Jan. 14, 1964 J. N. McMILLAN 3,117,704

APPARATUS FOR FINISHING TROUSERS

Filed March 21, 1961 7 Sheets-Sheet 1

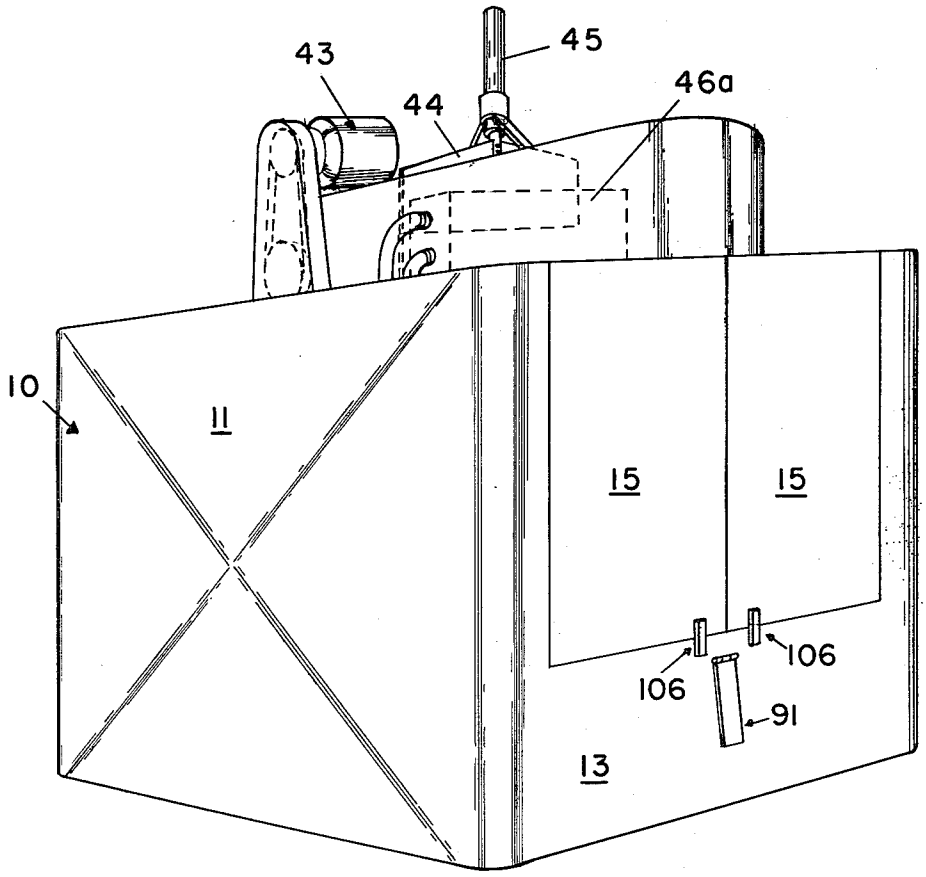


FIG - 1

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Jan. 14, 1964 J. N. McMILLAN 3,117,704

