This invention relates to garment pressing machines, and more particularly to automatic pants pressing machines. This application is a continuation-in-part of my copending application Serial No. 644,510, filed March 7, 1957 and now abandoned.

In the commercial pressing of pants, it is common practice to press the pants in a number of separate lays between the platens of a conventional presser. The usual method of pressing requires at least ten separate lays on the presser. Only experienced operators are able to do this work satisfactorily and a long training period is required before an operator is able to perform this operation quickly and correctly. The repeated handling necessary to arrange the pants upon the platen of the presser not only wears the material of the pants but requires a substantial amount of time. Frequently, lays must be repeated or done over when the operator does not properly arrange the pants upon the platen with the result that double creases or wrinkles are pressed into the pants.

Another object of the invention is to provide a pants pressing machine in which the formation of double creases or wrinkles is eliminated.

Another object of the invention is to provide a pants pressing machine adapted to press pants of various types and sizes.

Still another object of the invention is to provide a pants pressing machine for pressing a pair of pants with a minimum number of manual handling operations.

Still another object of the invention is to provide a pants pressing machine which will rapidly and satisfactorily press pants under the control of relatively unskilled operators.

In the achievement of the foregoing and other objects, the invention includes crease defining members which are mounted to permit a pair of pants to be slipped onto the members. Each leg of the pants receives a pair of opposed crease defining members which are expandable from each other into engagement with the interior of the pant leg along the front and back crease line. When the pants are in place upon the crease defining members, the members are expanded to stretch the pant legs firmly against the crease defining members.

Four pair of crease bars are mounted upon the machine, each pair being movable into a position in which a crease line established by a crease defining member is located between the pair of crease bars. The crease bars may be clamped against the exterior of the pant leg along opposite sides of each crease line formed in the pant leg. When the crease bars are clamped against the exterior of the pant legs, relative movement is initiated between the crease bars and the crease defining members in a manner such that the pant legs are disengaged from the crease defining members while the crease defined by the members is retained in clamped engagement between the crease bars.

To assist in accomplishing this, the crease bars are covered with a relatively coarse material which exerts a greater frictional grip on the pants than a smooth covering disposed on the crease defining members.

Steam is then supplied to the crease bars and followed by air which expedites the cooling and drying of the pants.

In operation of the machine, the operator first places the pants in position on the crease defining members and expands the members into engagement with the pant legs. After the pants are satisfactorily positioned on the crease defining members, the operator initiates a pressing and drying cycle which is performed under the control of an automatic control system.

Other objects and features of the invention will become apparent from the following specification and the accompanying drawings.

In the drawings:

Fig. 1 is a side elevational view of a machine embodying the present invention;

Fig. 2 is a front view of the machine of Fig. 1 in somewhat greater detail;

Fig. 3 is a cross sectional view of the machine taken on the line 3—3 of Fig. 2;

Fig. 4 is a cross sectional view of the machine taken on the line 4—4 of Fig. 3;

Fig. 5 is a detail cross sectional view of the crease defining members taken on the line 5—5 of Fig. 3;

Fig. 6 is a detail cross sectional view of the mounting structure of the upper crease defining members taken on the line 6—6 of Fig. 3;

Fig. 7 is a detail view of the upper crease bar assembly taken on section line 7—7 of Fig. 3, with certain parts broken away and others omitted;

Fig. 8 is a partial cross sectional view of the mounting structure of the lower crease bar assembly taken on the line 8—8 of Fig. 3;

Fig. 9 is a detail cross sectional view of the upper crease bar assembly taken on line 9—9 of Fig. 7;

Fig. 10 is a detail cross sectional view of the upper crease bar assembly taken on line 10—10 of Fig. 7;

Fig. 11 is a detail view of the pressing side of a crease bar;

Fig. 12 is a longitudinal cross sectional view taken on the line 12—12 of Fig. 11;

Fig. 13 is a side view of certain operative parts of the machine in engagement with a pair of pants during one stage of the operation of the machine;

Fig. 14 is a view similar to Fig. 13 showing a subsequent step in the operation of the machine;

Fig. 15 is a cross sectional view through one set of crease bars and crease defining members taken on the line 15—15 of Fig. 13;
Fig. 16 is a cross sectional view, similar to Fig. 15 showing the relative position of the parts during the next subsequent step in the operation and taken on line 16—16 of Fig. 14;

Fig. 17 is a schematic diagram of the control system of the machine; and

Fig. 18 is a cross sectional view of a valve employed in the control system of Fig. 17.

Referring first to Figs. 1 and 2, a pants pressing machine embodying the present invention includes a main housing 20 and a base housing 22 extending outwardly from one side of main housing 20. A lower crease bar assembly designated generally 24 is supported, in a manner to be described below, for vertical movement toward and away from the upper surface of base housing 26. A lower crease defining assembly 26 is supported from main housing 20 by a yoke 38 which is connected within the housing 20 to move lower crease defining assembly 26 upwardly and forwardly with respect to the housing. Immediately above lower crease defining assembly 26, an upper crease defining assembly 30 is rigidly supported from housing 20.

A fixed pedestal 32 is supported on main housing 20 to rigidly support a fixed arm 34 which projects outwardly beyond housing 20 to overlie upper crease defining assembly 30. An upper crease bar assembly 36 is mounted at the outer end of arm 34 for vertical movement toward and away from the lower side of arm 34. A pleat clamp assembly 38 is mounted at the top of main housing 20 for pivotal movement toward and away from upper crease defining assembly 30. A steam diffuser 40 projects from housing 20 immediately below upper crease defining assembly 30 and a waistband stretching assembly 42 projects from housing 20 below steam diffuser 40. Waistband assembly 42 is supported from within housing 20 for vertical movement parallel to the front surface of housing 20.

