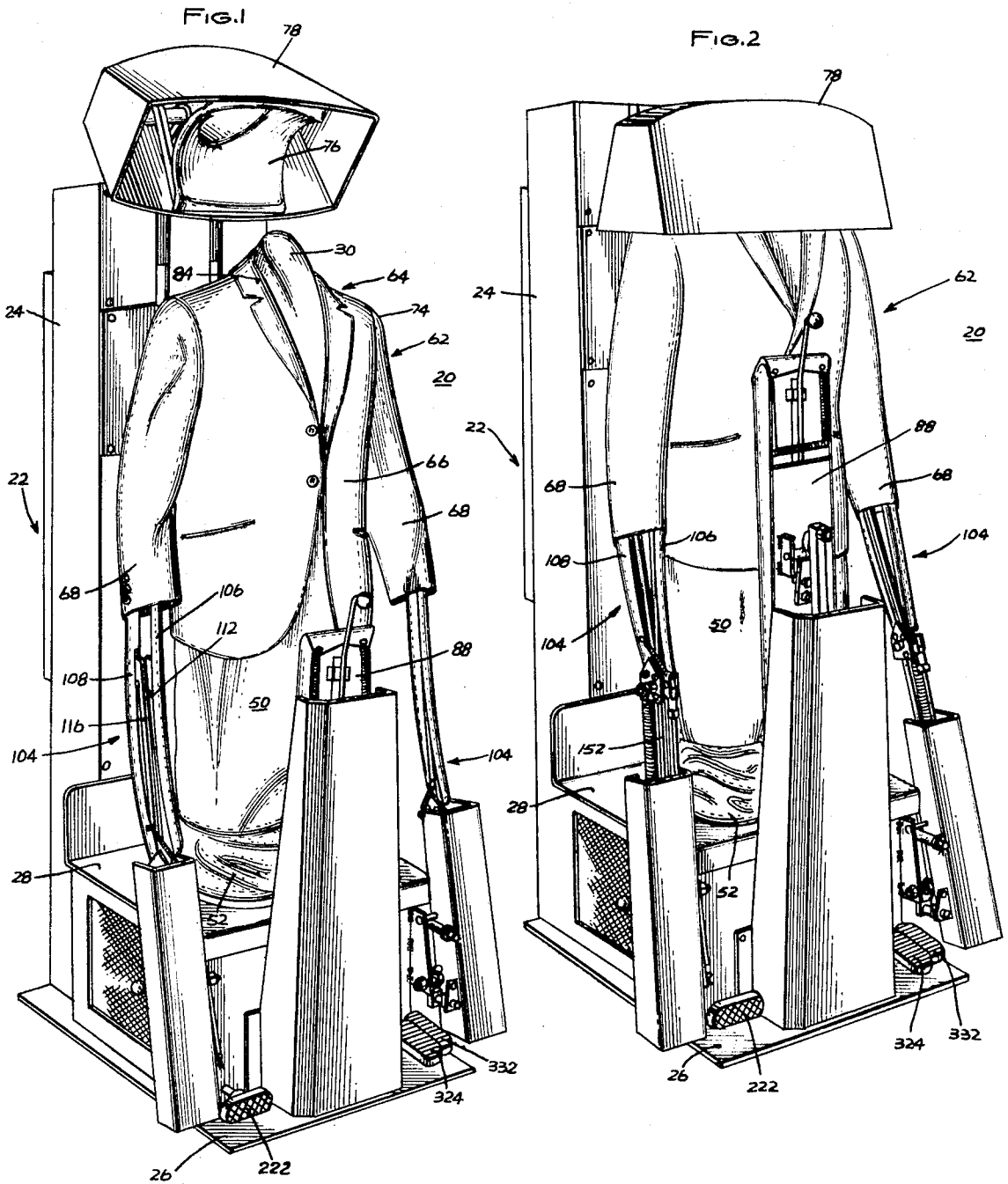
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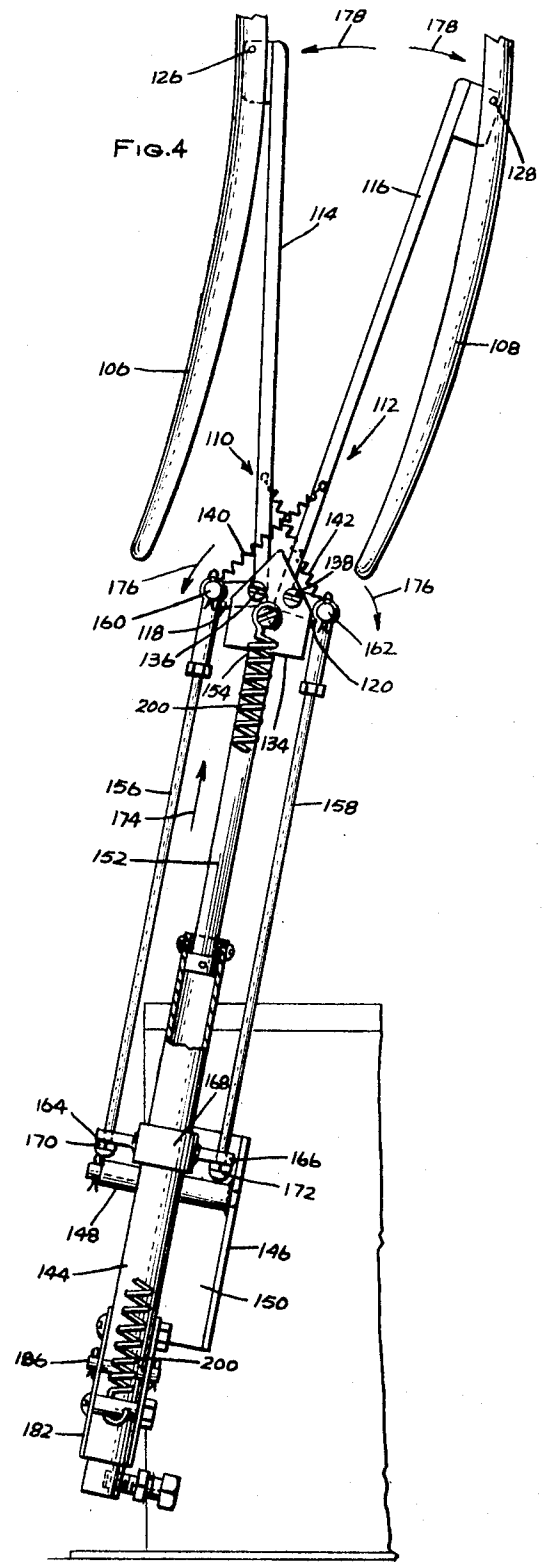
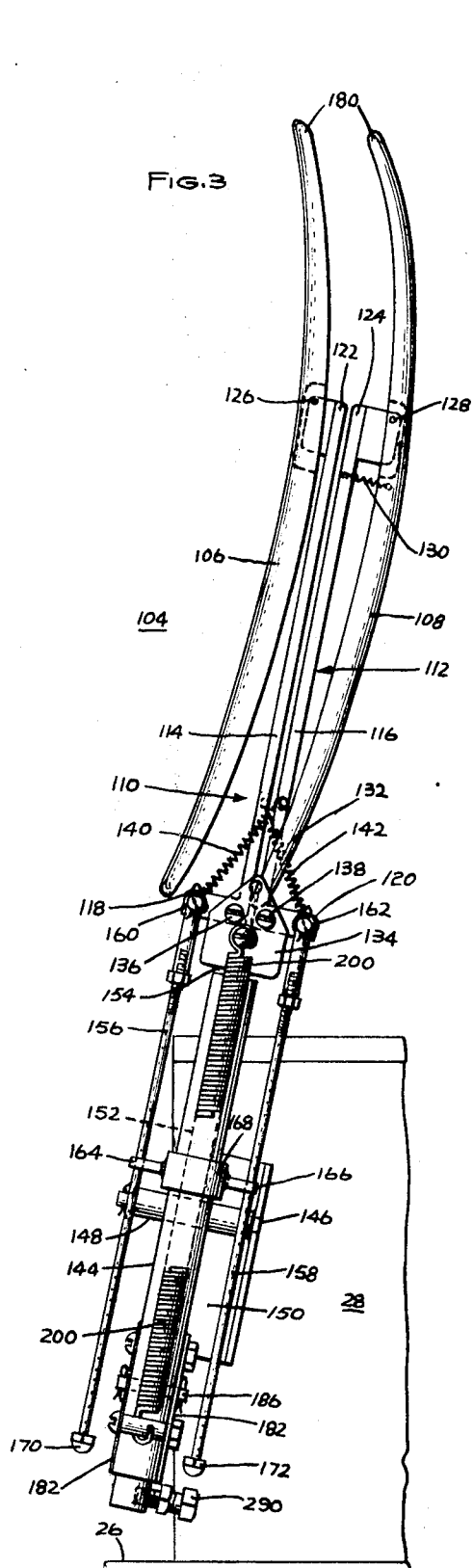
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ABSTRACT: Apparatus for finishing a sleeved garment, such as a coat. A frame is provided having a fluid-pervious, inflatable bag supported thereon adapted to have the body portion of the garment dressed thereover with the sleeves depending therefrom. Steam is supplied to the interior of the bag to dampen and heat the body portion and sleeves, and a blower supplies air to the interior of the bag thereby to inflate the bag to dry the body and sleeves. A pair of sleeve expanders are provided for respectively expanding the sleeves to shape the same during steaming and drying operation. Each of the sleeve expanders includes a pair of elongated expanding elements adapted to be inserted in the open end of the respective sleeve. A pair of power cylinders are mounted on the frame and respectively have piston rods movable between retracted and extended positions. Each pair of elements is mounted on a respective piston rod and longitudinally movable therewith, the elements being at least partially withdrawn from a respective sleeve when the piston rod is in its retracted position, and having a substantial length thereof received within the respective sleeve when the piston rod is in its extended position. Each pair of elements is mounted on its respective piston rod for movement between collapsed and expanded positions. Linkage is provided which moves the elements to their expanded positions in response to movement of the respective piston rod to its extended position. The cylinders are respectively pivotally attached to the frame to provide pivotal movement of the respective elements between a position spaced from the bag and a position adjacent the bag, and a linkage is provided which pivotally moves the cylinders and the respective elements from the spaced to the adjacent position in response to movement of the respective piston rod toward its extended position.





