AUTOMATED APPARATUS FOR TOPPING TROUSERS AND METHOD OF OPERATING THE SAME

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ABSTRACT

An automated apparatus for shaping the tops of various types of trousers includes a buck, a rapidly collapsible bag mounted on the buck, and an electrical circuit equipped with switches operable to control selected movements of a waistband support within the bag, a fly-pressing plate and a pair of pleat-pressing plates exteriorly of the bag, a source of steam and a source of heated air for introduction into the bag. A method for selectively shaping trousers which have a fly but no pleats, or which have a fly together with pleats, or which comprise slacks with neither fly nor pleats, is disclosed with sequences of treatment commensurate with the nature of the fabric material or construction of such trousers.

23 Claims, 18 Drawing Figures
AUTOMATED APPARATUS FOR TOPPING TROUSERS AND METHOD OF OPERATING THE SAME

BACKGROUND OF THE INVENTION

It has long been known that trousers may be shaped, finished, pressed and creased by applying steam thereto while the garment is held between a buck and a pressing plate, or may be shaped and finished by supporting it on a fluid-pervious bag to which steam, or steam and air, are supplied either simultaneously or sequentially under control of automatic timing means and while the garment is held tautly on the expanded bag. Moreover, the use of a contoured buck and the pivoted movement of pressing plates adapted to selectively engage and hold the garment while on the buck, is well known.

Air operated motors for actuating plaat plates or waistband supports, as for example those disclosed in Forse, U.S. Pat. No. 3,477,621, or in Hower, U.S. Pat. No. 3,421,668 respectively are known, but rather than employing a biasing spring or a vacuum source for retracting the movable piston, the present invention employs a simple two-way differential air operation using a three-way valve rather than the more costly and complicated four-way valve usually employed.

Moreover, it is conventional to employ in connection with trouser topping apparatus a series of operator-actuated controls, many of which necessitate an awkward and laborious movement of the hands of the operator, especially in conjunction with the laying of pleats. By contrast, the present invention provides a buck structure on which the trousers are conveniently supported for the pleat-laying operation and with certain sensor switches incorporated into that buck at locations where the operator's hands normally pass at the conclusion of the fly or pleat-laying operation, such switches serving to initiate automatic functions of the apparatus.

SUMMARY OF THE INVENTION

The method of the invention and the apparatus used for carrying out the same provides for the fully automated shaping and finishing of the tops of trousers of various types and constructed of various fabrics. The buck is inclined to provide a surface on which pleats and fly may be laid and serves to mount sensor switches over which the operator's hands pass in a normal manner. The buck, moreover, includes a metallic element in a low-voltage circuit of the electrical control system for the machine. The bag to be employed with the buck includes weights suspended therein to cause rapid collapsing of the bag when air supply is terminated and the waistband support is retracted; and in addition to aid in dressing the garment on the buck by directing the leg portion of the bag properly into the legs of the trousers.

The movable fly clamp, pleat clamps, waistband support, and damper-positioning member are selectively actuated by a compressed air system including motors for moving these elements, and which motors are biased by air pressure to hold the elements in their normal positions. A steam system and a processing air system also are provided, and together with the actuation of the air motors are controlled by means of switches in a electrical circuit means. Such switches serve to establish selective circuits by means of which the method may be carried out automatically in certain sequences, or optionally with manual intervention in other sequences.

Among the objects of the invention are the provision of: an improved buck for use in a trouser-topping apparatus; an improved bag for use in a trouser-topping apparatus; an improved arrangement of fly clamp and a pair of pleat clamps in combination with a trouser-topping buck and with pressure-biased air motors for moving the clamps; an improved arrangement of waistband support in combination with a bag and a pressure-biased air motor for moving the waistband support; an improved arrangement of a air supply damper and a pressure-biased air motor for positioning the damper; an improved system for selectively adjusting the pressure exerted by fly and pleat clamps upo trousers mounted on a buck; an improved electrical circuit for operating a trouser-topping apparatus and employing a low-voltage alternating current in grounded and isolated circuits for the protection of the operator; an improved method for topping trousers which have a fly but no pleats; an improved method for topping trousers which have a fly and pleats; an improved method for topping trousers which have neither fly nor pleats; an improved method for topping trousers requiring no steam preconditioning; and an improved method for topping trousers requiring a degree of steam preconditioning less than a normal amount of such preconditioning.

These and other objects and advantages of the invention will become more apparent as the description proceeds and when considered in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of the front of the apparatus with trousers removed therefrom, and indicating the location of the inclined stationary buck, the retracted plates, and certain switches.

FIG. 2 is a perspective view to a smaller scale showing a pair of trousers dressed on the apparatus of FIG. 1, and with the plates in garment-engaging position.

FIG. 3 is a rear perspective view similar to FIG. 2 and indicating the location of steam and compressed air connections to the apparatus.

FIG. 4 is a perspective view of the improved bag with parts broken away.

FIG. 5 is a side elevation view, with parts broken away, showing the fan and duct system of the apparatus and diagrammatically illustrating the raising of a pair of trousers toward the buck and the collapsed bag.

FIG. 6 is a schematic illustration of the steam system for the apparatus and indicated in perspective.

FIG. 7 is a front elevation view of the bag in collapsed condition as mounted on the buck and indicating diagrammatically the normal positions occupied by the weights within the bag.

FIG. 8 is a front elevation view similar to FIG. 7 but showing the bag in inflated condition and the correspondingly shifted positions of the weights.

FIG. 9 is a rear view of the buck with the bag in collapsed condition and with parts of the apparatus shown in section; the view indicating the cord suspension of the weights and the location of the steam tubes for delivering steam into the interior of the bag.

FIG. 10 is a front elevation view of the buck with the bag removed therefrom and indicating the relative locations of the pressure sensitive switches for operating the fly and the pleat-pressing plates.

FIG. 11 is a sectional view of the finger tip control switch taken on line 11—11 of FIG. 10.

FIG. 12 is a sectional view of the switch for the left pleat-pressing plate taken on line 12—12 of FIG. 10.

FIG. 13 is a schematic view illustrating the compressed air system and the elements actuated therefrom, as shown in perspective.

FIG. 14 is a top plan view of the structure with the cover removed and indicating the location of the compressed air motor for actuating the clamps and the damper.

FIG. 15 is a plan view of the manifold element which houses solenoid-actuated valves, and indicating the air line connections to and from the manifold.

FIG. 16 is a sectional view taken on line 16—16 of FIG. 15 and indicating the air passages within the manifold, and with the valves removed for purposes of clarity.

FIG. 17 is a sectional view taken on line 17—17 of FIG. 15, and indicating certain air passages within the manifold; and FIG. 18 is a schematic diagram showing electrical connections to the electrically operated elements of the apparatus.
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GENERAL ARRANGEMENT OF PREFERRED EMBODIMENT

The automated apparatus for topping trousers and the method for operating the same in accordance with the invention employs a stationary structure 10 as shown generally in FIG. 1 including a baseplate 11, a hollow vertical portion 12 and a forwardly projecting hollow upper portion 13 in communication with the vertical portion 12. The portion 13 is suitably inclined so as to place its forward end higher than its rearward end. Rigidly attached to the forward end of portion 13 is a stationary buck 14 having its front surface contoured to the shape of trouser fronts and inclined relative to the transverse vertical plane so that its lower end is positioned forwardly of the junction of its upper end with the portion 13. As will later appear the upwardly facing surface of the buck provides for the laying of trouser pleats and fly there against in cooperation with a switch actuation.