APPARATUS FOR FINISHING TROUSERS

Filed March 21, 1961 7 Sheets-Sheet 2

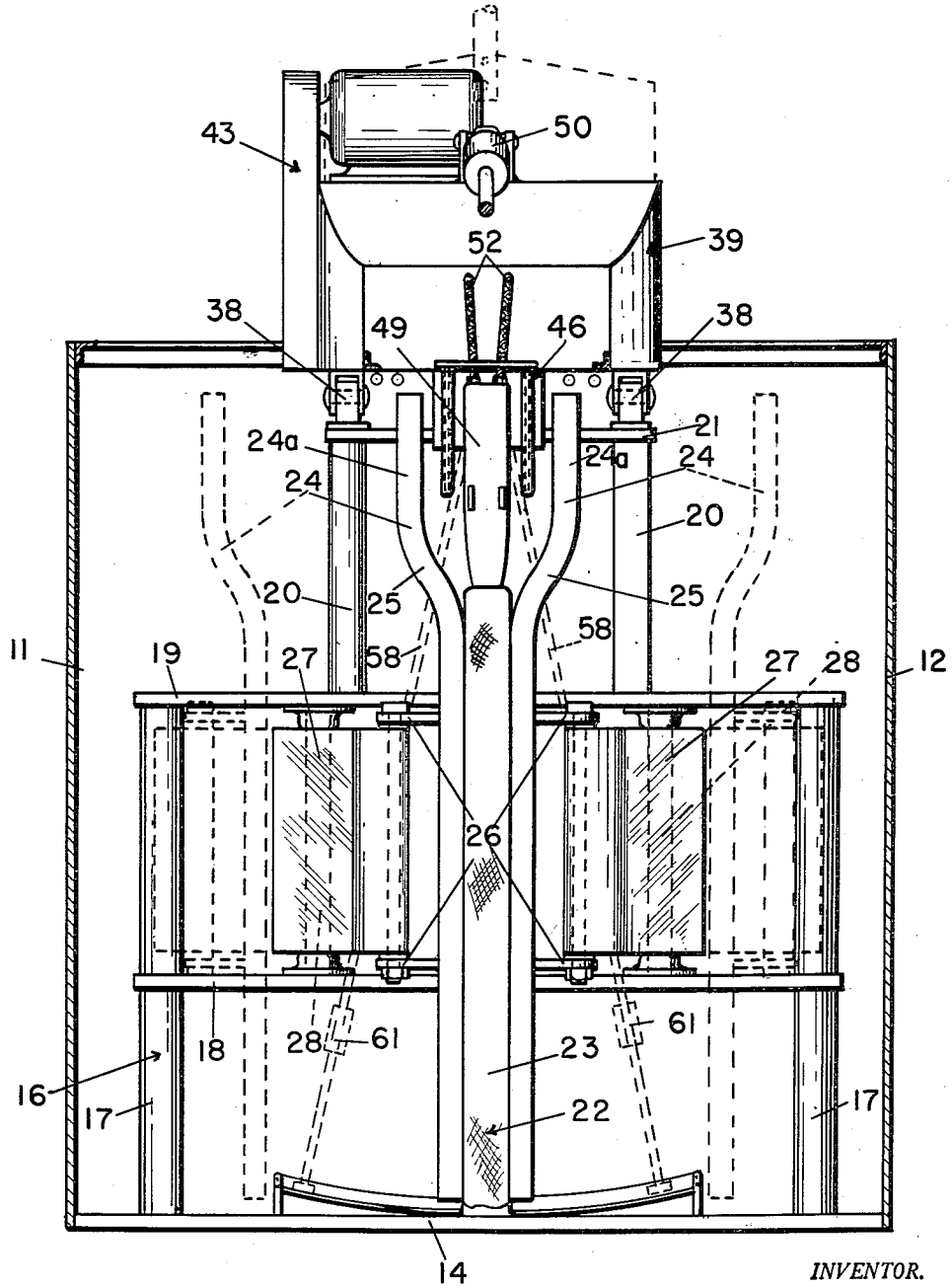


FIG-2

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APPARATUS FOR FINISHING TROUSERS