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FIG. 5

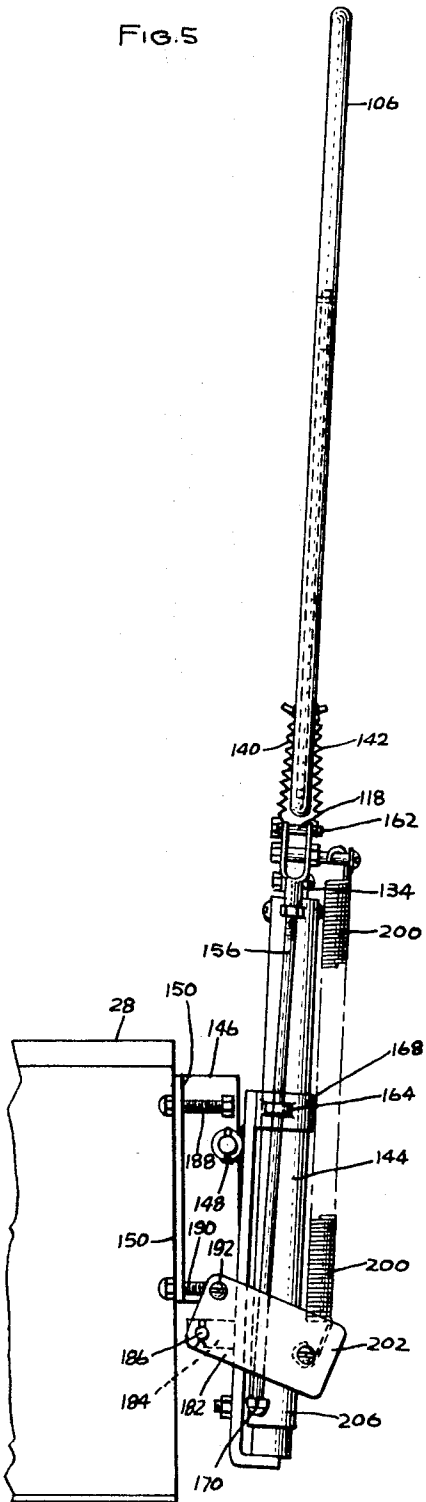
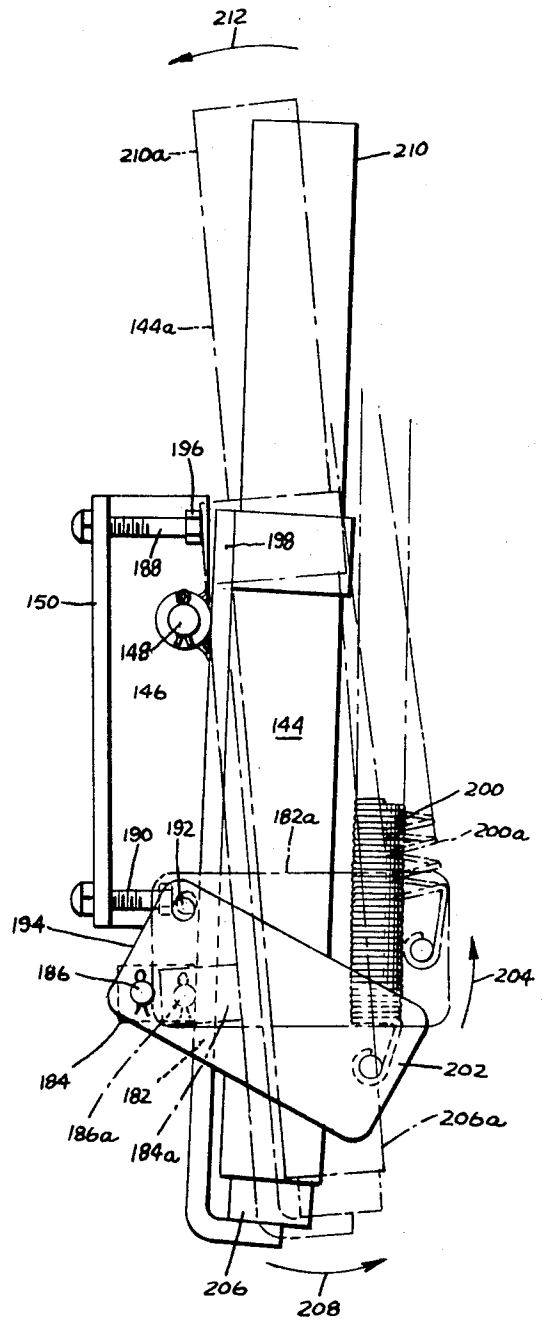


FIG. 6



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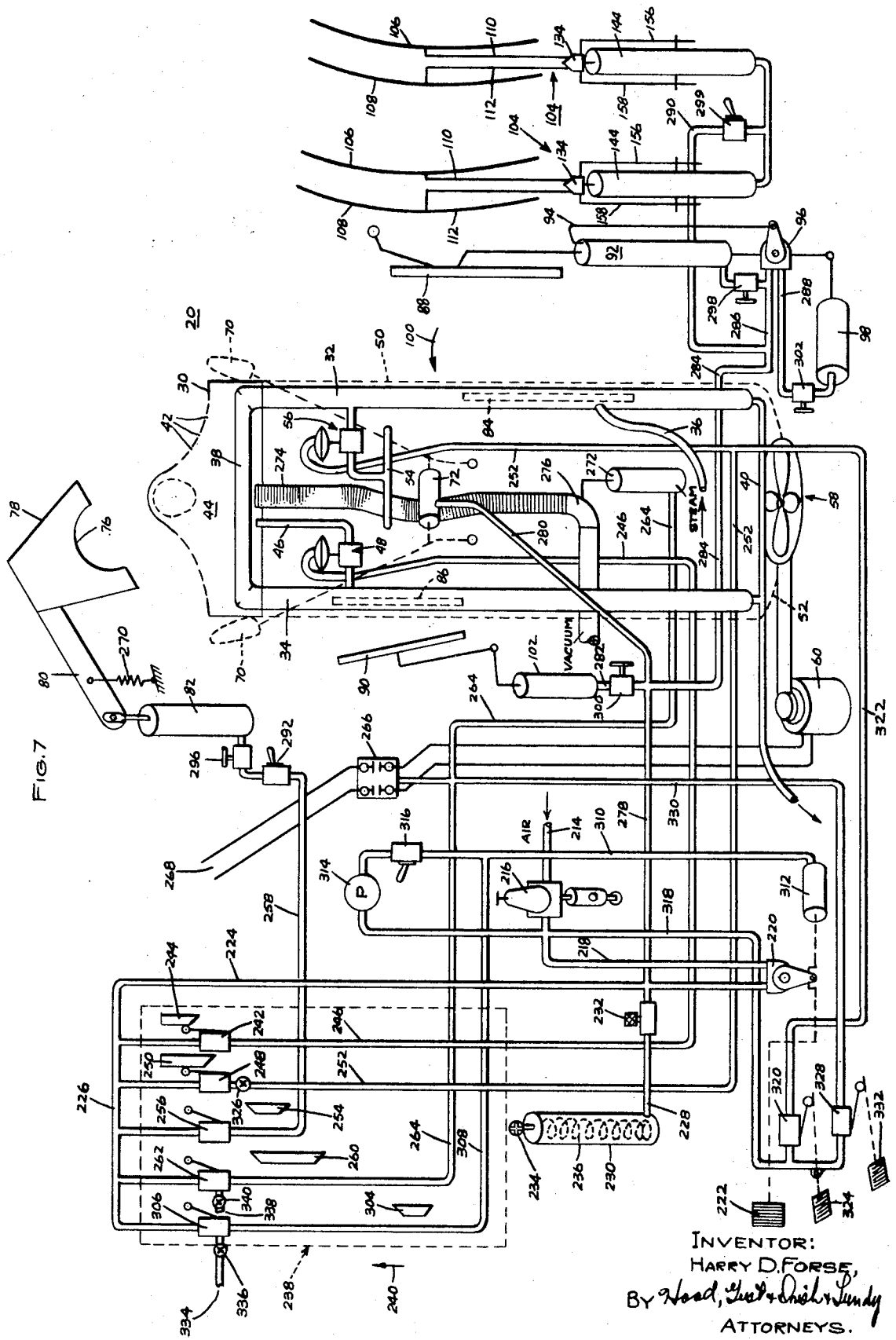


FIG. 7

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GARMENT FINISHING APPARATUS WITH SLEEVE EXPANDERS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to garment finishing apparatus of the air-steam type, and more particularly to garment finishing apparatus including mechanisms for expanding appendage portions of the garment, such as sleeves, at least during the drying operation.