A clamping plate 15 for selectively engaging and pressing the left pleat (as viewed by the operator) of a trouser top is carried by an arm 16 pivotally mounted at 17 on the left side of the housing portion 13 and is raised and lowered by a compressed air motor located within the portion 13, and automatically operated in the manner later to be described. As shown in FIG. 3, a companion clamping plate 18 carried by arm 19 pivotally attached at 20 on the other side of housing portion 13, and which likewise is actuated by another motor within the portion 13, serves to selectively engage and press the right pleat of a trouser top.

In accordance with the invention, and in contrast to conventional mounting of pleat plates, the length of arms 16 and 19 is relatively short due to the mechanical movement resulting from the air motor drives associated with these arms. Thus, the plates lower and raise more rapidly and result in a minimum of displacement of a laid pleat during engagement and disengagement of the pleat clamps therewith and therefrom.

In addition, a fly-pressing plate 21 is carried by an arm 22 pivotally attached at 23 to the forward end of housing portion 13, and in turn is actuated by another motor mounted within that housing portion and as later to be described. A U-shaped frame 24 attached to the lower front face of housing portion 12 supports a cloth tray 25 adapted to receive the cuffs and lower leg portions of the trousers and to prevent them from touching the floor. A water spray gun 26 fed through a flexible hose 27 and supported from the rigid condensate conduit 28 is provided for touchup treatment of the trousers when so required.

The front of the vertical housing portion 12 provides a mounting for various control elements of the automated apparatus including an adjustable air pressure regulator 29 with its associated air gage 30 and a second adjustable air pressure regulator 31 with its associated air gage 32. As will later appear, the clamping pressure to be exerted upon trouser pleats and the rapidity of movement of the waistband support may vary with the types of trousers being shaped, or with preference of the operator in conducting his duties, merely by adjusting regulators 29 and 31 and by observing the pressure readings on gages 30 and 32 the operator can conveniently select the proper pressure of his choice. As seen in FIG. 13 and as will be more fully described under the heading of Compressed Air System, a third adjustable air regulator 33 with an associated air gage 160 are located within the rear of housing portion 12 and are in communication with a compressed air supply line 34 extending from the rear of the apparatus and including a relief valve 35, an orifer 36 for providing lubrication of pistons of the cylinders later to be described, and a strain relief 36a. Also extending from the rear of the apparatus are a steam supply line 37 and a steam return line 38 provided with a trap 39 and the operation of which will be described under the heading of Processing Air and Systems. The electrical connections for the apparatus to be described under the heading of Electrical Control System may be made to that apparatus through an outlet 40 (FIG. 3) located at the rear of the housing portion 12.

A power switch 41 (FIGS. 1 and 18) and an air selector switch 43 are mounted upon a removable panel 42 forming part of the front face of the apparatus, and a three position selector switch 44 is mounted on the left side of the upper portion 13 of the housing. An adjustable steam timer 45 and an adjustable air timer 46, the functions of which will later be described with respect to the nature of the garments being processed, are also mounted upon panel 42. Moreover, a series of individually operated foot-actuated switches 47, 48 and 49 the functions of which will also be described with respect to the different operations of the apparatus, are mounted at the front end of the baseplate 11.

An improved bag 50 later to be described under the heading, Bag and Buck, is mounted upon the buck 14 and encompasses a rear waist band support 53 as well as the sensor-operated switches 55, 56 and 57 which are mounted on the forward surface of that buck. A fingertip control switch 54 the function of which will later appear, projects from the forward convex face of the housing portion 13.

PROCESSING AIR AND STEAM SYSTEMS

Referring now to FIGS. 5 and 14, a blower housing 60 located in the portion 12 of the apparatus includes a blower wheel 61 driven by motor 62. Air entering through lateral opening 63 is forced by the blower into an upwardly directed duct 64 and thence into the hollow upper portion 13 of the structure past a control damper 65. A steam radiator 66 located in duct 64 serves to heat the air during this passage.

The sidewalls 67, 68, floor 69, and removable top 70 of the inclined upper portion 13 serve as a heated air enclosure which confines the heated air and directs it through an opening 71 in the forward end of the floor, and thence into the bag 50, as will later appear. Mounted within the confines of this enclosure is a double-acting air motor 72 having a piston rod 73 in its cylinder. This piston rod is connected to lever 74 pivotally mounted on transverse rod 75 and the lever carries a roller 76 at its lower end and which engages with damper 65 to move the same to closed position. When roller 76 is lifted, the damper is free to open under the pressure of air supplied by blower 61. A pair of double-acting air motors 77 and 78 has its piston rods 79, 80 connected to levers 81, 82 for pivotally moving the respective left-hand and right-hand clamps 15 and 18, and these motors likewise are housed within the enclosure.

In addition, a double-acting air motor 83 housed in the enclosure has a piston rod 84 attached to the pivoted arm 22 which carries the fly-pressing plate 21. Furthermore, an elongated double-acting air motor 85 has its forwardly extending piston rod 86 connected to plate 87 which slides in a groove on the underside of floor 69 of the enclosure, and with the plate 87 being attached to the waistband support 53 in the bag 50 (FIG. 4). As best seen in FIG. 5 the motor 85 is mounted within the portion 12 of the housing and with its piston rod 86 extending through the front wall of that housing portion.

A frictionally held lever 90 is also pivotally mounted at 91 within the inclined enclosure and the lower end of this lever is moved to selected positions above the damper 65 thus to limit the opening of the damper and to regulate the volume of air which can flow into the above-described enclosure. A rod 92 connects the lever 90 to a second lever 93 pivotally mounted at 94 on the right wall 68 (FIG. 14) and is adapted to be manually operated by a suitable actuator 95 on the exterior of that wall. Thus the operator may establish the desired amount of airflow as required for the proper drying of the garment.

Passing now to FIG. 6, the steam supply line 37 is connected to a suitable steam chamber 97 mounted upon the rear of the housing portion 12, FIG. 3, and a steam valve 98 at the upper end of the chamber is controlled by a solenoid 99, which when energized opens the valve to pass steam into tube 100 and thence to the inlet connection 101 leading to a perforated
steaming tube 102 affixed to the inner surface of buck 14 and adapted to spray conditioning steam into the interior of bag 50. A companion heating tube 103 mounted on the interior of the buck receives steam from a tube 104 connected to a lower portion of the steam chamber 97, and this steam after serving to heat the buck then passes into a tube 105 connecting with the radiator 66. An outlet tube 107 from the radiator then conducts wet steam and condensate back to a return pipe 106. Connected to this return pipe and at a lower elevation is a condensate chamber 108 with a tube 109 extending therefrom and controlled by a manually operated valve 110. Tube 109 is connected to the rigid conduit 28 which supplies the water to be sprayed from gun 26. A coiled tension spring 111 attached to this conduit and to the flexible hose 27 supports the gun in ready position for use. The steam trap 39, as will be understood, discharges excess amounts of collected condensate from the return pipe 106 back into the main steam return line 38.