Filed March 21, 1961 7 Sheets-Sheet 3

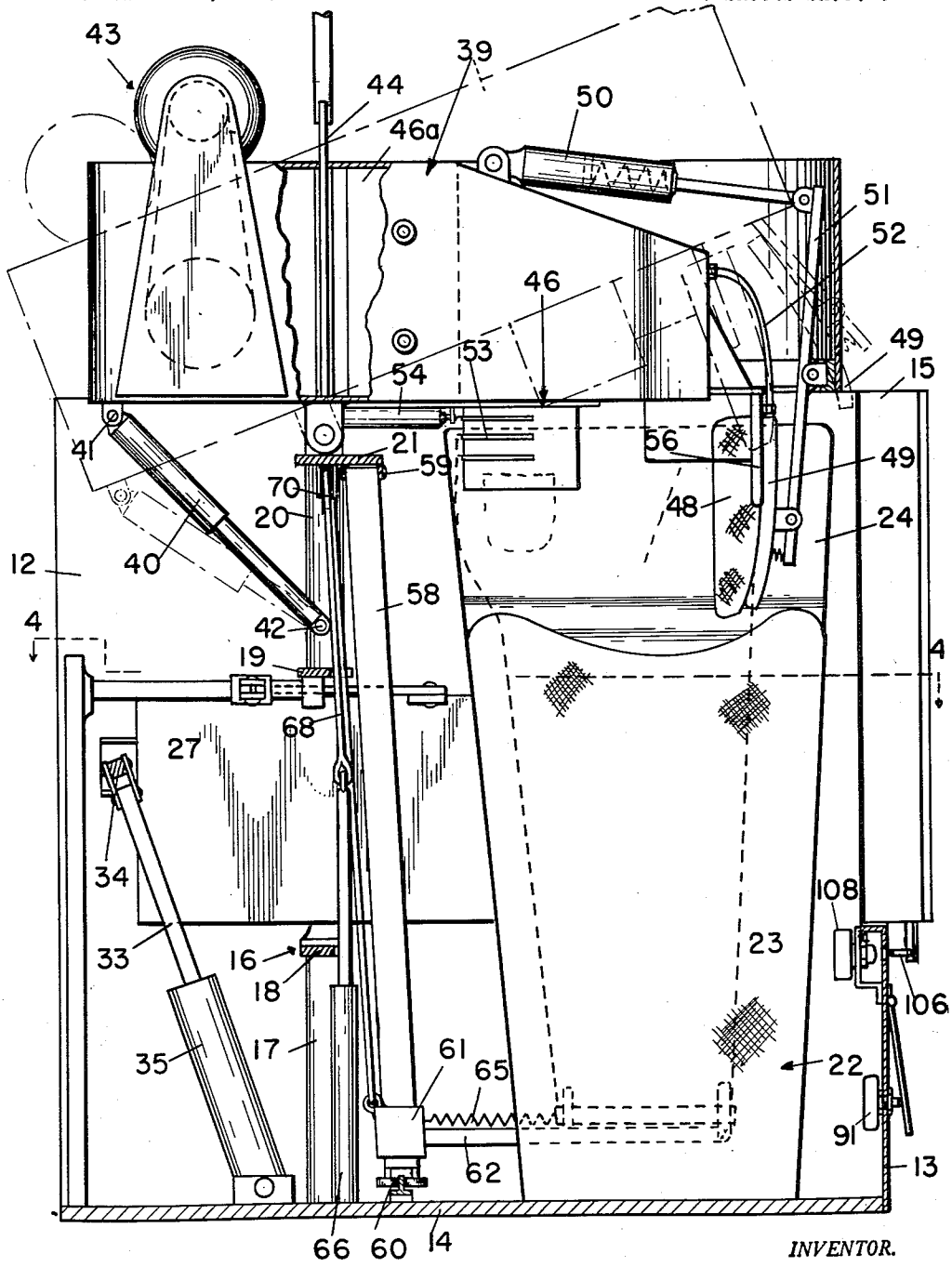


FIG-3

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Jan. 14, 1964 J. N. McMILLAN 3,117,704