2. Description of the Prior Art

In my U.S. Pat. No. 3,477,621, and in U.S. Pat. No. 2,986,311 to Werner Stiefel, there is disclosed apparatus of the air-steam type for finishing a sleeved garment. In such apparatus, a frame is provided which supports a form adapted to have the garment dressed thereon. The form includes a rigid buck for shaping the shoulder and collar portions of the garment and a fluid-pervious, inflatable bag depending from the buck which shapes the body portion of the garment. Steam is injected into the bag and the buck for dampening and heating the body and sleeves of the garment, and a blower is provided for supplying air to the interior of the bag for inflating the same thereby to dry the body and sleeve portions of the garment. An upper press plate, unheated in the case of my aforesaid patent, and heated in the case of the Stiefel patent, is mounted on the frame and movable into cooperative relationship with the buck for pressing selected regions of the shoulder and/or collar portions of the garment. Front and rear press plates or clamps are provided movable into positions to retain the back and front portions of the body of the garment during the steaming and drying operations.

In air-steam garment finishing apparatus of the type disclosed in my aforesaid patent, and in the Stiefel patent, it is desirable to shape the sleeves of the garment during the steaming and drying operations so that upon completion of the drying cycle, the sleeves will have the desired finished shape. In the past, manually actuated, removable sleeve expanders have been employed for this purpose, such as the sleeve expanders 34 shown in FIG. 2 of my aforesaid patent. In employing such prior sleeve expanders, once the operator has dressed the garment upon the form, it is then necessary for the operator manually to compress or collapse one of the expanders, insert it in the proper position in a respective sleeve, and then manually to collapse the other expander and to insert it in the proper position in the other sleeve. After the finishing operation has been completed, it is then necessary for the operator sequentially to remove the two sleeve expanders from the sleeves before removing the garment from the form. Such insertion and removal of the prior sleeve expanders, being entirely a manual operation, adds appreciably to the overall time required for finishing a garment. Further since conventional sleeve expanders are spring-expanded, considerable hand fatigue results from repeated collapsing of the expanders during insertion and removal. Still further, such prior sleeve expanders are free-hanging in the sleeves thus adding appreciable hanging weight thereto and producing undesired wrinkles in the garment.

It is therefore desirable to provide garment finishing apparatus incorporating automatically actuated sleeve expanders thereby to reduce manual labor and fatigue, reduce the time required for dressing the garment on the form and undressing the same therefrom following a finishing operation, and which eliminates the wrinkles produced by prior manually actuated, free-hanging sleeve expanders.

SUMMARY OF THE INVENTION

The invention, in its broader aspects, provides garment finishing apparatus including a frame and a fluid-pervious inflatable bag supported on the frame and adapted to have at least a part of the body portion of the garment dressed thereon with a pair of open-ended appendage portions of the garment extending from the body portion. Means are provided for sup-

plying hot, wet vapor to the interior of the bag thereby to dampen and heat the body and appendage portion, and means are provided for supplying dry vapor, under pressure, to the interior of the bag thereby to inflate the bag and to dry the body and appendage portions. A pair of means are provided for respectively expanding the appendage portions thereby to shape the same at least during drying of the garment, each of the expanding means including a pair of elongated expanding elements adapted to be inserted in the open end of the respective appendage portion, and means are provided supported on the frame for mounting the expanding elements for movement between collapsed and expanded positions.

It is accordingly an object of the invention to provide improved garment finishing apparatus.

Another object of the invention is to provide improved garment finishing apparatus incorporating garment appendage expanding means.

A further object of the invention is to provide apparatus for expanding an open-ended appendage portion of a garment.

The above-mentioned and other features and objects of this invention and the manner of attaining them will become more apparent and the invention itself will be best understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view in perspective showing garment finishing apparatus incorporating the sleeve expanders of the invention, with the sleeve expanders shown in their retracted, collapsed position;

FIG. 2 is a view in perspective showing the garment finishing apparatus of FIG. 1 in its pressing position with the sleeve expanders in their extended, expanded position;

FIG. 3 is a side view of one of the sleeve expanding mechanisms in its retracted, collapsed position,

FIG. 4 is a side view, similar to FIG. 3, showing the mechanism in its extended, expanded position;

FIG. 5 is an end view of one of the sleeve expanding mechanisms shown in its retracted, collapsed position;

FIG. 6 is a fragmentary end view showing that part of the mechanism which pivotally moves the sleeve expander inwardly toward the bag in response to extension of the sleeve expander mechanism; and

FIG. 7 is a diagram schematically illustrating the pneumatic control system for the garment finishing apparatus and sleeve expander mechanisms of the previous figures.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1, 2 and 7, garment finishing apparatus of the type illustrated and described in greater detail in my aforesaid patent is generally indicated at 20. Apparatus 20 includes a frame 22 having an upright portion 24 and a base portion 26 having a housing 28 mounted thereon.

A rigid, hollow, metal buck 30 is provided supported above housing 28 by two spaced, parallel upstanding pipe elements 32 and 34 (FIG. 7). A steam line 36 adapted to be connected to a suitable source of steam (not shown) is coupled to pipe elements 32. Pipe elements 32 and 34 extend into the hollow buck 30 and are joined by connecting pipe element 38 located interiorly of the buck for preheating the buck. A condensate return line 40 is connected to the lower ends of the pipe elements 32, 34. The surface of the buck 30 is conventionally covered with padding (not shown) and has perforations 42 therein communicating with its interior cavity 44 for applying steam to the shoulder and collar portions of the garment for heating and dampening the same, and thereafter for the inward passage of air therethrough into cavity 44 under the influence of a vacuum applied thereto during the drying cycle, as will hereinafter be described. Steam is admitted to the cavity 44 in buck 30 by a steam line 46 extending into cavity 44 and coupled to pipe 34 by a conventional pneumatically actuated valve 48.

A fluid-pervious, inflatable bag 50 is supported by buck 30 and is suspended therefrom. Bag 50 has an open lower end 52 which is secured to the upper surface of housing 28. Steam is injected into the bag 50 by a steam line 54 coupled to pipe 32 by a conventional pneumatically actuated valve 56. A conventional blower 58 and drive motor 60 are mounted in housing 28, blower 58 communicating with the interior of bag 50 through its open bottom end 52 and an opening (not shown) in the upper surface of housing 28.