BAG AND BUCK CONSTRUCTION

The inclined buck 14 comprises a metallic baseplate 120 contoured to the shape of the trouser top and having perforations 121 distributed uniformly over its surface. The upper end of the base portion is rigidly attached to the front wall of the described pump portion 13 of the bucket moving forwardly of the opening 71 therein. As seen in FIGS. 10 to 12 the buck is grounded as at 222 and forms part of a low-voltage circuit when any one of the switches 54, 55, 56 or 57 is closed. The fingertip switch 54 is exposed above the bag and upon pressing of an outwardly biased conductive lever 123 attached to plate 120 against a conductive pin 124 insulated in bushing 125 a circuit is made to wire 326 and will later appear under the heading, Electrical Control System. The sensor switches 55, 56 and 57, however, are disposed on the buck at locations where the operator's hands normally pass in the dressing of the garment or laying of pleats, and are covered by the padding of the buck and the attached bag. FIG. 12 illustrates the construction of these sensor switches in which an outwardly biased conductive lever 127 for switch 57 is attached to plate 120 and is pressable against a conductive pin 128 insulated in bushing 129 and making a circuit to wire 130. Similarly switches 55 and 56 are adapted to make circuits to wires 131, 132 (FIG. 18) respectively.

As will be understood, a conventional soft pad of perforated heat-resistant sponge rubber or the like is fitted over the front of the buck plate and permits passage of air or steam from the interior of the bag and into contact with the trousers being held on the buck. This pad, however, while overlying the levers 127 of the respective switches 55, 56 and 57 is sufficiently resilient to permit the levers of the respective sensor switches to retain their open-biased positions until brushed by the operator's hand.

For use with the described buck the improved bag 50, which may be of nylon cloth, has a shape conforming to the trouser top and includes a front panel 135 shaped to fit over the pad, and which panel may be constructed of a woven nylon and asbestos thread fabric. The upper edge of this panel is padded and stitched to form a tubular sleeve 136 for a flexible cord 145 and the sleeve 137 forms a housing for a flexible cord 138. The rear body portion 134 of the bag generally conforms to the seat and top leg portions of the trousers. In addition the bag comprises a top panel 139 and depending leg portions 140, 141 in which suspended weights 142, 143 respectively are suitably located and which function to cause a rapid deflation of the bag; to aid in the rapid removal of trousers from the bag; and to prevent folding of the bag as trousers are dressed thereon.

The forward end of top panel 139 is folded to provide a tubular sleeve 144 for reception of the flexible cord 145 and the sleeve 144 is spaced from the sleeve 136 to leave an opening into which heated air may be directed from the overhead duct. The side and rear perimetral portions of the top panel are stitched to the body portion 134 of the bag, and the waistband support 53 which preferably includes a swivel pin 146 pivotally attaching it to the air-motor-actuated slide 87, is thus fully housed within the bag at all times.

In assembling the bag, the cord 138 is drawn taut with the sleeve 137 in engagement with the perimetral edges of the buck, the ends of cord 138 being fastened to a suitable projection 147 on the front portion 148 of the stationary overhead duct structure as seen in FIG. 9, whereupon the front panel 138 is held smoothly taut over the pad and causing the bag to be secured to the buck. Likewise, the end of the cord 145 are fastened to a projection 149 on one side of the overhead duct structure with the loop in the cord 145 engaging a suitable projection 150 on the opposite side of the overhead duct, the sleeve 136 overlying buck 120 just below the overhead duct and the sleeve 144 is engaged against the edge of the opening from that duct, thus securing the bag to the duct structure and registering the opening in the top of the bag with the opening through which air is to pass from the duct structure.

As diagrammatically seen in FIGS. 7 and 8, a flexible cord 152 has an eye 153 at its upper end and through which the cord 138 passes. Attached to cord 152 is the weight 142 serving the left leg (as viewed by the operator) portion 140 of the bag, and a shorter cord 154 extends from this weight and is anchored to a patch 155 on the corresponding side of the bag and rearwardly from the front panel of the bag. Likewise, a flexible cord 156 having an eye 157 through which cord 138 passes is attached to weight 143. From this weight a shorter cord 158 is anchored to a patch 159 on the corresponding side of the bag and rearwardly from the front panel of the bag.

As indicated in FIGS. 5 and 8 when a pair of trousers is being raised to the inclined buck the deflated bag readily fits within the trouser band, and if the rear portion 144 of the bag is brushed by the trousers, the weights through the shorter cords 154, 158 hold down the bag material and prevent it from being carried upwardly by the trouser band. When the bag is inflated, as in FIG. 8, the shorter cords 154, 158 are placed in tension and pull the weights laterally and slightly upwardly. Thereafter when the supply of air to the bag is cut off and the waistband support 53 moves forwardly the weights drop, and pulling upon the patches 155, 159 promptly collapses the bag in a side to side direction. No springs or vacuum means or the like are required to effect this action. The weights, moreover, hang downwardly for a substantial length in the leg portions of the bag and assure that as the trousers are lifted to the bag separate leg portions of the bag will be guided into the corresponding leg portions of the trousers. The tension is enhanced since the suspended weights are hanging at an acute angle with respect to the plane of the buck as indicated in FIG. 5.

COMPRESSED AIR SYSTEM

In general, the operation of an automated trouser lifter must provide for the processing of three types of trousers which conveniently may be designated as follows: Type A comprising plain trousers worn by men and having a front fly, but no pleats, Type B having both a front fly and pleats as found in men's suit trousers; and Type C comprising slacks without pleats and without a front fly. The three-position selector switch 44 (FIG. 18) is movable between corresponding positions A, B and C according to the type of trousers being processed. The steam timer 45 is set by the operator to give the proper length of steaming time and for trousers or slacks of lightweight material this time is generally short whereas for heavy fabrics the time is longer, intermediate times being employed for fabrics of intermediate weights. Similarly the air timer 46 is adjustable to give commensurate times of flow of heated air into the bag. Normally, garments of the same type as above listed and of the same weight of fabric are segregated and processed consecutively thus avoiding constant resetting of timers. However, in some instances it may be desirable to finish a Type-C garment while still using automatic pressing as would occur in processing a Type-A or
Type-B garment. It is a feature of the invention that various combinations of switch and timer settings may be employed in order to give the operator a flexible and wide range of operations and which may be efficiently conducted, as will become more evident under the heading, Sequence of Operations.

For example in handling Type-B garments the opening of switch 47 after either one of the pleat-pressing plates is in pressing position will cause that plate to rise out of engagement with the pleat thus to permit the operator to readjust or replace the pleat, if desired. Moreover after such plates have been lowered to the pressing position, operating the switch 47 will recycle the automatic timed operation of steam and air as will later appear and will cause the pleat plates to rise. In addition when pressing Type A garments the opening of switch 47 after the fly plate 21 is in pressing position will not recycle the automatic steam and air application and will not raise the plate 21, it being understood that upon the movement of plate 21 to its fly-pressing position the timed steam and air cycle was started.