APPARATUS FOR FINISHING TROUSERS

Filed March 21, 1961 7 Sheets-Sheet 4

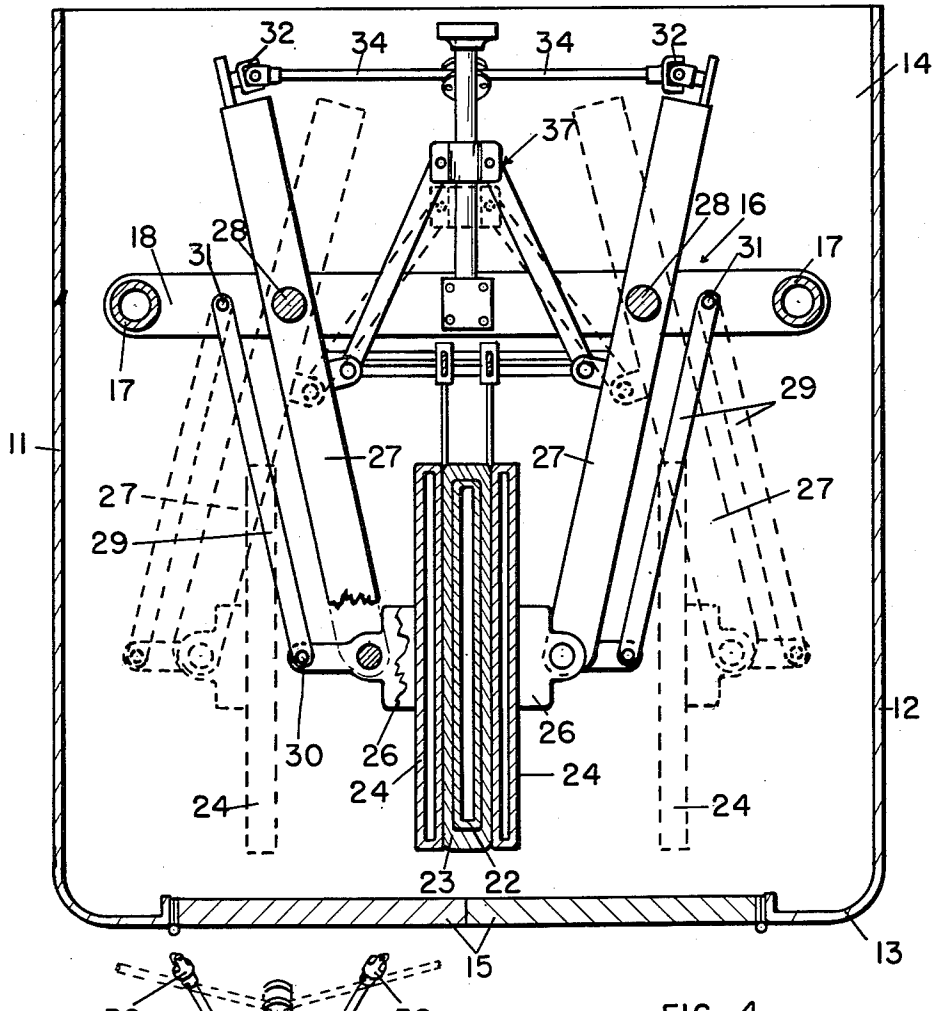


FIG - 4

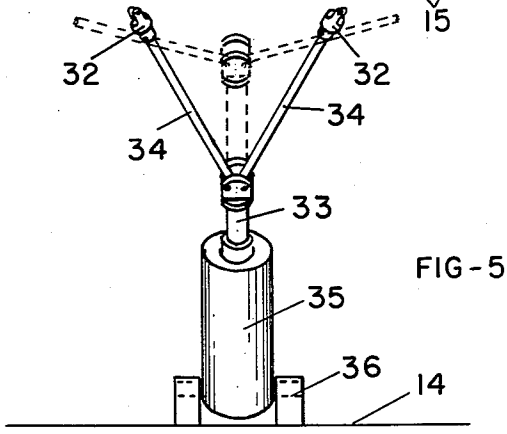


FIG - 5

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APPARATUS FOR FINISHING TROUSERS