As best seen in FIGS. 1 and 2, a sleeved garment 62 is dressed on the form comprising the buck 30 and the depending bag 50, the shoulder and collar portions 64 of the garment being supported by buck 30, and the body portion 60 surrounding bag 50, sleeves 68 depending from the shoulder portion 64 as shown. As more fully described in my aforesaid patent, steam is injected by steam line 46 into buck cavity 44 for outward flow through perforations 42 thereby to dampen and heat the shoulder and collar portions 64 of the garment. Steam is injected into the bag 50 by steam line 54 thereby to dampen and heat the body portion 66, a portion of the bag steam flowing into sleeves 68 thereby to dampen and heat the same.

As more fully described and illustrated in my aforesaid patent, a pair of shoulder expanders 70 are provided actuated by a conventional pneumatic cylinder 72 for expanding and shaping the shoulders 74 of the garment. An upper press or grid plate 76 is provided mounted in a housing 78 and pivotally supported on upstanding portion 24 of frame 22 by a pivoted lever member 80. A conventional pneumatic cylinder 82 connected to lever member 80 moves grid plate 76 between its inactive position, as shown in FIGS. 1 and 7, and its pressing position, as shown in FIG. 2. In a specific embodiment, grid plate 76 is unheated and is suitably shaped so that it engages and presses only the collar portion 84, thereby forming the crease extending around the back of the collar and partially down onto the lapels of the garment.

As more fully described in my aforesaid patent, after termination of the injection of steam into bag 50, motor 60 and blower 58 are actuated thereby to supply unheated air, under pressure, to the interior of bag 50 thereby to inflate the bag to expand the body portion 66 of the garment, as shown in FIG. 2, so as to dry the body portion to provide the desired finish, a portion of the air thus supplied to the interior of bag 50 flowing outwardly into sleeves 68 thereby to dry the sleeves.

As more fully described in my aforesaid patent, front and back stationary press plates or clamps, shown by the dashed lines 84 and 86, are provided interiorly of the bag 50 and cooperate with front and back movable press plates or clamps 80 and 90. Front press plate 88 is moved upwardly from an inactive position to an upwardly extended position by a conventional pneumatic cylinder 92. Arrival of the front pressing plate 88 at its upper, extended position is sensed by linkage 94 which actuates a valve 96, thereby to actuate pneumatic cylinder 98 which pivots cylinder 92 and front pressing plate 88 inwardly, as shown by the arrow 100, to its active position cooperatively engaging stationary pressing plate 88 with bag 50 and the front part of body portion 66 of the garment therebetween, as shown in FIG. 2. Rear pressing plate 90 is actuated between its inactive and active, pressing position by conventional pneumatic cylinder 102.

A pair of sleeve expanding mechanisms 104 are provided for expanding the sleeves 68 of the garment 62 during the steaming and drying cycles. Since the two sleeve expanding mechanisms 104 are identical, detailed description of one will suffice.

Referring now specifically to FIGS. 3 through 6 of the drawings, each of the sleeve expanding mechanisms 104 includes a pair of elongated sleeve expanding elements 106, 108, having a somewhat curved configuration, as best seen in FIG. 3, in order to conform to the sleeves 68 and provide the desired shape thereto. A pair of generally L-shaped lever members 110, 112 are provided respectively having upstanding long legs 114, 116 and short legs 118, 120. Expanding elements 106, 108 are respectively pivotally connected to the

upper ends 122, 124 of the long legs 114, 116, as at 126, 128. A suitable coil spring 130 is connected between long leg 116 and expanding member 108 thereby to bias the lower end 132 of expanding member 108 toward long leg 116.

Lever members 110, 112 are pivotally connected adjacent the junctures of their long and short legs to a bracket member 134, as at 136, 138. Suitable coil springs 140 and 142 respectively connect short leg 118 of lever member 110 and long leg 116 of lever member 112, and short leg 120 of lever member 122 and long leg 114 of lever member 110, thereby biasing long legs 114, 116 toward each other with expanding elements 106, 108 thus being in their collapsed positions, as shown in FIGS. 1 and 3.

A suitable pneumatic cylinder 144 is provided pivotally connected to an angle bracket member 146, as at 148 (FIGS. 5 and 6). Bracket member 146 in turn has its flange portion 150 secured to a respective side of housing 28 with the cylinder 144 thus being inclined upwardly and rearwardly toward upstanding frame portion 24, as best seen in FIGS. 1, 2 and 3. Cylinder 144 has a piston rod 152 movable between a retracted position, as shown in FIG. 3, and an extended position, as shown in FIG. 4. Bracket member 134 is attached to the upper end 154 of piston rod 152 and thus, upward extension of piston rod 152 from its retracted position, as shown in FIG. 3, to its extended position, as shown in FIG. 4, results in longitudinal upward movement of lever members 110, 112 and expanding elements 106, 108 to their upper, extended positions, as shown in FIGS. 2 and 4.

In order pivotally to move expanding elements 106, 108 from their collapsed position, as shown in FIGS. 1 and 3 to their expanded position, as shown in FIGS. 2 and 4, in response to extension of piston rod 152 of cylinder 144, a pair of lost-motion links in the form of elongated rods 156 and 158 are provided respectively having their upper ends 160, 162 pivotally connected to short legs 118, 120 of lever members 110, 112. Rod elements 156, 158 slidably pass through openings in restraining members 164, 166 rigidly secured to cylinder 144 by collar 168. Abutments 170, 172 are respectively attached to the lower ends of rod elements 156, 158.

Inspection at FIGS. 3 and 4 will reveal that as the piston rod 152 moves upwardly in the direction shown by the arrow 174 from its retracted position (FIG. 3) toward its extended position (FIG. 4), rod elements 156, 158 will slide upwardly through the openings in restraining members 164, 166, and springs 140, 142 will thus maintain lever members 110, 112 and elongated expanding elements 106, 108 in their collapsed positions, as shown in FIG. 3. When piston rod 152 reaches a point in its upward travel in direction 174 determined by the length of rod elements 156, 158, abutments 170, 172 will engage restraining members 164, 166, thereby inhibiting further upward movement of rod elements 156, 158. Thus, as piston rod 152 continues its upward movement beyond such point, rod elements 156, 158 will exert downward force on short legs 118, 120 of lever members 110, 112 causing them to pivot downwardly, as shown by the arrows 176, in turn causing the long legs 114, 116 and the expanding elements 106, 108 to pivot outwardly, against the force exerted by springs 140, 142 to their expanded positions, as shown in FIGS. 2 and 4. It will be appreciated that only a very small amount of additional upward travel of rod 152 is necessary beyond the point at which abutments 170, 172 is necessary beyond the point at which abutments 170, 172 become effective, in order to reach its fully extended position in which shaping elements 106, 108 are in their expanded position.