Likewise, when pressing Type-C garments, the plates 15, 18 and 21 are usually not lowered, and timed steam and airflows are automatically started when the waistband support has moved into expanded position. Operating switch 47 after this has occurred will not restore the waistband support to its forward position, and will not recycle the automatic steam and air.

The foot-operated switch 48 serves to provide a manually controlled flow of steam into the bag if that switch is operated while the machine is not operating on its automatic time-controlled steam and air cycle, and to stop the automatic cycle if the switch 48 is held depressed after such cycle has started. Upon release of switch 48, however, the automatic cycle can be restarted.

The foot-operated switch 49 serves to stop all functions of the machine and to deenergize all control circuits. This switch is useful to release the fly-pressing plate 21 and to cause the waistband support to move to its retracted position so that the trousers may be removed from the buck.

The significance of these purposes of switches 47, 48 and 49 is related to operations of the air motors best shown in FIG. 13 and to the compressed air system used in operating such motors. The high-pressure point of such system is the inlet line 34 which is a pressure of about 70 to 100 p.s.i.g. Air passing from this line under control of the regulator 33 and relief valve 35, which is adjustable by that regulator, enters line 161 and moves to inlet port 162 of the manifold 163 which is more clearly shown in FIGS. 15 to 17. Normally the regulator setting is such as to give a pressure of about 20 p.s.i.g. in line 161 and the relief valve 35 is commensurately set to open at about 25 p.s.i.g.

The inlet port 162 is in open communication at all times with manifold outlets 164, 165, 166, 167 and 168 and these respective outlets have attached thereto air lines 169, 170, 171, 172 and 173. These air lines lead respectively to one end of the respective plate motor 83; to the left pressing plate motor 78; to the right pressing plate motor 78; to the damper motor 72; and to the waistband-actuating motor 85, and since the pistons in these cylinders are constantly under the air pressure of about 20 p.s.i.g., the fly plate 21 and pressing plates 15 and 18 are normally retracted from the garment. Similarly, the damper 65 is normally held closed, and the waistband support 83 is normally held in the bag-collapsing position due to the biasing pressure in the respective motors.

The manifold also has a high-pressure inlet port 175 supplied from air line 176 at a pressure of, for example 60 p.s.i.g., and this inlet port is in open communication with a plurality of valve housing recesses in the manifold body, as indicated at 177, 178, 179, 180 and 181. These recesses have respective vacuum openings 182, 183, 184, 185 and 186, and respective outlet pressure ports 187, 188, 189, 190 and 191 to which are connected high-pressure air lines 192, 193, 194, 195 and 196 respectively. Suitable valves (not shown) are housed in the respective recesses and are operated by solenoids 197, 198, 199, 200 and 201 respectively (FIGS. 13 and 18). A suitable valve is represented by the catalog number ULBX8328, 3-way normally closed, cartridge type, valve operator for manifold installation available from the Automatic Switch Company, Flemington Park, N.J.

Accordingly, when the valve in recess 177 is opened by energizing its solenoid, air flows at about 60 p.s.i.g. through line 192 to regulator 31 and thence at a predetermined pressure into line 202 leading to the other end of cylinder 85, whereupon the bias on the piston in that cylinder is overcome, and the waistband 53 is moved to expand the bag and the trousers dressed thereon. Thereafter, when its solenoid is deenergized the valve exhausts and the constantly acting lower air pressure in line 173 then forces the waistband support forwardly to effect collapsing of the bag in its rear to front direction.

Air entering the five valves from line 176 at about 60 p.s.i.g. is under control of regulator 29 which receives air at line pressure through line 203 connected to supply line 34 upstream from regulator 33. Thus when the valve in recess 178 is opened, relatively high-pressure air flows through line 193; overcomes the bias in cylinder 83; and lowers the fly clamp 21. Upon deenergization of solenoid 198 that valve is vented and the clamp 21 returns to is elevated position. Similarly the energization of solenoids 199, 200 and 201 causes the flow of high-pressure air to the respective cylinders 77, 78 and 72 to cause lowering of clamps 15 and 18 and to permit opening of damper 65. Deenergization of these solenoids will reestablish the bias on these cylinders and cause clamps 15 and 18 to lift and damper 65 to close.

To regulate the speed with which cylinder 83 moves fly clamp 21 to pressing position, a valve 204 is included in line 193 which restricts the rapid flow of air to cylinder 83 but allows full flow of air to exhaust when that cylinder is being vented.

**ELECTRICAL CONTROL SYSTEM**

The sequence of operations followed by the operator in processing the various types of trousers involves the utilization of an improved electrical system as best seen in FIG. 18 and in which the double-pole, single-throw power switch 41 conveniently located on panel 42 is connected to the energizing current through leads 210, 211. With this switch in its closed position the blower motor 62 is energized by the circuit from wire 212, through the motor 62, wire 213, wire 214, and thence to lead 210. At the same time, through wire 215, the normally closed foot-operated switch 49 and its lever 345, wire 216, the primary coil 217 of transformer 218, and wires 219, 220 another higher voltage circuit are connected. As the lower voltage circuits later described, is made. As will later be evident, the use of lower voltage current in connection with the operation of the controls and the pressure-sensitive switches which the operator touches not only simplifies the switch construction but also provides for grounded and isolated circuits which are essentially shock-free even in a vapor atmosphere.

The secondary 221 of the transformer is connected to ground at 222 and is also connected through wires 223, 224, coil 225 of the waistband control relay, and wire 226 to a terminal 227 of the normally open fingertip control switch 54 whose other terminal is connected to ground. Upon closing of switch 54, after the trousers have been dressed on the buck as to be explained under the heading Sequence of Operations, the coil 225 is energized and raises armature 227 in engagement with contact 228 to complete a holding circuit for that coil, whereupon the fingertip switch returns to its normally open position. At the same time the armatures 229 and 230 are raised and held in contact with contacts 231, 232 respectively. A higher voltage circuit is now completed through wires 233, 234, 235, 236, 237 armature 230, contact 232, wire 219, 197 (FIG. 13), wires 239, 240, 241, 220, 214 and back through the closed power switch 41. At this time the air
cylinder 85 becomes pressurized and the waistband support 53 is moved into position to expand the bag to hold the trousers in pressing relation on the buck.

Moreover, with the armature 229 now closed on its contact 231, and as the operator's hand passes downwardly over the buck during the straightening and smoothing of the fly of the trousers, the sensor switch 55 is momentarily closed, and provides a lower voltage circuit through wires 242, 243, coil 244 of the fly control relay, wire 245, armature 229, contact 231, wire 231, closed switch 55, and to ground. Energizing of coil 244 raises armatures 246, 247, 248 into engagement with their contacts 249, 250, 251 respectively whereupon a holding circuit is completed for coil 213 and which is retained after switch 55 returns to its normally open position. At the same time, energization of coil 244 raises armature 252 from its normal position on contact 253.