The construction of upper crease bar assembly 36 is best shown in Figs. 2 and 7–12 of the drawings. Upper crease bar assembly 36 is suspended from the piston rod 44 of an air motor 46 mounted at the outer end of arm 34. Piston rod 44 is coupled to a main frame member 48 by a pin 50 which passes horizontally through rod 44 and upstanding lugs 52, 54 and 56 integral with frame 48. Upper crease bar assembly 36 is guided in reciprocating vertical movement by a pair of vertically extending spaced guide rods 58 and 60 which are fixedly secured to frame 48 as by bolts 62 (Fig. 10) and project upwardly from the upper surface of frame 48 to be guided in suitably located sleeves (not shown) in the housing at the outer end of arm 34.

As best seen in Fig. 7, frame 48 is formed with outwardly projecting lugs 64 at each corner, each of lugs 64 being bored at 66 to rotateably receive clamp operating shoes 68, a shaft 69 extending longitudinally along each side of frame 48. Sheet metal housings 70 are mounted upon frame 48 and extend along each side of frame 48 to enclose the respective shafts 68 in a manner best shown in Fig. 10.

Each of shafts 68 is connected to operate a pair of opposed crease bars 72A, 72B and 72C, 72D, which are spaced below frame 48 by structure to be described in greater detail below. Each opposed pair of crease bars comprises the front edge line of a pair of pants during the pressing operation, the pair of crease bars 72A and 72B acting on the left pant leg while the pair of bars 72C and 72D operate on the right pant leg. Since the structure disclosed for operating each of the respective pairs of crease bars is identical, only that structure associated with crease bars 72C and 72D will be described in detail, it being understood that identical structure is employed in combination with the bars 72A and 72B.

Crease bar 72D is supported from 48 by a pair of L-shaped supporting brackets 74, a bracket 74 being fixedly secured to crease bar 72D as by bolts 76 at each end of the bar. Each bracket 74 is supported upon the shanks of a pair of screws 78 and 80 which are threaded into the end surfaces of frame 48. As best seen in Fig. 9, each bracket 74 is formed with elongated slots 82 and 84 through which the respective screws 78 and 80 pass so that bracket 74 may be moved across the end of frame 48 in a horizontal direction between limits defined by the opposite ends of the elongated slots. An elongated central slot 86 is formed in each bracket 74 midway between slots 82 and 84. The upper side of slot 86 is constructed with a plurality of gear teeth 88 which are adapted to mesh with gear teeth 90 formed in each end of shaft 68.

Crease bar 72C is similarly supported by a pair of brackets 92, a bracket 92 being secured to crease bar 72C at each end of frame 48. Brackets 92 are likewise supported from screws 78 and 80 by engagement of the screws within elongated slots 94 and 96. A central opening is formed in each bracket 92 which is unnumbered since it is coextensive with the opening 86 in bracket 74 when the brackets 92 and 74 are in the position shown in Fig. 9. The opening in bracket 92 differs from opening 86 in that gear teeth 98 are formed on the lower side of the opening in bracket 92 to mesh with gear teeth 90 on shaft 68 at the lower side of the shaft as opposed to the meshing engagement between teeth 88 on bracket 74 with the upper side of the shaft. To seal openings 86, a cap such as 100 is bolted to the outer surface of each bracket 74 to thereby prevent lint and dust from being collected on the respective gear teeth.

Referring now to Fig. 9, it is believed apparent that a rotation of shaft 68 in a counterclockwise direction will tend to drive bracket 74 and its associated clamping bar 72D to the left, while at the same time driving bracket 92 and its clamping bar 72C to the right.

Shaft 68 is rotated about its axis by an air motor 102 fixedly mounted upon frame 48 as by bracket 104. The piston rod 106 of motor 102 is pivotally connected to a link 108 which is pivotally connected in turn to a crank 110 fixedly secured to the right hand shaft 68 and a second crank 112 which is fixed to the left hand shaft 68 employed to operate clamping bars 72A and 72B. In Fig. 9, piston rod 106 is shown in its fully retracted position. When air is supplied to air motor 102, piston 108 pushes link 108 to the left, thus causing link 108 and cranks 110 and 112 to simultaneously rotate both shafts 68 in a counterclockwise direction as viewed in Fig. 9. This action causes each of clamping bars 72A–D to move toward the opposed member of its pair. The clamping bar pairs are biased to their open position shown in Fig. 9 by a tension spring 114 which is connected between crank 112 and a pin 116 which is fixed to bracket 92.

Each of clamping bars 72A–D is constructed with a pair of inner chambers 118 and 120. Tapped bores 122 and 124 pass through the wall of the bar to form connections for steam conduits to chamber 118. Steam is normally supplied to chamber 118 so that the metal of the clamp bar is continuously heated. Chamber 120 is provided along the pant leg engaging side with a plurality of orifices 126 from which steam is expelled during the pressing operation. Steam is fed into chamber 120 through an inlet connection 127 which, as best seen in Fig. 12, passes completely through chamber 118 to locate its discharge opening 128 within the interior of chamber 120. Connection 127 is sealed both at the exterior of the clamping bar as by an O-ring 130 and also at the wall between chambers 118 and 120 as by a second O-ring 132.

Since it is necessary that the crease bars firmly grip
the material of the trousers, relatively coarse nylon coverings 136 are placed over the opposed surfaces of each pair of crease bars and held upon the crease bars as by lacing (not shown).

Referring now to Fig. 1, it will be seen that air motor 46 is not coupled directly to the frame of the machine but is instead fixedly secured to the cylinder of a second air motor 138 whose piston rod 140 is connected to the frame of the machine. The purpose of this mounting will be discussed in more detail in connection with the operation of the machine.