Inspection of FIG. 1 will reveal that in the retracted, collapsed position of expanders 104, expanding elements 106, 108 are at least partially withdrawn from the open ends of sleeves 68, the extent of such withdrawal depending, of course, upon the length of the sleeves of the particular garment dressed on the form. Thus, when the operator dresses the garment 62 upon the form, the upper ends 180 of the expanding elements, 106, 108 may readily be inserted in the open ends of sleeves 68. In section of FIG. 2 will reveal that in

the extended, expanded position of expanders 104, a substantial length of the expanding elements 106, 108 is received within the sleeves 68 of the garment 62 thereby to shape the sleeves during the above-described steaming and drying operations. It will be readily seen that after initial insertion of the upper ends 180 of expanding elements 106, 108 in the open ends of sleeves 68, and upon actuation of the automatic cycling system of the apparatus to be hereinafter described, expanding elements 106, 108 move longitudinally upwardly in their collapsed position into the sleeve 68 very nearly to their fully extended position before expansion to their expanded position takes place.

Referring briefly to FIGS. 1 and 2, it will be observed that in the dressing position of expanders 104, i.e. with the expanding elements 106, 108 in their retracted, collapsed position, the expanders 104 are spaced somewhat away from bag 50 and garment 62 in order to facilitate dressing sleeves 68 over the collapsed, retracted expanders. During the finishing operation however, expanders 104 are pivotally moved inwardly toward the bag to a position for properly finishing of the sleeves. Referring now specifically to FIGS. 5 and 6, in order to provide this pivotal movement of expanders 104, cylinder 144 is pivotally mounted on bracket 146, as at 148, as above-described. A lever member 182 is provided pivotally connected to a bracket 184, as at 186, bracket 184 being rigidly attached to cylinder 144 at a point thereon spaced from pivot 148 on the side thereof remote from piston rod 152. Lever member 182 has a normal position, as shown in solid lines in FIGS. 5 and 6, when piston rod 152 and expanding elements 106, 108 are in their retracted positions.

A pair of adjustable stops 188, 190 are provided to flange 150 of bracket 146 and extending toward cylinder 144. Lever member 182 has an abutment 192 thereon at its end 194. Abutment 192 at all times engages the end of stop 190, thereby providing a fulcrum for pivotally moving lower end 206 of cylinder 144 to its outer position, as shown in the dashed lines at 206a, as will shortly be described. In the retracted position of cylinder 144, as shown in solid lines in FIGS. 5 and 6, and with stop 190 engaging abutment 192 of lever member 182 in its normal position, end 196 of stop 188 is spaced from mounting bracket 198 which supports cylinder 144.

A coil spring 200 is provided connected between end 202 of lever member 182 and bracket 134 at the upper end of piston rod 152 of cylinder 144 to which lever member 110, 112 are pivotally connected. As piston rod 152 moves upwardly from its retracted toward its extended position, spring 200 is extended exerting pivotal upward force on end 202 of lever member 182, thus causing it to pivot upward in the direction shown by the arrow 204 to the position shown in dashed lines at 182a. During this pivotal upward movement of lever member 182, abutment 192 acts as a fulcrum against the end of stop 190 thus pivoting pivot 186, bracket 184 and the lower end 206 of cylinder 144 outwardly, as shown by the arrow 208, to the position shown in dashed lines at 184a, 186a and 206a, in turn pivotally moving the upper end 210 of cylinder 144 together with piston rod 152, lever members 110, 112 and expanding elements 106, 108 inwardly toward bag 50, as shown by the arrow 212, to the position shown in dashed lines at 210a.

It will now be seen that longitudinal upward movement of piston rod 152 of cylinder 144 of each expander mechanism 104 results in the accomplishment of three functions, i.e. longitudinally upward movement of expanding elements 106, 108, lateral expansion of the expanding elements from their collapsed to their expanded positions, and lateral, pivotal inward movement of the expanding elements 106, 108 from their outer, spaced positions to their inner positions adjacent bag 50.

Referring now to FIG. 7, with the exception of the blower drive motor 60, the above-described apparatus is entirely pneumatically operated and controlled. A high pressure air input line 214 is provided adapted to be connected to a source

of high pressure air (not shown), and has a conventional regulator 216 connected therein. Regulator 216 is coupled by line 218 to valve 220 which is actuated by foot pedal 222 to initiate the automatic cycle of operation following pressing of the garment 62 on the form and insertion of the expanding elements 106, 108 in the open ends of sleeves 68. Valve 220, when actuated by foot pedal 222, connects line 224 to line 218 and regulator 216, line 224 being connected to a manifold 226. Line 224 is also connected by line 228 to timing cylinder 230, line 228 having an exhaust valve 232 therein to permit exhaust at cylinder 230 upon the retraction of its piston rod 234 by internal spring 236. Piston rod 234 has a cam assembly 238 associated therewith and upward movement of cam assembly 238 by piston rod 234 in the direction shown by the arrow 240 causes the cams of cam assembly 238 sequentially to actuate the several valves, as will now be described.

Valve 242 is actuated to its open position by cam 244 in the normal, at rest position of cam assembly 238. Thus, when valve 220 is actuated by foot pedal 222, valve 242 connects manifold 226 to line 246 which is coupled to pneumatically actuated valve 48 thereby initially to admit steam to cavity 44 of buck 30 for outward flow through openings 42 therein, thereby to dampen and heat the shoulder and collar region 64 of garment 62.

Valve 248 is also normally actuated to its open position by cam 250 in the at rest position of cam assembly 238 thereby coupling manifold 226 to line 252 to actuate pneumatically actuated valve 56 so as to inject steam into bag 50 to dampen and heat the body portion 66 of garment 62 on the bag 50. In the applicant's apparatus, steam injected into the bag 50 by line 54 does not inflate the bag. As cam assembly 238 moves upwardly in direction 240 by extension of piston rod 234 of cylinder 230, cam 244 first moves off of valve 242 thereby to germinate the buck steam, and shortly thereafter, cam 250 moves off of valve 248 thereby to terminate the bag steam.