Filed March 21, 1961 7 Sheets-Sheet 5

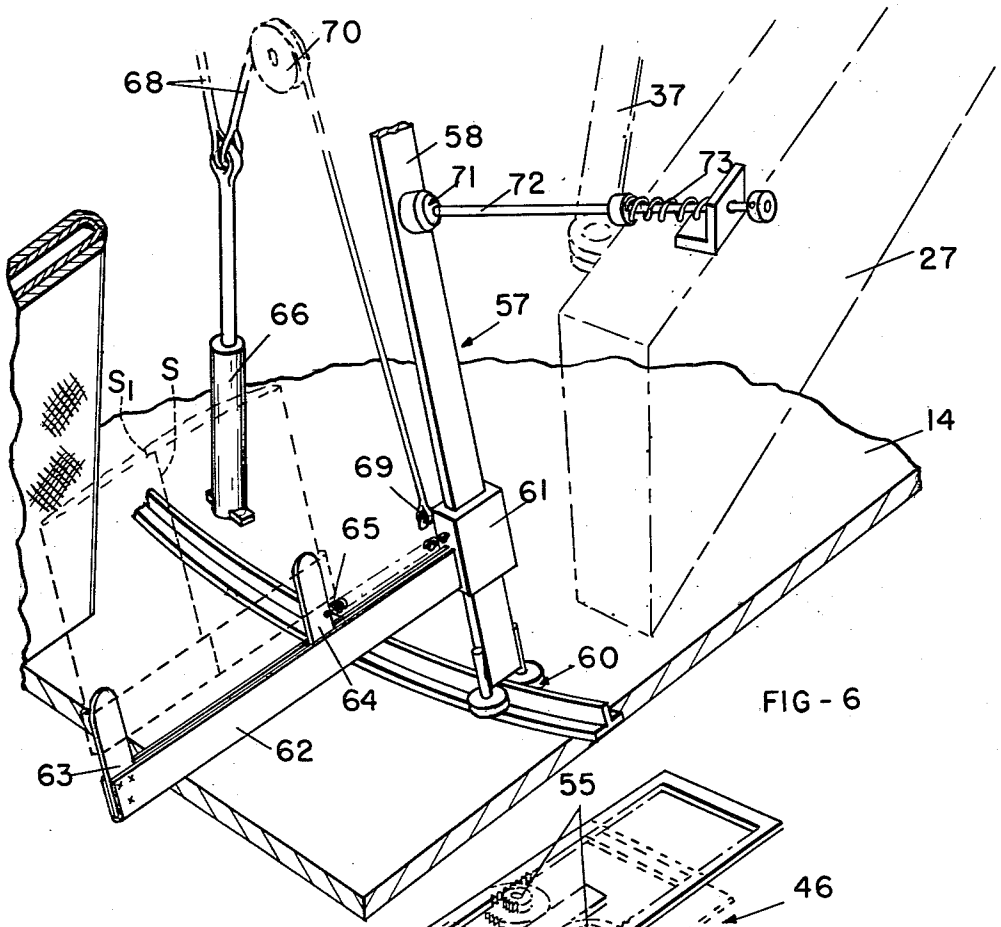


FIG - 6

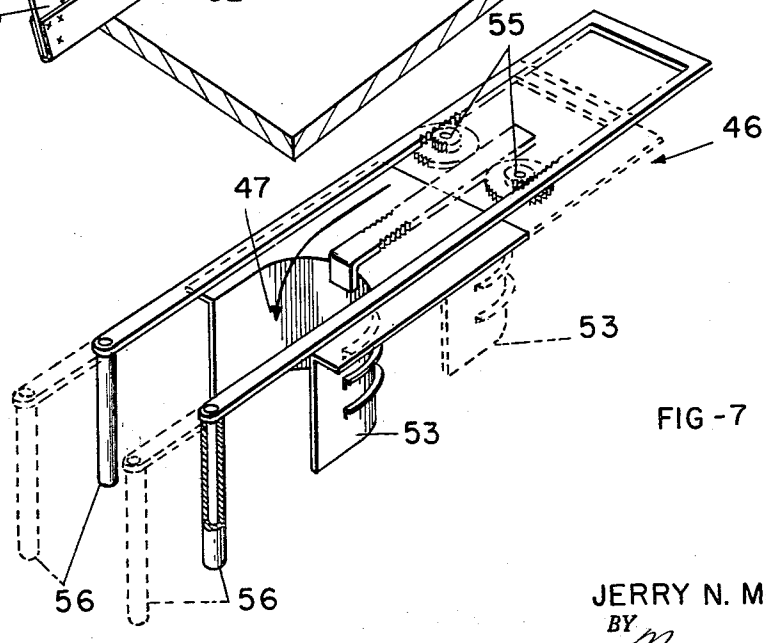


FIG - 7

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APPARATUS FOR FINISHING TROUSERS