The engagement of armature 248 on contact 251 completes a higher voltage circuit through wire 237, armature 230, contact 232, wire 254, contact 251, armature 248, wire 255, solenoid coil 198 (FIG. 13), and wires 256 and 241 back to the closed power switch 41. At this time the air cylinder 83 becomes pressurized and the fly-pressing plate 21 is moved against the already dressed fly of the trousers. Simultaneously, the following automatic steaming of the garment occurs. As armature 247 closes on contact 250 a higher voltage circuit is made from wires 235, 257, the armature 258 of the relay coil 259 for the left-hand pleat clamp 15, the contact 260, wire 261, armature 247, contact 250, wire 262, armature 263, armature 264 of the relay coil 265 for the right-hand pleat clamp 18, wire 266, wire 267 (since armature 252 is raised from its contact 253 at this time), foot-operated switch lever 268 normally engaged on contact 269, wires 270, 271, steam timer 45, wire 272, armature 273 of the steam-timing relay, contact 274, wire 275, solenoid coil 299 of the normally closed steam solenoid valve 98 (FIG. 6), and wires 276, 277, 278, 240 and 241 back to the closed power switch 41. Thus, as coil 99 is energized and the timer 45 starts its cycle, valve 98 is opened and processing steam flows into conduit 100 and is sprayed from the buck tube 102.

Similarly, with the described energization of coil 99 (and with the selector switch 44 either at its setting of A or B (for pressing of Type A or Type B trousers)) another circuit is established through the coil of steam timer 45 and wire 279 to wire 278. After the timed steaming period ends, the armature 273 is then lifted into engagement with contact 280 and the circuit through solenoid 99 is broken and valve 98 returns to its normally closed position.

As will be noted, the control of air supply to the garment during this steaming may be effected as follows. By means of a circuit from wire 257, armature 258, contact 260, wire 261, armature 247, contact 250, wire 262, contact 263, armature 264, wire 266, wires 280, 281, lever 282 of the three-position selector switch 44, contact 283, wires 284, 285, contact 286 of the air selector switch 45 which is closed in the automatic position thereof, lever 287, wire 288, solenoid coil 201 of the air damper valve (FIG. 13), wires 289, 290, armature 291 of the coil of air timer 46, contact 298, and wires 292, 293, 294, 277, 278, 240 and 241 back to the closed power switch 41. Thus when solenoid coil 201 is energized, the air cylinder 72 is pressurized and the roller 76 is retracted from damper 65 which may then rise under pressure of air supplied from the blower and permit the heated air to pass to the bag.

Simultaneously, with the described energization of coil 201 another circuit is established through the coil of air timer 46 by means of wires 284, 295, 296, the air timer coil 46, and wires 297, 294, 277, 278, 240, and 241 back to the closed power switch 41. After the timed air supply period ends, the armature 291 is then lifted from contact 298 and the circuit through solenoid 201 is broken whereupon the high-pressure air line 196 leading to cylinder 72 is vented and the biasing air pressure in line 172 causes the roller 76 to reengage the damper, thus stopping airflow into the bag.

The desired automatic steam and air cycles are also obtainable with the selector switch positioned at C for Type-C trousers. For example, since coil 225 of the waistband control relay is energized and with the switch arm 282 in engagement with contact 308 and the switch arm 301 in engagement with contact 302, a circuit to coil 91 of the steam solenoid valve is made by wire 237, armature 230, contact 233, wires 254, 303, contact 302, arm 301, wire 280, armature 252, contact 253, wires 271, 272, armature 273, contact 274, wire 275, coil 99 of the steam valve, and wires 276, 277 back to the closed power switch 41.

It will be noted that the foot-operated switch 48 with its lever 268 normally in engagement with contact 269 provides a parallel closed circuit for the above-described circuit in which armature 252 is in engagement with contact 253 (and corresponding to a situation in which the coil 244 of the fly-relay is deenergized). Such a parallel circuit is made from wire 267, lever 268, contact 269 and wire 270 to contact 253. This parallel circuit is redundant for energization of solenoid coil 99 under the above-described situation and rather is intended for the primary function of preventing deenergization of that coil 99 when the foot-operated switch 48 is shifted from its normal position when the fly-relay coil 244 is deenergized. It also serves to permit energization of solenoid coil 99 when the coil 244 of the fly-relay is energized to lift armature 252 from the contact 253.

The operation of the pleat clamps, now to be described, may best be followed with the selector switch set at B for a Type-B garment and with prior energization of both the waistband relay coil 225 and the fly-relay coil 244; and with right pleat smoothed and laid in position on the inclined buck. As the operator's hand passes over the laid pleat the sensor switch 56 is closed and a lower voltage circuit is made from the transformer secondary 221 through wires 222, 242, 304, lever 305 of foot-operated switch 47 normally closed on contact 306, wires 307, 308, coil 265 of the right pleat relay wire 132, contact 309, and lever 56 to ground 222. Energization of coil 265 raises armatures 310, 311, 264 and 312 into engagement with contacts 313, 314, 315 and 316 respectively. Simultaneously, a holding circuit for coil 265 is made from the grounded secondary of the transformer through wire 317 of coil 265, contact 313, lever 310 and thence to ground 222. Moreover, as coil 265 is energized, armature 264 moves into engagement with contact 315 and breaks engagement with contact 263.

The engagement of armature 311 with contact 314 completes a higher voltage circuit from wires 234, 320, armature 311, contact 314, wire 321, solenoid coil 200 of normally closed right pleat air valve (FIG. 13), wires 322, 323, 290, armature 291 of the air-timing relay, contact 298, and wires 292 and 293 back to the closed power switch 41. Upon energization of solenoid 200 higher pressure airflow through conduit 195 into cylinder 78, overcomes the biasing of the lower air pressure therein, and cause right-hand pleat clamp 18 to be moved into contact with the laid pleat on the buck.

Simultaneously, when armature 264 moves into engagement with contact 315, a circuit, later to be described, is prepared for subsequent energization of coil 99 of the steam valve.

Having thus prepared the right pleat for processing the operator then proceeds to smooth and lay the left pleat into the inclined buck, after which his hand passes over the sensor switch 57 and closes the same. A lower voltage circuit is then made from the transformer secondary and closed switch 47 through wire 307 coil 289 of the left pleat relay, wire 130, contact 324, and lever 57 to ground 222. Energizing of coil 259 also raises armatures 325, 326 and 328 respectively into engagement with contacts 327, 328 and 329 at which time a holding circuit is made from the grounded secondary of the transformer through wire 330 of coil 299, contact 327, armature 328 and thence to ground 222. As armature 326 engages contact 328 a higher voltage circuit also is made through wires 233, 331, armature 336 of the left pleat relay, contact 328,
wire 332, solenoid coil 199 of the left pleat air valve, wires 333, 323, 290, armature 291 of the air-time relay, contact 298, and wires 292 and 293 back to the closed power switch 41. Upon energization of solenoid 199 higher voltage circuit, wire 275, 278 and 293 back to the closed power switch 41. Thus, the biasing of the lower air pressure therein, and causes the left- hand pleat clamp 15 to be moved into contact with the left pleat on the buck.