Continued upward movement in direction 240 of cam assembly 238 results in cam 254 actuating valve 256 to its open position to couple line 258 to manifold 226, thereby actuating cylinder 82 to move grid plate 76 to its lower pressing position, as shown in FIG. 2, it being observed that grid plate 76 is not lowered to its pressing position until both the bag and buck steam have been terminated by closing of valves 242 and 248. At the same time, cam 260 actuates valve 262 to its open position thereby coupling manifold 226 to line 264. Line 264 is coupled to pneumatically actuated switch 266 and opening of valve 262 thus actuates switch 266 to couple blower drive motor 60 to a source of energizing potential 268, thereby to initiate operation of blower 58 to inflate the bag. Further continued upward movement in direction 240 of cam assembly 238 will first result in cam 254 moving off of valve 256 thereby closing the same to terminate the application of air to cylinder 82 so that grid plate 76 is pivotally moved to its upper position under the influence of a suitable spring 270. The operation of blower 58 is continued for an appreciable time thereafter until cam 260 moves off of valve 262 so as to close the same thereby deactuating switch 266 to deenergize motor 60 and terminate operation of blower 58. Line 264 is also coupled to cylinder 272. A vacuum line 274 communicates with cavity 44 in buck 30 and is coupled to a source of vacuum (not shown). Cylinder 272 actuates the vacuum valve 276 in vacuum line 274 so that vacuum is applied to cavity 44 thereby to draw air inwardly through openings 42 in buck 30 so as to dry the shoulder and collar regions of the garment during operation of the blower 58.

Line 224 also has line 278 coupled thereto which is coupled to shoulder expander cylinder 72 by line 280; to the rear press plate cylinder 102 by line 282; and to front press plate cylinder 92 by lines 284 and 286. Valve 96 couples line 286 to the front press plate tilting cylinder 98 by line 288. Lines, 278, 284 and 290 couple line 224 to cylinders 144 of expanders 104. Thus, actuation of foot pedal 222 to open valve 220 thereby to couple line 218 and regulator 216 to line 224 results not only in initiation of operation of the cam assembly

238, but also results in simultaneous actuation of the front and rear press plates 88, 90, and simultaneous actuation of the expander cylinders 144, as above-described.

A manually actuated disabling valve 292 is provided in line 58 to permit selective disabling of cylinder 82 so that grid plate 76 will not be moved to its lower position, as in the case of finishing a coat having a fur collar, and manually actuated valve 294 in line 290 permits disabling cylinders 144 so that expanders 104 will not be actuated, as in the case of finishing a garment having short sleeves or no sleeves. Conventional exhaust valves 296, 298, 300 and 302 are provided for exhausting cylinders 82, 102, 92, 98 and 144.

At the conclusion of the timing cycle, cam 304 actuates valve 306 to its open position thereby coupling lines 308 and 310 to manifold 226. Line 310 is coupled to cylinder 312 which actuates valve 220 to its closed position, thereby terminating the application of air to line 224, thus deactuating timing cylinder 230, shoulder expander cylinder 72, front press plate cylinders 92, 98, back press plate cylinder 102 and expander cylinders 144.

An air pressure indicating gauge 314 is coupled to line 218 and is in turn coupled to line 310 by manually actuated valve 316. Actuation of valve 316 provides immediate termination of the entire cycle of operation.

Line 318 is coupled to line 218 and regulator 216, and is coupled by valve 320 to line 322, directly coupled to line 252 and pneumatically actuated valve 56 which admits steam the interior of bag 50. Valve 320 is actuated by a suitable foot pedal 324. Thus, actuation of foot pedal 324 to open valve 320 permits operator-controlled injection of steam into bag 50 prior to the timer-controlled injection of steam for presteaming the body portion 66 of the garment 62. Since application of high pressure air by valve 320 to line 322 results in application of high pressure air to line 252 which is coupled to the normally open valve 248, and thus would otherwise be coupled to line 224, a restriction 326 is provided in line 252 to inhibit the reverse application of air pressure to valve 248.

Line 318 is also coupled by valve 328 to line 330 which is directly coupled to line 264. Valve 328 is actuated by another foot pedal 332. Thus, actuation of foot pedal 332 to open valve 328 will permit direct application of high pressure air to pneumatically actuate switch 266, and to vacuum cylinder 272 to actuate vacuum valve 276, thus permitting manually actuated operation of blower 58 and application of vacuum to chamber 44 of buck 30 for additional drying of the garment if desired.

Cam-actuated valve 306 has an exhaust 334 associated therewith for exhausting cylinder 312. Since the exhaust 334 is open when valve 306 is in its closed position, actuation of valve 316 which terminates the cycle would otherwise result in backward flow of high pressure air through line 308 and exhaust 334. To prevent this occurrence, a restriction 336 is provided in exhaust 334.

Cam-actuated valve 262 likewise has an exhaust 338 which is open when valve 262 is closed to permit exhaust of vacuum valve-actuated cylinder 272. It will be observed that actuation of valve 328 will result in the application of high pressure air to line 264 which otherwise would flow through the open exhaust 338, and to prevent this occurrence a restriction 340 is provided in exhaust 338.

It will be observed that the expander mechanisms 104 may be incorporated in other types of air-steam garment finishing apparatus, such as in a pants topper to shape and finish the legs of pants.

It will now be seen that the invention provides garment finishing apparatus of the air-steam type incorporating automatically actuated expanders for appendage portions of the garment which reduce the time required for dressing the garment upon the form, reduce operator fatigue, and improve the quality of the finished garment.

While there have been described above the principles of this invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of the invention.

I claim:

1. Garment finishing apparatus comprising: a frame, fluid-pervious inflatable bag supported on said frame and adapted to have at least a part of the body portion of a garment dressed thereon with a pair of open-ended appendage portions of said garment extending from said body portion, first means for supplying hot, wet vapor, to the interior of said bag thereby to dampen and heat said body and appendage portions, second means for supplying dry vapor under pressure, to the interior of said bag thereby to inflate said bag and to dry said body and appendage portions, and a pair of means for respectively expanding said appendage portions thereby to shape the same at least during said drying of said garment, each of said expanding means including a pair of elongated expanding elements adapted to be inserted in the open end of a respective appendage portion, and means supported on said frame for mounting said expanding elements for movement between collapsed and expanded positions each of said mounting means including means for further longitudinally moving the respective pair of expanding elements between a retracted position in which said elements are at least partially withdrawn from the respective appendage portions, and an extended position in which a substantial length of said elements is received within the respective appendage portion, and means for moving the respective pair of elements from its collapsed to its expanded position in response to movement thereof from its retracted to its extended position.