As best seen in Fig. 2, upper crease bar assembly 36 is located in vertical alignment with upper crease defining assembly 30 in such a manner that, when lowered, crease bars 72A and 72B may be located on opposite sides of upper right crease alignment blade 142R, while crease bars 73C and 72D will be located on opposite sides of upper left crease alignment blade 142L. The respective designations of right and left appear to be reversed in Fig. 2 but are employed to designate the respective pant leg which is supported on the crease blade. Since the trousers are supported upon the blades 142R and 142L, with the front facing upward in Fig. 2 and the waistband of the trousers opening away from the observer, the designation of right and left is reversed. As stated above, each of crease blades 142R and 142L is fixedly supported from the frame of the machine within housing 20. As best seen in Figs. 5 and 6, each blade includes an elongated body of generally oval shaped cross section having a vertically projecting fin 144R or 144L extending longitudinally over substantially the entire upper surface of the respective blade. The fins terminate somewhat outwardly from housing 20 where the body of each blade extends into housing 20 where it is clamped to a fixed frame member 146 of the assembly as by U-bolts 148. Bars 142R and 142L engage the pants on the inner sides of the legs. During operation of the machine, it is necessary that the pants be lifted clear of blades 142R and 142L by the upper crease bar and in order to assure this movement, the outer surfaces of crease blades 142R and 142L are covered with a relatively slick nylon covering 150 so selected that the frictional resistance between the coarse nylon covering 156 of the crease bars and the pants is much greater than that exerted between the slick nylon covering 150 of the crease blade and the pants.

Lower crease bar assembly 24 is substantially similar in construction to upper crease bar assembly 36. The primary distinctions between the upper and lower crease bar assemblies is that the lower crease bars are bent as at 222. As best seen in Fig. 1, lower crease bar assembly 24 includes a main frame 154 which is coupled by a pivotal connection to the rod 156 of another housing 22. At either side of piston rod 56, vertical guide rods 160 and 162 are pivotally connected to connecting pin 164 which passes through rods 160 and 162, piston rod 156 and lugs 166 and 168 integral with frame 154. Aside from the longitudinally bent configuration of the crease bars, and the somewhat similar connected elements of rods 156 and 222, lower crease bar assembly is substantially similar to upper crease bar assembly 36, and includes two opposed pairs of crease bars 170A and 170B, 170C and 170D which are driven in clamping and unclamping movement by an air motor 172 in exactly the same fashion that motor 102 drives upper crease bars 72A-D. The internal structure of crease bars 170A-D is similar to the internal construction of crease bars 72A-D.
rod 220 is normally maintained in its fully extended position shown in Fig. 3 by a spring (not shown) acting between the lower end of the cylinder of motor 222 and the piston.

Additional operative parts disposed within housing 20 include a fan and heater assembly designated generally 224 which is located to discharge heated air through a duct 226 (see also Fig. 4) having a discharging opening 228 (Fig. 2) in the front wall of housing 20 between upper crease defining assembly 30 and waistband stretching assembly 42. The fan of assembly 224 is driven by a motor 230 best seen in Fig. 4.

A steam tank 232 is also located within housing 20 to receive steam from an external source through steam inlet conduit 234.

Automatic control of a pressing operation by the machine is achieved by the control system shown in Fig. 17. The sequential operation of the various elements of the machine is controlled by a series of cams, designated C1 through C12 inclusive, all of which are mounted upon a common drive shaft 236 which is driven by a constant speed motor 238.

Cams C1 through C10 inclusive are employed to operate air pressure control valves V3 through V10 respectively. Each of valves V1 through V10 is identical, a section of a typical valve V1 is shown in Fig. 18 as including a hollow housing 240 having an internal valve chamber within which a valve piston 241 is mounted for reciprocatory movement. The wall of casing 240 is pierced at aligned locations to permit inlet duct 242 and outlet duct 243 to communicate with the internal chamber of the casing. Valve V1 is shown in its one position at which an internal passage 244 through piston 241 places ducts 242 and 243 in communication with each other. The upper wall of casing 240 is provided with a passage 245 which vents the upper portion of the chamber upon casing 240. A compression spring 246 acts between the upper wall of casing 240 and the upper surface of piston 241 to bias the piston downwardly in Fig. 18.

Piston 241 is reciprocated within casing 240 against the action of spring 246 by a cam follower rod 247 which projects through an opening in the lower end of casing 240 to permit a roller 248 at the lower end of rod 247 to ride upon the surface of cam C1. Cam C1 has its peripheral surface divided into two sections, one lying at a large radius R1 from the axis of shaft 236 and the other section lying at a relatively small radius R2 from the axis of shaft 236. In the position of shaft 236, roller 248 is supported upon the large radius section of cam C1 and hence piston 241 is located in its uppermost position in which passage 244 places ducts 242 and 243 in communication with each other. Upon rotation of shaft 236 to a position where roller 248 is supported on the small radius section of cam C1, piston 241 is moved downwardly to locate passage 244 below ducts 242 and 243. In this position, piston 241 seals the inner end of duct 242 and places outlet duct 243 in communication with the upper portion of the chamber within housing 240 by means of a slot 249 cut into piston 241. Spring 246 maintains the roller 248 in contact with the small radius portion of the cam. When in its lowermost position, duct 243 is vented through groove 249 and venting passage 245 in the upper portion of casing 240.

It is believed apparent that by varying the relative circumferential extents of the large and small radius portions of the various cams and by properly orienting the cams upon shaft 236, the desired sequence of operation of valves V1 through V10 inclusive may be achieved.

Cams C11 and C12 are employed to operate electrical switches S1 and S2 respectively. Like the typical cam C1 of Fig. 18, cams C11 and C12 are formed with appropriately related large radius and small radius sections which engage cam followers on switches S1 and S2 to close the switches when the respective followers are in engagement with a large radius section of their associated cam and to open the switches when the follower is in engagement with a small radius section of the cam. Switch S1 is connected to energize, when closed, cam shaft drive motor 238 while switch S2 is operable when closed to energize fan drive motor 238. As shown in Fig. 17, switch S1 is by-passed by a manually operated foot switch FS which is employed by the operator to initiate the control cycle.

In Fig. 17, the inlet duct of each of valves V1 through V10 inclusive is designated P to indicate that the inlet duct of all valves is commonly connected to a point P on a pressure supply conduit 250 which is connected to a schematically illustrated source of air under pressure PS. In the machine, valves V1 through V10 are connected to a manifold, for the sake of clarity in the diagram of Fig. 17, this manifold connection has been omitted.