Energization of coil 259 also moves armature 258 away from contact 260 and into engagement with contact 259, whereupon the previously prepared circuit for energizing the steel coil 99 is ready for operation, it being understood that the pleat laying of the trousers has now been completed for a normal procedure. Accordingly, a steaming circuit is now made from wire 257, armature 258, contact 329, wire 330 contact 315, armature 264 of the right pleat relay, wires 266, 267, lever 268 of normally closed switch 48, contact 269, wires 270, 271, 272, armature 273 of the steam relay contact 274, wire 275, solenoid coil 99, and wires 276, 277 back to the closed power switch 41. Energization of coil 99 provides the timed flow of steam into the bucket and bag as previously disclosed. Moreover, at this same time the coil of timer 45 is energized by a higher voltage circuit through wires 235, 257, armature 258, contact 329, wire 330, contact 315, armature 264, wires 266, 267, lever 268 of the closed switch 48, contact 269, wires 270, 271, coil of timer 45, wires 279, 278 and back to the closed power switch 41. When the timed interval expires the armature 273, of course, is shifted from contact 274 to deenergize the steaming solenoid 99 and to close steam valve 98 (FIG. 6).

Simultaneously with the energization of steam coil 99 (and with the selector switch 44 still set at position B for Type-B garments) another higher voltage circuit for energizing solenoid coil 201 of the air damper valve is established from wires 235, 257, armature 258, contact 329, wire 330, contact 315, armature 264, wires 266, 280, 281, armature 312, contact 316, wires 311, 296, 285, 285, contact 286 of the air selector switch 43, lever 287, wire 288, solenoid coil 201 for the air damper valve (FIG. 13), wires 289, 290, armature 291, contact 298 and wires 292 and 293 back to the closed power switch 41. As before explained, energization of solenoid coil 201 permits the blower to supply air to the bag since the damper is no longer closed by the action of air motor 72. Furthermore with the selector switch 44 set at A for processing Type-A garments, the coil 201 would be energized and function in the same described manner by virtue of the circuit from wire 281, switch arm 282, contact 283, wires 284, 285, contact 286, arm 287, wire 288, coil 201, wires 289, 290, armature 291, contact 298, and wires 292, 293 back to the closed power switch 41. In each instance, after the air timer 46 runs its allotted time, its armature 291 rises from contact 298 and deenergizes coil 201 whereupon the air motor 72 moves its moving pressure to reclose damper 65.

All of the above-described circuits for operating the air supply have assumed the air selector switch to be in its automatic position with its lever 287 engaging contact 266, but the invention also provides for normal and continuous airflow rather than automatic control of air supply in order to enhance the capabilities of the apparatus. For such manual usage the operator sets the switch 43 so that its coupled lever arms 287 and 335 engage contacts 336, 337 respectively, with the switch 43 so positioned, a simpler higher voltage circuit is made from wire 338, contact 336, arm 287, wire 288, coil 201, wires 289, 290, 339, arm 335, contact 337, and wires 340 and 293 back to the closed power switch 41. With this arrangement the coil 201 remains energized and cylinder 72 acts to permit the damper to remain open so that a continuous flow of air enters the bag.

A manually controlled steam operation of limited duration also is provided and for this purpose the foot-operated switch 48 may have its lever 268 shifted from contact 269 to contact 341. When so shifted and with the coil 244 of the fly-relay 73 deenergized, a higher voltage circuit is made through wires 342, 343 contact 341, lever 268, wire 267, armature 252 of the deenergized fly-relay 244, wires 271, 272, armature 273, contact 274, wire 275, solenoid coil 99, and wires 276 and 277 back to the closed power switch 41. However, at this same time the coil of steam timer 45 is being energized by a circuit from the same wire 271, through coil of steam timer 45, and wires 279 and 278 back to the closed power switch 41. Thus the duration of manual steam application to the buck by moving the foot-operated switch 48 will be limited to the time allotted by the setting of steam timer 45. Moreover, if the operator depresses switch 48 while the fly-relay 244 is energized and with armature 252 disengaged from contact 253, the coil of steam timer 45 is deenergized, as is the steam valve solenoid 99. When, however, the switch 48 is restored to normal position, a new automatic cycle of steam alone or steam and air jointly is begun.

As will be apparent, all of the above described circuits are contingent upon foot-operated switch 49 being in its normally closed position. If for any reason, the operator desires to terminate operation of the apparatus (excepting blower motor 62) depressing the switch lever 345 will deenergize such circuits and restore them again to a starting position.

Furthermore, the circuits for energizing relay coils 265 and 259 for the operation of the pleat-pressing plates are contingent upon lever 305 of foot-operated switch 47 being in engagement with contact 306. Thus, the depressing of lever 305 at any time after either or both of these coils have been previously energized, will deenergize the same and will cause pleat clamps 15 or 18, or both, to rise out of pressing engagement with the trousers and at the same time will interrupt the automatic steam-air cycles which may then be in operation.

As for the operation of the waistband support 53 and the fly-pressing plate 21 during the automatic cycle, however, depressing of lever 305 of switch 47 will have no effect thereon, and these elements can be restored to their normal retracted positions only by depressing lever 345 of switch 49.

SEQUENCE OF OPERATIONS

In view of the fully automated capabilities of the apparatus for effecting a high quality of finish for the trousers a brief description of the recommended procedures for handling any of the Types A, B and C trousers is presented in the interest of clarity. At initial startup the compressed air in line 34 and the steam in line 37 are turned on, and the machine is allowed to become preheated. Thereafter, power switch 41 is closed and the air selector switch 43 is set to manual position for 1 minute to heat the buck. After this time the selector switch 44 is set to the MATIC position, stopping the continuous flow of heated air into the bag and placing the apparatus in readiness for automatic timed operation of steam and air.

The steam and air timers 45 and 46 are set to the desired timings commensurate with the materials of the trousers to be processed, and the selector switch 44 is set to one of its positions A, B, or C as above described.

NORMAL SEQUENCE A

With switch 44 in position A, the trousers of Type A are unzipped at the fly and the front waistband button or clip is engaged to form a continuous waistband. With the trouser held at the waistband at each outside leg seam they are shaken to assure that pockets hang smoothly and downwardly. The trousers are then lifted to envelop the waistband support 53, buck 14 and bag 50, and at this time the interior weights function to position the legs 140, 141 of the bag within the leg portions of the trousers. With the center rear section of the waistband located high on the support 53 a slight tension is placed forwardly on the waistband and the finger tip control switch 54 is closed whereupon the described circuit the air motor 85 moves the support 53 to its expanded location, the waistband meanwhile being permitted to slip through the hands as the support 53 is moving.
While still holding the waistband with the right hand at the upper end of the fly, the operator with his left hand then straightens the fly out, tucks in the zipper pull tab, straightens the inner and outer members of the fly and moves the left hand downwardly to smooth the lay of the fly against the buck, and to apply pressure to the sensor switch 55 located at the lower extremity of the fly. By the described circuits, air motor 83 now moves the fly clamp 21 into pressing engagement and the automatic timed operation of steam and air is started. Then while the trousers are drying in the timed air portion of the cycle the operator aligns the right and left cuffs at the front crease line, holding the same with the right hand; and aligns the right and left creases at a point just below the inclined buck, and holds the same with the left hand.

When the timed air cycle stops, the switch 49 is opened with the foot whereupon waistband support 53 retracts; the weights pull upon the sides of the bag to collapse the same quickly; and the fly-pressing plate rises, thus permitting the trousers to drop from the buck and bag.