Filed March 21, 1961 7 Sheets-Sheet 6

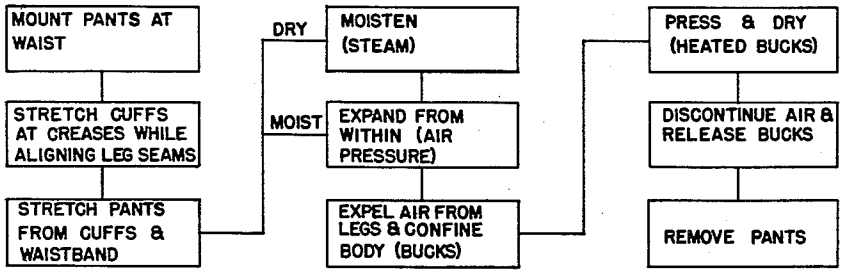


FIG - 8

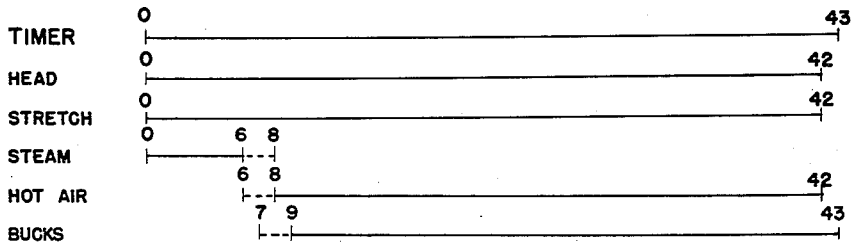


FIG - 9

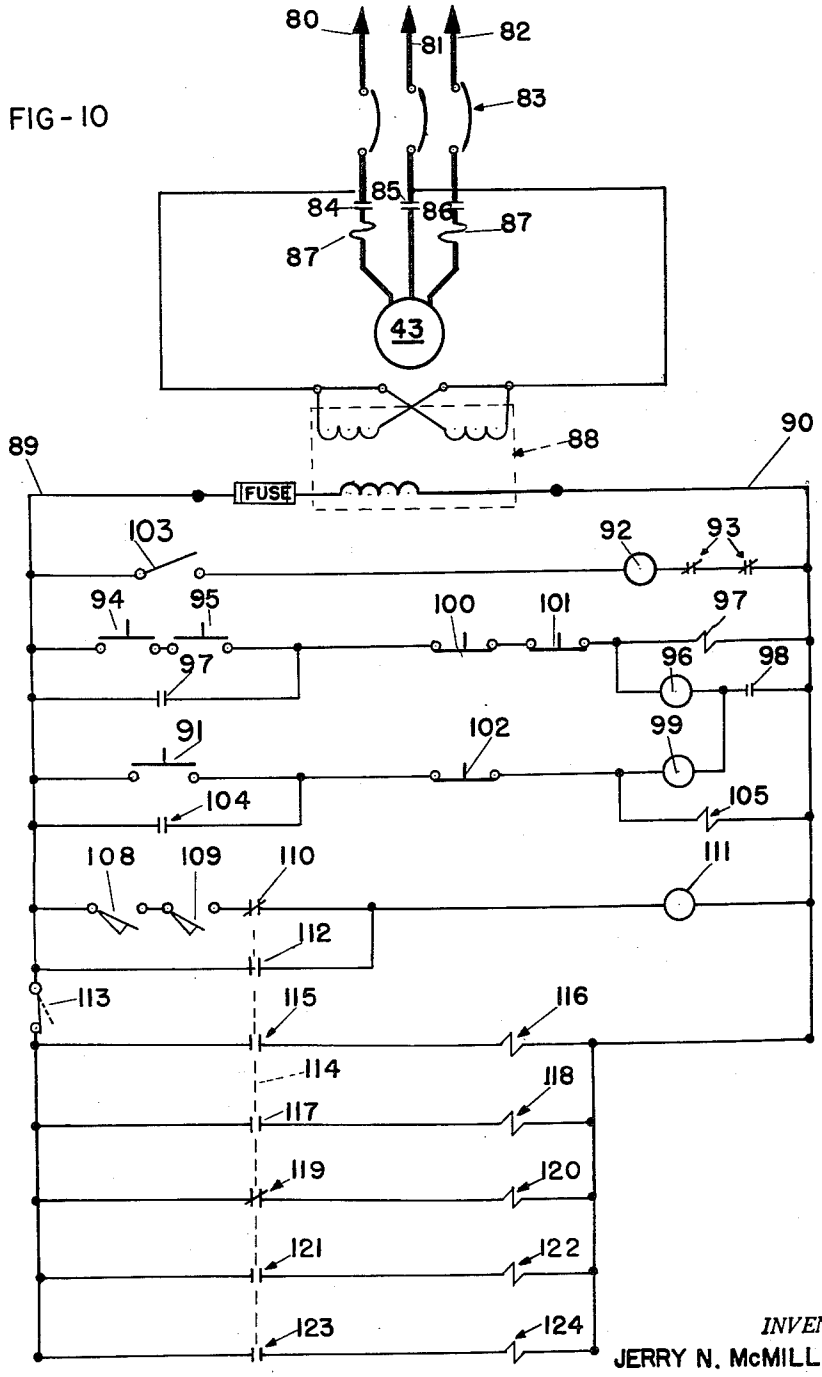
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APPARATUS FOR FINISHING TROUSERS