Pressure source PS is connected by a conduit 251 to an inlet of a conventional three position four-way valve indicated schematically at 252. In addition to the connection to pressure line 253, valve 252 includes a venting outlet 254 and suitable connections to conduits 254 and 255, conduit 254 connecting valve 244 to the rod end of yoke 232 while conduit 255 connects valve 244 with the head end of motor 212 when valve 252 is a commercially available pilot operated center neutral type valve which is normally maintained in the neutral position shown in Fig. 17 wherein the valve blocks communication between ducts 254 and 255 and ducts 251 and 253. Valve 252 is operated by applying pressure to either of a pair of oppositely disposed pistons 256, 257. When pressure is supplied to pilot 256, valve 252 is actuated to a position in which the cross connections are aligned to connect conduit 251 to conduit 254 and to connect conduit 254 to venting conduit 253. When in this position pressure is supplied to the head end of motor 212 to extend its piston rod while the rod end of motor 212 is vented through conduit 254 and the cross connection of the valve to conduit 253. When pressure is released from pilot 256, valve 252 is biased, as by springs, not shown, to the center neutral or blocking position shown in Fig. 17. When the pressure is applied to pilot 257, valve 252 is actuated to place the parallel connections in alignment with the respective conduits to connect conduit 251 to conduit 254 and to connect conduit 255 to venting conduit 253, thus driving air motor 58.

Air supply to pilot 256 is controlled by a manually operated foot pedal FP connected in conduit 258. Air supply to pilot 257 is controlled by valve V1 which is operated by cam C1.

Valves V2 through V7 inclusive are each connected to operate one or more air motors employed in the machine. In each case, only a single conduit connects the outlet duct of the various valves to the motor and it will be understood that the piston rod of the motor is returned when the motor is vented either by the action of the mass of the various parts connected to the piston rod or by a suitable return spring acting on the piston. In Fig. 17, the various conduits are shown as extending from the valve either to the head end or rod end of the respective motor, thereby indicating the direction in which the piston rod strokes when pressure is supplied to the motor. In the case where the conduit is connected to the head end, supply of pressure extends the piston rod from the motor; where the conduit is connected to the rod end of the motor, supply of pressure through the conduit retracts the piston rod of the associated motor. To describe the various connections, the outlet duct of valve V2 is connected by conduit 259 to the head end of lower crease bar motor 158. The outlet of valve V3 is connected by conduit 260 to the head end of waistband
9 stretcher motor 222. The outlet of valve V4 is connected by conduit 262 to the rod end of upper motor 138 of the upper crease bar assembly, while conduit 264 connects the outlet of valve V5 to the rod end of the lower motor of the upper crease bar assembly. Valve V6 is connected to the head end of pleat clamp motor 216 by conduit 266. Valve V7 is connected to both upper and lower crease bar clamping motors 102 and 172 through brancched conduit 268.

Valves V8 and V9 are employed to supply pump pressure to operate steam control valves V11 and V12. Valve V11 is in the steam circuit to permit flow of steam from conduit 270 into conduit 272 when valve V11 is open and to block communication between conduits 270 and 272 when valve V11 is closed. Valve V11 is normally closed, but is opened when pressure is supplied to its pilot 276, pressure being supplied to pilot 276 when valve V8 is open to permit air under pressure to flow into conduit 278 which connects the outlet of valve V8 to the head end of pilot 276. Valve V12 is of construction identical with valve V11 and is connected to control flow of steam between conduit 280 and steam diffuser 40. Pilot 282 of valve V12 is connected to valve V9 by conduit 284.

The outlet of valve V10 is connected by conduit 286, to a branch conduit 288 which connects conduit 286 to the respective upper and lower crease bar assemblies, conduit 289 having an upper branch 290 connecting conduit 289 to chambers 120 in the outermost crease bars of upper crease bar assembly 36. Conduit 290 is connected to the respective outer upper crease bar at connection 127 (Fig. 12). A second branch conduit 292 is connected in a similar fashion to the chambers 120 of the outermost lower crease bars. A one-way check valve 294 is located in conduit 292 to prevent flow of fluid from conduit 292 into conduit 286. Valve V10, when open, supplies air under pressure into the above mentioned chambers 120 from which the air is discharged through orifices 124 (Fig. 12) during the drying operation. One-way check valve 294 is necessary since conduits 288, 289 and 292 are connected to steam conduit 272 to conduct steam to the above-mentioned crease bars during the pressing operation. A one-way check valve 296 is connected in conduit 272 to prevent flow of air through conduit 272 toward steam tank 252.

To normally maintain the crease bars at the desired high temperature, steam is continuously supplied to chambers 118 of the outermost upper and lower crease bars through conduit 298 which connects steam tank 252 to upper and lower branch conduits 300 and 302 respectively. Conduit 300 is connected to one of the outermost upper crease bars by tapped bore 122 (Fig. 12). Steam passing into chamber 118 from conduit 300 is conducted from the opposite end of chamber 118 by a flexible conduit 304 which is connected between the tapped bore 124 on the crease bar to which conduit 300 is connected and the tapped bore 124 on the opposite outermost crease bar of upper crease bar assembly 36. The tapped bore 122 in this latter crease bar is connected by conduit 306 to the heater unit of fan and heater assembly 224. Thus, steam from steam tank 232 flows successively through conduit 298, conduit 300, chamber 118 in crease bar 72a, conduit 304, chamber 118 of crease bar 72d and thence, usually in the form of hot water, through conduit 306 to the heater. A one-way check valve 308 prevents reverse flow through conduit 306. Branch conduit 302 is similarly connected to the inlet 123 of chamber 118 of lower crease bar 170D whose outlet is connected by a conduit 310 to the outer end of the chamber 118 in crease bar 170A and is discharged from the opposite end of the last mentioned chamber into conduit 312 connected to a drain. Again, a one-way check valve is connected in conduit 312 to prevent reverse flow of steam or water through the conduit.