Subsequent handling of the thus-treated trousers may involve laying the trousers on a separate press for leg creasing, and conducting that creasing operation after a second pair of trousers has been placed on the buck and bag and while the timed steam and air cycle for such second pair is taking place. Normally, the time required for such leg creasing, touchup, and placing the finished trousers on a conveyor is considerably less than the time required for the steam and air cycles. Accordingly, the time of the operator is efficiently employed when following this described sequence.

NORMAL SEQUENCE B

With switch 44 in position B, the trousers of Type B are handled as above described until the fly plate 21 is clamped against the fly at which time automatic steaming only is begun by the described circuits, and which steaming serves as a preconditioning or moistening required because of the presence of pleats. When the fly clamp 21, therefore, is engaged, the waistband is held by the left hand, above the right pleat, and with the right hand the front crease of the right leg is grasped just below the crotch line, and the fullness of the right pleat is folded upon the inclined upper surface of the buck. Ordinarily, the amount of pleat fold at the crotch line is about equal to the amount provided for the pint at the waistband.

In contrast with conventional bucks, the present feature of an inclined buck having an upwardly facing surface supporting the trouser material and pleat material during this press-laying operation significantly aids the operator in producing a properly laid pleat and in avoiding a time consuming pleat-relaying step.

Then while holding the waistband with the left hand the operator moves the right hand downwardly over the folded right pleat to smooth the pleat lay and the adjacent area of the trousers upon the buck and also to apply pressure against sensor switch 56 located at the lower extremity of that right pleat. As this switch closes, the right-hand pleat clamp 18 is lowered automatically into clamping position.

Thereafter, the left hand is laid in similar fashion, but with a reverse usage of the operator's hands, and with a reverse usage of the operator's hands. When the sensor switch 57 is closed the left-hand pleat clamp 15 is likewise lowered automatically, and by the described circuits automatic timed operation of steam and air is begun. As will be understood either the left-hand pleat or the right-hand pleat may be laid first, depending upon the preference of the operator.

After the timed steam and air cycles are finished, the pleat-pressing plates rise automatically thus avoiding any objectionable marking of the garment in case the operator is unable to return to the machine promptly. Also, after the foot switch 49 is opened the waistband support 53 retracts; the weights serve to collapse the bag, and the fly-pressing plate 21 rises, thus permitting ready removal of the trousers from the buck and bag, and which trousers may then be handled subsequently as indicated in Normal Sequence A.

NORMAL SEQUENCE C

With switch 44 in position C, the trousers of Type C (such as slacks worn by women) are unzipped at the side and placed around the buck and bag, after which the zipper is reclosed to form a continuous waist band, and top. As in Sequence A the waistband support 53 is moved to expanded position and the finger-tip control switch 54 is then closed, whereupon automatic timed operation of steam and air is started. While the trousers are drying in the timed air cycle the cuffs and leg creases are handled as above described in Sequence A. After the timed air terminates the switch 49 is opened by foot operation causing the waistband support 53 to retract; the weights collapse the bag; and the slacks may be subsequently treated as indicated in Sequence A.

FIRST ALTERNATE SEQUENCE

In some situations it may be desirable to process Type-B trousers with the selector switch 44 set at position A and in this case the pleated trousers with a fly would be dressed upon the buck and bag as in Normal Sequence A, and the fly plate 21 lowered into pressing position and the automatic timed steam and air cycle started. However, after several seconds of steaming the foot-operated switch 49 gets depressed, and held depressed to interrupt the steaming. The steaming which had then occurred serves to moisten the trousers and to permit proper laying of the pleats above and joining the respective right and left leg creases.

With the switch 48 still depressed, either the right or left pleats are laid in the manner described in Normal Sequence B and when the first of the sensor switches 56 or 57 is closed, its corresponding pleat clamp will move downwardly. As soon as that clamp begins to move downwardly the operator may release switch 48 since clamping operation of either clamp 15 or 18 terminates the automatic steam and air cycle.

Thereafter, the other pleat is laid and its sensor switch is closed and with switch 48 again depressed until that corresponding pleat clamp has moved downwardly. Simultaneously with the successive lowering of the plates 15 and 18, or vice versa, automatic timed steam and air operation is resumed. As above described in Sequence A, these plates will then rise automatically when the automatic steam and air cycle terminates. When the foot-operated switch 49 is then opened, the waistband support 53 retracts; the weights collapse the bag; the fly clamp 21 rises; and the trousers drop from the buck and bag and are ready for the subsequent handling indicated in Sequence A.

SECOND ALTERNATE SEQUENCE

In some situations it may be desirable to process Type-B trousers wherein the pleats are laid without presteaming (due to the trousers being made of a material such as regenerated rayon which may undergo color changes if too damp). In this case, with selector switch 44 at position A the trousers are dressed on the buck and the fingertip control switch 54 is actuated as in Normal Sequence A. However, before lowering the fly-pressing plate 21 one of the pleats is laid and the corresponding pleat-pressing plate is automatically lowered by closing of its sensor switch. Since the fly plate 21 has not yet been lowered, the steam and air cycles will not start at this time.

Thereafter the fly is laid and the plate is lowered by closing of sensor switch 55. The other pleat is then laid and its pressing plate is automatically lowered by closing its sensor switch. Simultaneously, the automatic timed operation of the steam and air cycle is started.

After the timed steam and air cycle terminates, the right and left pleat plates automatically rise and no objectionable marking effects on the trouser material results in the event the operator cannot return promptly to the machine at this time. As in the previous sequences the operator then opens foot switch 49, the waistband support 53 retracts, the weights collapse the bag, the fly clamp 21 rises, and the trousers drop from the buck and bag and are ready for the subsequent handling indicated in Sequence A.
Having thus disclosed the method of practicing the invention in various ramifications and the combination of coordinated apparatus, for use in practicing the method, it will be understood that the invention may also be embodied in other forms within the scope of the appended claims.

What is claimed is:

1. Trouser-topping apparatus comprising, a rigid buck, a bag suspended on said buck and adapted to be expanded within the trousers enveloping said bag and said buck, a clamp movably between a first position out of contact with said trousers and a second position in clamping relation thereto, a motor for moving said clamp, and electrical means including a switch for controlling operation of said motor, said switch being mounted on the forward lower face of said buck at a location at which the operator's hand normally passes over the buck during the dressing of a garment thereon, said switch upon being actuated by the operator's hand serving to cause said motor to move said clamp into its first position in contact with the dressed garment.

2. Apparatus as defined in claim 1 wherein said buck is stationary and is inclined from the vertical thereby to present an upwardly facing surface on which the trousers may be positioned in order to arrange the lay of the pleats or the fly thereof prior to actuation of said switch.

3. Apparatus as defined in claim 1 wherein said electrical means includes a relatively high-voltage primary circuit and a relatively low-voltage secondary circuit, said switch being in said secondary circuit.

4. Apparatus as defined in claim 3 wherein said bucks comprises conductive material and is in said secondary circuit and is grounded.