2. The apparatus claim 1 wherein each of said mounting means further includes means for pivotally moving the respective pair of expanding elements laterally with respect to said bag in response to movement of the pair of expanding elements from its retracted to its extended position.

3. Garment finishing apparatus comprising: a frame, a fluid-pervious inflatable bag supported on said frame and adapted to have at least a part of the body portion of a garment dressed thereon with a pair of open-ended appendage portions of said garment extending from said body portion, first means for supplying hot, wet vapor, to the interior of said bag thereby to dampen and heat said body and appendage portions, second means for supplying dry vapor under pressure, to the interior of said bag thereby to inflate said bag and to dry said body and appendage portions, and a pair of means for respectively expanding said appendage portions thereby to shape the same at least during said drying of said garment, each of said expanding means including a pair of elongated expanding elements adapted to be inserted in the open end of a respective appendage portions, means supported on said frame for mounting said expanding elements for movement between collapsed and expanded positions, at least one stationary press plate supported on said frame within said bag, at least one movable press plate supported on said frame exteriorly of said bag, and cooperating with said stationary press plate, means for moving said movable press plate between an inactive position and a pressing position engaging said stationary press plate with portions of said bag and said garment body portion therebetween, and means for simultaneously actuating said movable press plate to its pressing position and each of said pair of expanding elements to its expanded position.

4. Garment finishing apparatus comprising: a frame, a fluid-pervious inflatable bag supported on said frame and adapted to have at least a part of the body portion of a garment dressed thereon with a pair of open-ended appendage portions of said garment extending from said body portion, first means for supplying hot, wet vapor, to the interior of said bag thereby to dampen and heat said body and appendage portions, second means for supplying dry vapor under pressure, to the interior of said bag thereby to inflate said bag and to dry said body and appendage portions, and a pair of means for respectively expanding said appendage portions thereby to shape the same at least during said drying of said garment, each of said expanding means including a pair of elongated expanding elements adapted to be inserted in the open end of a respective appendage portion, means supported on said frame for mounting said expanding elements for movement between collapsed and

expanded positions, each of said mounting means including a fluid power cylinder, means for attaching said cylinder to said frame, said cylinder having a piston rod longitudinally movable between retracted and extended positions, means for connecting the respective pair of elements to said piston rod for longitudinal movement therewith, said elements being at least partially withdrawn from the respective appendage when said piston rod is in said retracted position and having a substantial length thereof received within the respective appendage in the position of said piston rod, and means connected to the respective pair of elements for moving the same from its collapsed to its expanded position in response to movement of said piston rod from its retracted to its extended position.

5 5. The apparatus of claim 4 wherein each of said connecting means comprises a pair of lever members respectively pivotally connected to said piston rod, each of said lever members being connected to a respective elongated element of a respective pair, and means for normally biasing said lever members toward each other thereby holding the respective pair of elongated members in their collapsed position, each of said moving means comprising linkage means respectively coupled to said lever member for pivotally moving the same laterally away from each other thereby moving the respective pair of elongated members to their expanded positions when said piston rod reaches a predetermined point in its movement from its retracted to its extended position.

6. The apparatus of claim 5 wherein each of said lever members is generally L-shaped and has relatively long and short legs, one end of each of said long legs being pivotally connected to the respective elongated element intermediate its ends, said biasing means comprising springs respectively connecting the short leg of one lever member and the long leg of the other lever member of each pair, said linkage means comprising a pair of lost-motion link elements respectively having one end connected to a short leg of a respective lever member, said link elements having a predetermined length, and means for restraining movement of the other ends of said link elements when said piston rod reaches said predetermined point determined by the length of said link elements whereby continued movement of said piston rod beyond said predetermined point toward its extended position causes said link elements respectively to exert force on said short legs of said lever members thereby pivotally to move said long legs apart against said springs.

7. The apparatus of claim 4 wherein said attaching means comprises a pivotal connection of said cylinder to said frame whereby said cylinder and the respective pair of elongated elements are pivotally movable laterally between a position in which said elements are spaced from said bag and a position in which said elements are adjacent said bag, and further com-

prising linkage means connected to said cylinder for moving said cylinder and elements from said spaced position to said adjacent position in response to movement of said piston rod from its retracted to its extended position.

8. The apparatus of claim 7 wherein said cylinder and elements are normally in said spaced position when said piston rod is in said retracted position, said linkage means comprising another lever member pivotally connected to said cylinder at a point thereon spaced from said pivotal connection on the side thereof remote from said piston rod, said other lever member being movable between first and second positions, said other lever member having a portion engaging said frame and pivotally moving said cylinder to said adjacent position in response to movement of said other lever member from said first to said second position, said other lever member being in said first position when said piston rod is in its retracted position, and means for connecting said other lever member to said piston rod whereby movement of said piston rod toward said extended position moves said other lever member to said second position.

9. The apparatus of claim 8 wherein said last-named connecting means is a spring.

10. The apparatus of claim 6 wherein said link elements comprise elongated rods, said restraining means comprising members connected to said cylinder and having a lost-motion connection with said rods, said members engaging abutments on the other ends of said rods when said piston rod reaches said predetermined point, said attaching means comprising a pivotal connection of said cylinder to said frame whereby said cylinder piston rod, and the respective pair of elongated elements are pivotally movable laterally between a position in which said elements are spaced from said bag and a position in which said elements are adjacent said bag, said cylinder and the respective pair of elements being normally in said spaced position when said piston rod is in said retracted position, and further comprising another lever member pivotally connected to said cylinder at a point thereon spaced from said pivotal connection on the side thereof remote from said piston rod, said other lever member being movable between first and second positions, said other lever member having a portion engaging said frame and pivotally moving said cylinder to said adjacent position in response to movement of said other lever member from said first to said second positions, said other lever member being in said first position when said piston rod is in its retracted position, and a spring connecting said lever member and said piston rod whereby movement of said piston rod toward said extended position moves said other lever member to said second position thereby pivotally moving said cylinder and the respective pair of elongated elements to said adjacent position.

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