Insofar as the machine operator is concerned, there are basically four steps in the operation of the machine. In the first step, the operator manually positions the traversers to be pressed upon the machine. At this time, the various operative parts of the machine will be in the position shown in Figs. 1 through 3. The traversers are placed on the machine with their front crease line facing upwardly and the front crease lines of the right and left legs of the traversers supported on the fins on the respective right and left upper crease defining members. When the traversers are in position, the waistsband is located closely adjacent the front cover of housing 20. In Fig. 3, a pair of traversers designated T is shown in position in broken line. As a part of the positioning operation, the right and left elements of pleat clamp assembly 38 may be manually placed in position at this time.

In the second operative step, the operator depresses foot pedal FP to connect pilot 256 of valve 252 to pressure source PS. Pilot 256 then actuates valve 252 to place the cross connections in position to connect pressure line 251 to the head end of yoke operating motor 212 to extend piston rod 210 from the motor, thereby pivoting yoke 28 in a counterclockwise direction about the axis of shaft 200 (Fig. 3). The operator maintains foot pedal FP depressed to cause piston rod 210 to stroke outwardly until the fins of the lower crease defining assembly 26 engage the back crease line of the traversers and stretch the traverser legs to the desired extent. This portion of the operation is manually controlled in order to compensate for various sizes of traversers. When the traversers are stretched to the desired extent, the operator releases foot pedal FP to release the pressure from pilot 256, thereby permitting valve 252 to return to its center neutral position, blocking conduits 254 and 255 and thus maintaining piston rod 210 in the position to which it has been actuated. At this time, the operator will usually perform any further adjustments necessary to locate the crease lines on the front and rear of the respective traverser legs in alignment with the fins on the respective crease defining members. When the traversers have been finally positioned, the operator initiates the automatic pressing operation by depressing foot switch FS to energize cam shaft drive motor 238. As motor 238 begins to drive, cam C11 actuates switch S1 to close its contacts, thereby bypassing the foot switch and permitting the operator to release the switch. Cam C11 is so arranged as to maintain switch S1 closed for a complete revolution of motor 238 and to then open switch S1 to stop the motor.

The automatic pressing cycle may be conveniently divided into eleven steps which, for convenience, are listed below. It should be understood that certain of these steps may overlap and that the time duration allotted for any given step is not necessarily equal to the time duration allotted to any other step. The steps are listed in their approximate sequence, although it should be understood that certain steps may be performed simultaneously.

1. Stretch waistsband.
2. Position upper and lower crease bars.
3. Clamp upper and lower crease bars.
4. Raise upper crease bars, yoke and pleat clamp assembly.
5. Pressing steam on.
6. Pressing steam off.
7. Drying air on.
8. Drying air off.
10. Unclamp upper and lower crease bars.
11. Retract upper and lower crease bars.

In the interest of simplifying the description of the operation, the condition of the various valves V1 through
V10 inclusive during the various steps outlined above is set forth below in tabular form.

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<td>V</td>
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<tr>
<td>Motor Control</td>
<td>138 222 138 46 216 102 172</td>
<td></td>
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<tr>
<td>Piston Rod Position when Valve Vented</td>
<td>R</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
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In the above table, the notation V indicates that the outlet conduit of the particular valve is vented, while the notation P indicates that the particular valve is in the position shown in Fig. 13 to supply pressure from pressure source PS to the outlet conduit. The operative step denominated “Start” in the above table shows that at the start of a cycle all valves with the exception of valve V5, are in their venting position. Valve V5 supplies air to the lower operating cylinder of upper crease bar assembly 36, the upper operating cylinder 138 being vented, to maintain the assembly in its elevated position. Tabulated below valves V2 through V7 is the motor controlled by the valve together with the piston rod position when the motor is vented, R indicating the piston rod is retracted; E indicating the piston rod is extended. It will be understood that when pressure is supplied through the valve the piston rods will move to the opposite position.

It is believed that the above description of the structural features of the control circuit and the foregoing table sufficiently inter-relate the operation of the various valves and motors, so the following description of the operation of the machine is set forth in terms of the direction in which the piston rods of the various air motors stroke during the cycle.

With yoke 28 positioned to stretch the trousers (see Fig. 13) and motor 238 energized to rotate the cants, the first step in the cycle finds waistband motor 222 being supplied with air to retract its piston rod 220, thereby driving waistband stretching assembly 42 downwardly from the Fig. 3 position to stretch the waistband of the trousers as indicated in Fig. 13.

After the waistband has been stretched, upper crease bar motor 46 is vented to permit upper crease bar assembly 36 to move downwardly from the Fig. 3 position to the position shown in Fig. 13. Simultaneously, air is supplied to lower crease bar motor 158 to elevate lower crease bar assembly 24 from the Fig. 3 position to the position shown in Fig. 13. Note that the pivotal mounting of lower crease bar assembly 24 upon the piston and guide rods associated with motor 158 permits the lower crease bar assembly to adapt itself to the position of the lower crease defining assembly 36. Reference to Fig. 15 shows the relative position of the crease bars and crease defining members associated with one pant leg at this particular stage.

During the next step, air is supplied to upper and lower crease bar clamping motors 102 and 172 to move the opposed pairs of crease bars toward each other to grip the pant legs on opposite sides of the fin of the associated crease defining member. When the pant legs are firmly clamped between the respective crease bars, air is supplied to upper motor 138 of the upper crease bar assembly to retract the piston rod of this motor into its cylinder, thereby partially elevating the upper crease bar air is supplied to pilot 257 to operate valve 252 to cause the piston rod 210 of yoke drive motor 212 to be retracted, thereby pivoting yoke 28 in a clockwise direction from the Fig. 13 position to the Fig. 14 position. At the completion of this step, the respective pant legs are gripped along their front and rear crease lines by the respective upper and lower crease bar assemblies. The internal crease defining members are no longer present in the crease and hence an extremely sharp crease is imparted to the pants.