5. Trouser-topping apparatus including an electrical control system therefor and comprising, a rigid buck, a bag suspended on said buck and adapted to be expanded within trousers enveloping said bag, and a motor for moving said support, said electrical control system including a first switch adapted when actuated to cause said motor to move said support to its first position, and a second switch normally providing an operating circuit for said apparatus and adapted when actuated to cause said motor to move said support to its second position, said operating circuit being deenergized when said second switch is actuated.

6. Apparatus as defined in claim 5 wherein said electrical control system includes a relatively high-voltage circuit and a relatively low-voltage circuit, said first switch being in said low-voltage circuit and said second switch being in said high-voltage circuit.

7. Apparatus as defined in claim 5 wherein said first switch is hand-operated and is located above said buck, and said second switch is foot-operated and is located below said buck and in spaced relation thereto.

8. Trouser-topping apparatus comprising, a buck, a bag suspended on said buck and adapted to be expanded within trousers enveloping said bag and having a movable damper therein, a clamp movably between a first position out of contact with said trousers and a second position in clamping relation to said trousers, a double-acting air motor having a piston and a piston rod connected to said clamp, a compressed air system having first and second lines extending to the cylinder of said motor, means for constantly supplying air under relatively low pressure through said first line to said cylinder thereby to bias said piston in the direction holding said clamp in its first position, and means for selectively supplying higher pressure air to said cylinder through said second line thereby to overcome the bias and to move said clamp to its second position.

9. Apparatus as defined in claim 8 including regulating means in said air system for selectively varying the pressure applied to said piston through said second line and thereby to vary the pressure applied by said clamp to said trousers.

10. Apparatus as defined in claim 8 including a double-acting second air motor having a piston rod and piston connecting with said damper to permit selective opening and closing of said damper, third and fourth lines within said air system extending to the cylinder of said second motor, means for constantly supplying air under relatively low pressure through said third line to said second motor thereby to bias the piston therein in the direction holding said damper in its closed position, and means for selectively supplying higher pressure air through said fourth line to the cylinder of said second motor thereby to overcome the bias and to move its piston and piston rod out of coacting engagement with said damper to permit said damper to open.

11. Apparatus as defined in claim 8 wherein said clamp comprises a fly-engaging plate having an arm pivotally mounted adjacent the forward end of said duct and with one end of the arm attached to the plate and the other end thereof connected to said piston rod.

12. Apparatus as defined in claim 8 wherein said clamp comprises a pleat-engaging plate having an arm pivotally mounted at one side of said duct, said arm being attached at one end to said plate and connected at its other end to said piston rod.

13. Apparatus as defined in claim 10 wherein both of said motors are housed in said duct.

14. Trouser-topping apparatus comprising, a rigid buck, a bag suspended on said buck and adapted to be expanded within trousers enveloping said bag and said buck, a waistband support within said bag and movable between a first position serving to fasten the waistband of said trousers and a second position serving to release the trousers from the buck, a double-acting air motor having a piston and piston rod connected to said support, a compressed air system having first and second lines extending to the cylinder of said motor, means for constantly supplying air under relatively low pressure to said motor through said first line thereby to bias the piston in the direction holding said support in its trouser-tautening first position, and means for selectively supplying higher pressure air to said cylinder through said second line to overcome said bias and to move said support to its second position.

15. Apparatus as defined in claim 14 including regulating means in said air system for varying the pressure applied to said piston through said second line thereby to vary the tautness applied to the waistband of the trousers.

16. A trouser-topping bag for support upon a stationary buck and upon a duct furnishing air into said bag, said bag comprising a front panel portion, a rear portion adapted to fit within the seat of a pair of trousers, side portions joined said front portion and said rear portion and connected to each other to form leg portions adapted to fit within the legs of said trousers, a top panel portion attached to said rear and side portions and having a front edge spaced from said front portion to form an opening into which air may be passed from said duct, and a pair of weights suspended within said leg portions and having flexible cords connected respectively to said weights and to said side portions, said weights upon inflation of said bag being adapted to be displaced and upon deflation of said bag returning to their normal positions and by means of said cords serving to pull the side portions inwardly and to deflate the bag.

17. A trouser topping bag as defined in claim 16 including an elongated cord serving to fasten said front portion to said bag and to said fastening fastened said top panel portion along said front edge thereof to said bag, and a pair of generally vertical suspension cords attached to the respective weights and having a slidable engagement with said elongated cord.

18. The method of shaping the top of trousers on an apparatus comprising a buck, a bag on said buck with a movable waistband support connected to said bag, a movable fly-pressing plate and movable right and left pleat-pressing plates mounted exteriorly of said bag, said apparatus having a selectively operated electrical circuit means for controlling the
movement of said support and said plates and for governing the supply of conditioning steam and heated air into said bag; said method comprising the steps of first manually operating a first switch in said circuit means thereby to move said support into bag-expanding position holding the trousers tautly on said buck and bag and placing the steam and air supplies in readiness for operation upon actuation of a second switch; second, initiating a flow of steam followed by a flow of air into said bag upon actuation of said second switch by the operator and upon termination of said flow automatically lifting any pleat-pressing plate from the trousers without requiring further action by the operator; and third, manually actuating a third switch to cause said waistband support to retract whereby said bag promptly collapses and the shaped trousers may be removed therefrom.

19. The method as defined in claim 18 wherein upon actuation of said second switch the second step of the method comprises the lowering of said fly plate into contact with the previously smoothed and laid fly of the trousers, and said third step includes the automatic raising of the fly plate upon actuation of said third switch.

20. The method of shaping the top of trousers on an apparatus comprising a buck, a bag on said buck with a movable waistband support connected to said bag, a movable fly-pressing plate and movable right and left pleat-pressing plates mounted exteriorly of said bag, said apparatus having a selectively operated electrical circuit means for controlling the movement of said support and said plates and for governing the supply of conditioning steam and heated air into said bag; said method comprising the steps of first manually operating a first switch in said circuit means thereby to move said support into bag-expanding position holding the trousers tautly on said buck and bag and placing the steam and air supplies in readiness for operation upon actuation of a second switch; second, lowering said fly plate and automatically initiating flow of steam followed by flow of air into said bag upon actuation of said second switch; third, lowering at least one of said pleat plates into contact with the smoothed and laid pleat of the trousers on actuating a third switch and upon termination of the flow of air automatically lifting the pleat plate out of contact with the trousers without requiring further action by the operator and avoiding pleat marking on the trousers; and fourth, manually actuating a fourth switch to cause said fly plate to rise and said waistband support to retract whereby said bag promptly collapses and the shaped trousers may be removed therefrom.

21. The method of claim 20 including the step of manually actuating a fifth switch to interrupt the flow of steam after the beginning of said second step and thereafter restoring said fifth switch to its normal position in order to resume said second step of the operation.

22. The method of claim 20 including a fifth step of manually actuating a fifth steam-air-cycle interrupting switch after the beginning of said third step and causing said pleat clamp to rise and to enable the operator to relay the pleat, and thereafter restoring said fifth switch to normal position in order to resume the automatic steam-air cycle.

23. The method of claim 20 wherein said fifth step includes the constant supplying of air to said bag until said pleat clamp is relowered in order to resume the automatic steam-air cycle.