With the pants gripped directly between the crease bars in the fashion described above, valve V11 is opened to admit steam from steam tank 232 into the chambers 120 of the outermost crease bars. Steam is ejected from the outermost crease bars through the openings 256 in these bars to set the crease in the pants. Steam is supplied for a pre-determined time interval which is selected by the design of the configuration of cam C8. Valve V12 is opened simultaneously with valve V11 to connect steam diffuser 40 to steam tank 232, thereby applying steam in the region of the waistband to permit any wrinkles which may be present in this region to be stretched out of the pants by the stretching action of stretcher 42. Upon completion of the steaming operation, air is supplied to the aforementioned chambers 120 to assist in drying the material of the trousers. During this operation, cam C13 closes switch S2 to energize the fan drive motor 230 whereby fan 224 discharges air into the body portion of the pants to assist in the drying operation. If desired, the steam and air cycles may overlap.

While the air is flowing, waistband stretcher motor 222 may be vented so the return spring of the motor biases stretching assembly 42 upwardly to the Fig. 3 position. Upper and lower clamping motors 102 and 172 are vented at this time to unclamp the crease bars to permit the pants to drop back downwardly onto upper crease defining assembly 30. After the pants have been released from the crease bars they are manually removed from the machine. Upper motor 135 of the upper crease bar assembly is vented and lower motor 46 is supplied with air to retract its piston rod to elevate fully the upper crease bar assembly 36 clear of the pants while at the same time lower crease assembly motor 158 is vented to permit the lower crease bar assembly to retract downwardly under the action of gravity. During this latter period, switch S2 opens to deenergize fan motor 230 and, with the various valves and cams now returned to their original position, switch S1 opens to stop motor 238.

While I have disclosed but one embodiment of my invention, it will be apparent to those skilled in the art that the disclosed embodiment may be modified. Therefore the foregoing description is to be considered exemplary rather than limiting and the true scope of my invention is that defined in the following claims.
I claim:
1. A pants pressing machine comprising an elongated crease defining member arranged to fit within a pant leg along a crease line, a pair of elongated crease bars disposed along opposite sides of said member, means for clamping said crease bars against the pant leg along opposite sides of said member, and means for causing relative movement between said crease defining member and said crease bars transversely of the crease line to remove said member from the crease line while said bars remain clamped along the pant leg.

2. A pants pressing machine comprising front crease defining members arranged to fit within pant legs along the front crease lines, back crease defining members arranged to fit within pant legs along the back crease lines, said front and back defining members being mounted for relative movement to expand and contract within the pant legs, front crease bars disposed along opposite sides of the respective front crease defining members, back crease bars disposed along opposite sides of the respective back crease defining members, means for clamping said bars against the front and back crease lines of the pants along opposite sides of the respective members, and means for causing relative movement between said crease defining members and said crease bars to remove said members from the crease lines while said bars remain clamped along the front and back crease lines of the pant legs.

3. A pants pressing machine comprising an elongated horizontally disposed crease defining member arranged to fit within a pant leg along a crease line, a pair of elongated crease bars disposed along opposite sides of said member, means for clamping said crease bars against the pant leg along opposite sides of said member, and means for causing relative vertical movement between said crease defining member and said crease bars while the pant leg is clamped by said crease bars.

4. A pants pressing machine comprising horizontally disposed front crease defining members arranged to fit within pant legs along the front crease lines, back crease defining members arranged to fit within pant legs along the back crease lines, said front and back crease defining members being mounted for relative vertical movement to expand and contract within the pant leg, front crease bars disposed along opposite sides of the respective front crease defining members, back crease bars disposed along opposite sides of the respective back crease defining members, means for clamping said crease bars against the front and back crease lines of the pant legs along opposite sides of the respective members, and means for causing relative vertical movement between said crease defining members and the respective crease bars to remove said members from the front and back crease lines while the pant legs are clamped by said bars.

5. A pants pressing machine comprising a first horizontally disposed stationary crease defining member arranged to fit within a pant leg along the front crease line, a second crease defining member arranged to fit within a pant leg along the back crease line, said first crease defining member being mounted for vertical movement relative to said first crease defining member, means for clamping said crease bars against the front and back crease lines of the pant legs along opposite sides of said member, and means for causing relative vertical movement between said crease defining members and said crease bars while said bars remain clamped along the front and back crease lines of the pant legs.

6. A pants pressing machine comprising an elongated horizontally disposed crease defining member arranged to fit within a pant leg along a crease line, a pair of elongated crease bars disposed along opposite sides of said member, means for clamping said crease bars against the pant leg along opposite sides of said member, and means for causing relative vertical movement between said crease defining members and said crease bars while said bars remain clamped along the front and back crease lines of the pant legs.

7. A pants pressing machine comprising a first horizontally disposed stationary crease defining member arranged to fit within a pant leg along the front crease line, a second pair of crease defining members arranged within a pant leg along the back crease line, said first crease defining member being mounted for vertical movement relative to said first crease defining member, means for clamping said crease bars against the front and back crease lines of the pant legs along opposite sides of said member, and means for causing relative vertical movement between said crease defining members and said crease bars while said bars remain clamped along the front and back crease lines of the pant legs.

8. A pants pressing machine comprising an elongated horizontally disposed crease defining member arranged to fit within a pant leg along the front crease line, a second crease defining member arranged along the opposite side of said member, means for clamping said crease bars against the front and back crease lines of the pant legs along opposite sides of said member, and means for causing relative vertical movement between said crease defining members and said crease bars while said bars remain clamped along the front and back crease lines of the pant legs.

9. A pants pressing machine comprising an elongated horizontally disposed crease defining member arranged to fit within a pant leg along a crease line, a pair of elongated crease bars disposed along opposite sides of said member, covering material on each said crease bar coarser than the surface of said crease defining member, means for clamping said crease bars against the pant leg along opposite sides of said member, and means for causing relative movement between said crease defining member and said crease bars transversely of the crease line to retain the crease line of the pant leg between the coarse covers said bars while the crease defining member is removed from the crease line of the pant leg.

10. A pants pressing machine comprising an elongated horizontally disposed crease defining member arranged to fit within a pant leg along a crease line, a pair of elongated crease bars disposed along opposite sides of said member, means for clamping said crease bars against the pant leg along opposite sides of said member, and means for causing relative movement between said crease defining member and said crease bars while said bars remain clamped along the pant legs.

11. A pants pressing machine comprising a first crease defining member arranged to fit within the pant leg along the front crease line, a second crease defining member...
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15 arranged to fit within a pant leg along the back crease line, said crease defining members being mounted for relative movement to expand and contract with the pant leg, a first pair of crease bars disposed along opposite sides of said first crease defining member, a second pair of crease bars disposed along opposite sides of said second crease defining member, means for clamping said crease bars against the pant leg along opposite sides of said member, means for causing relative movement between said crease defining members and said crease bars to remain clamped along the pant leg, and means for distributing steam through said bars along the crease lines of the pant leg.

17. A pants pressing machine comprising a first crease defining member arranged to fit within a pant leg along the front crease line, a second crease defining member arranged to fit within a pant leg along the back crease line, said crease defining members being mounted for relative movement to expand and contract within the pant leg, a first pair of crease bars disposed along opposite sides of said first crease defining member, a second pair of crease bars disposed along opposite sides of said second crease defining member, means for clamping said crease bars along the pant leg on opposite sides of the respective members, means for causing relative movement between said crease defining members and said crease bars to remove said members from the front and back crease lines while said bars remain clamped along the pant leg, means for distributing steam through said bars along the crease lines of the pant leg, and means for distributing air through said bars along the length of the crease lines of the pant leg for cooling and drying the pant leg.

18. A pants pressing machine comprising a first crease defining member arranged to fit within a pant leg along the front crease line, a second crease defining member arranged to fit within a pant leg along the back crease line, said crease defining members being mounted for relative movement to expand and contract within the pant leg, a first pair of crease bars disposed along opposite sides of said first crease defining member, a second pair of crease bars disposed along opposite sides of said second crease defining member, means for clamping said crease bars against the pant leg opposite sides of said crease defining members and said crease bars to remove said members from the front and back crease lines while said bars remain clamped along the pant leg, means for distributing steam through the crease bars along the crease line of the pant leg, means for distributing steam through the waist portion of the pants, and means for distributing air through the waist portion of the pants for cooling and drying the pants.

19. A pants pressing machine comprising a first crease defining member arranged to fit within a pant leg along the front crease line, a second crease defining member arranged to fit within a pant leg along the back crease line, said crease defining members being mounted for relative movement to expand and contract within the pant leg, a first pair of crease bars disposed along opposite sides of said first crease defining member, a second pair of crease bars disposed along opposite sides of said second crease defining member, means for clamping said crease bars along the pant leg on opposite sides of the respective members, means for causing relative movement between said crease defining members and said crease bars to remove said members from the crease lines while said bars remain clamped along the pant leg, means for distributing steam through the crease bars along the crease line of the pant leg, means for distributing air through the waist portion of the pants for cooling and drying the pants, and means for distributing air into the waist portion of the pants for cooling and drying the pants.

20. A pants pressing machine comprising a first crease defining member arranged to fit within a pant leg along the front crease line, a second crease defining member arranged to fit within a pant leg along the back crease line, said crease defining members being mounted for relative movement to expand and contract within the pant leg, a first pair of crease bars disposed along opposite sides of said first crease defining member, a second pair of crease bars disposed along opposite sides of said second crease defining member, means for clamping said crease bars against the pant leg along opposite sides of said crease defining members, means for causing relative movement between said crease defining members and said crease bars to remove said members from the crease lines while said bars remain clamped along the pant leg, and means for distributing steam through said bars along the crease lines of the pant leg.
said pressing position, and means operative while said crease bars are in said pressing position for removing said locating means from the crease line.

21. A pants pressing machine comprising a frame, an elongate crease defining member on said frame to be received within a pant leg, means for expanding a pant leg located on said member to tension said pant leg transversely against said member to establish a crease line in said pant leg, a pair of elongate crease bars in side by side relationship on said frame, means for moving said crease bars into clamping engagement with a pant leg on said crease line in said pant leg by said expanding means, and means for causing relative movement of said crease bars and said member while maintaining said crease bars in clamping engagement with said pant leg to withdraw said pant leg from said member while retaining said crease line clamped within said pressing means.

22. A pants pressing machine comprising a frame, an elongate crease defining member located on said frame to be received within a pant leg, means for expanding a pant leg located on said member to tension said pant leg transversely against said member to establish a crease line in said pant leg, a pair of elongate crease bars in side by side relationship on said frame, means for moving said crease bars into clamping engagement with a pant leg on said crease line in said pant leg by said expanding means, and means for causing relative movement of said crease bars and said member while maintaining said crease bars in clamping engagement with said pant leg to withdraw said pant leg to said member while retaining said crease line clamped within said pressing means.

23. A pants pressing machine comprising a frame, an elongate crease defining member located on said frame to be received within a pant leg, means for expanding a pant leg located on said member to tension said pant leg transversely against said member to establish a crease line in said pant leg, means for moving said crease bars into clamping engagement with a pant leg on said crease line in said pant leg by said expanding means, and means for causing relative movement of said crease bars and said member while maintaining said crease bars in clamping engagement with said pant leg to withdraw said pant leg to said member while retaining said crease line clamped within said pressing means.

24. A pants pressing machine comprising a frame, an elongate crease defining member located on said frame to be received within a pant leg, means for expanding a pant leg located on said member to tension said pant leg transversely against said member to establish a crease line in said pant leg, a pair of horizontally disposed elongate crease bars having a length substantially equal to the length of said crease defining member and movably mounted in opposed side by side relationship on said frame, means for moving said crease bars into clamping engagement with a pant leg on said member along opposite sides of the crease line established in said pant leg by said expanding means, and means for moving said crease bars upwardly away from said member while maintaining said crease bars in clamping engagement with said pant leg to lift said pant leg from said member while retaining said crease line clamped within said pressing means.

25. A pants pressing machine as defined in claim 24 wherein said expanding means includes means for establishing a second crease line in said pant leg on the opposite side of said leg from the crease line established by the engagement of the pant leg with said crease defining member.

26. A pants pressing machine comprising a frame, alignment means mounted on said frame for supporting a pant leg from said frame with front and back crease lines defined in said pant leg, pressing means on said frame movable into clamping engagement along opposite sides of the front and back crease lines defined in a pant leg supported on said alignment means, and means for disengaging said pant leg from said alignment means while maintaining said pressing means in clamping engagement along said front and back crease lines.

27. A pants pressing machine comprising a frame, alignment means mounted on said frame for supporting a pant leg from said frame with front and back crease lines defined in said pant leg, pressing means on said frame movable into clamping engagement along opposite sides of the front and back crease lines defined in a pant leg supported on said alignment means, and means for disengaging said pant leg from said alignment means while maintaining pressing means in clamping engagement along opposite sides of the front and back crease lines defined in a pant leg supported on said alignment means, and a pair of back crease bars spaced from said front crease bars and movable into clamping engagement along opposite sides of the back crease line defined in a pant leg supported on said alignment means, and means for disengaging said pant leg from said alignment means while maintaining pressing means in clamping engagement along the respective crease lines.

28. A pants pressing machine comprising a frame, horizontally projecting alignment means mounted on said frame adapted to be received within a pant leg to support the pant leg from said frame with front and back crease lines defined in said pant leg, pressing means on said frame movable into clamping engagement along opposite sides of the front and back crease lines defined in a pant leg supported on said alignment means, and means for disengaging said pant leg from said alignment means while maintaining pressing means in clamping engagement along said front and back crease lines.

29. A pants pressing machine comprising a frame, an elongate crease defining member located on said frame to be received within a pant leg, means for expanding a pant leg located on said member to tension said pant leg transversely against said member to establish a crease line in said pant leg, pressing means on said frame, means for moving said pressing means into clamping engagement with a pant leg on said member along opposite sides of the crease line established in said pant leg by said expanding means, and means for causing relative movement of said crease bars and said member while maintaining said crease bars in clamping engagement with said pant leg to withdraw said pant leg from said member while retaining said crease line clamped within said pressing means.

30. A pants pressing machine comprising a frame, horizontally projecting alignment means mounted on said frame translated along the length of said crease line established in said pant leg by said expanding means, means for causing relative movement of said crease bars and said member while maintaining said crease bars in clamping engagement with said pant leg to withdraw said pant leg from said member while retaining said crease line clamped within said pressing means.

31. A pants pressing machine comprising a frame, an elongate crease defining member located on said frame to be received within a pant leg, means for expanding a pant leg located on said member to tension said pant leg transversely against said member to establish a crease line in said pant leg, pressing means on said frame movable into clamping engagement along opposite sides of the front and back crease lines defined in a pant leg supported on said alignment means, and means for disengaging said pant leg from said alignment means while maintaining said pressing means in clamping engagement along said front and back crease lines, and means for distributing steam through said pressing means along the entire length of the clamped crease line.

32. A pants pressing machine comprising a frame, alignment means mounted on said frame for supporting a pant leg from said frame with front and back crease lines defined in said pant leg, pressing means on said frame movable into clamping engagement along opposite sides of the front and back crease lines defined in a pant leg supported on said alignment means, and means for disengaging said pant leg from said alignment means while maintaining said pressing means in clamping engagement along said front and back crease lines.

33. A pants pressing machine comprising a frame, a pair of horizontally disposed elongate crease bars having a length substantially equal to the length of said crease defining member and movably mounted in opposed side by side relationship on said frame, means for moving said crease bars into clamping engagement with a pant leg on said member along opposite sides of the crease line established in said pant leg by said expanding means, and means for moving said crease bars upwardly away from said member while maintaining said crease bars in clamping engagement with said pant leg to lift said pant leg from said member while retaining said crease line clamped within said pressing means.

34. A pants pressing machine as defined in claim 33 wherein said expanding means includes means for establishing a second crease line in said pant leg on the opposite side of said leg from the crease line established by the engagement of the pant leg with said crease defining member.

35. A pants pressing machine comprising a frame, alignment means mounted on said frame for supporting a pant leg from said frame with front and back crease lines defined in said pant leg, pressing means on said frame movable into clamping engagement along opposite sides of the front and back crease lines defined in a pant leg supported on said alignment means, and means for disengaging said pant leg from said alignment means while maintaining said pressing means in clamping engagement along said front and back crease lines.

36. A pants pressing machine comprising a frame, an elongate crease defining member located on said frame to be received within a pant leg, means for expanding a pant leg located on said member to tension said pant leg transversely against said member to establish a crease line in said pant leg, pressing means on said frame, means for moving said pressing means into clamping engagement with a pant leg on said member along opposite sides of the crease line established by said expanding means, and means for causing relative movement of said crease bars and said member while maintaining said crease bars in clamping engagement along the respective crease lines.
leg to remove said member from the crease bar of said pant leg while retaining the crease line clamped within said pressing means, means for distributing steam through said pressing means along the entire length of the clamped crease line, and means for distributing air through said pressing means along the entire length of the clamped crease line for cooling and drying.

32. A pants pressing machine comprising a frame, alignment means mounted on said frame for supporting a pant leg from said frame with front and back crease lines defined in said pant leg, pressing means on said frame movable into clamping engagement along opposite sides of the front and back crease lines defined in a pant leg supported on said alignment means, means for disengaging said pant leg from said alignment means while maintaining said pressing means in clamping engagement along said front and back crease lines, means for distributing steam through said pressing means along the entire length of the clamped crease line, and means for distributing air through said pressing means along the entire length of the clamped crease line for cooling and drying.

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