Filed March 21, 1961 7 Sheets-Sheet 7

FIG - 10



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3,117,704

Patented Jan. 14, 1964

3,117,704

APPARATUS FOR FINISHING TROUSERS

Jerry N. McMillan, Colville, Wash.

Filed Mar. 21, 1961, Ser. No. 97,350
3 Claims. (Cl. 223—73)

This invention relates to apparatus for finishing fabric trousers and has for its principal object to provide quickly for finishing such trousers with a minimum expenditure of time and human effort.

Heretofore predominantly, pressing machines have been constructed with the pressing members horizontal with the result that only one leg of a pair of trousers could be pressed at one time and required careful arrangement of the trousers during a number of lays or different positionings of the trousers on the pressing machine to prevent wrinkles and undesirable folds. The obvious result of this conventional method of pressing trousers is a considerable waste of labor and time. It therefore is necessary to have plural pressing machines and operators to produce a given number of finished trousers each working day, thus resulting in a waste of floor space by reason of the number of such pressing machines required when a large volume of trousers is being handled.

There are also other pressing machines known which support trousers in an inverted position with the cuffs held above the pressing members or near the upper ends thereof and the waistband at the bottom. Employing these machines requires that the operator stoop down to make folds at the proper position in the waist-band of the trousers and then rise to operate the machines. Such alternate stooping and rising required for pressing every pair of trousers is fatiguing to the operator and usually requires additional pay.

In addition to this, there is at least one known pressing machine which supports the trousers from the waistband in an upright position by means of clips which grip the waist-band of the trousers from the opposite sides with the trouser waist-band disposed in face-to-face engagement and with previous folds at substantially the location for creases in the legs applied thereto. This machine has proved to be unsatisfactory because it does not finish the trousers acceptably for the reasons disclosed hereinafter and which will be understood by a careful reading of this specification.

It is an object of the present invention to provide apparatus for finishing trousers having means for supporting the trousers at the waist-band with the waistband substantially wrinkle fold free and at the cuffs while the pressing operations are carried out so that the trousers are properly sized and finished without wrinkles and with a minimum expenditure of time and labor.

Still a further object of the present invention lies in the provision of apparatus for finishing fabric trousers which includes means for tautening the trousers from the waist-band and cuffs, means for distending the trousers by a pressure medium and while the trousers are so supported and urged toward distension pressing selected portions of the trousers to remove wrinkles and provide the conventional creases.

The accompanying drawings disclose a preferred embodiment of the present invention but it is not intended that said drawings shall constitute a limitation to the scope of the present invention and are exemplifying to assist in the understanding thereof, the invention to be considered as broadly as the appended claims permit.

In the drawings:

FIGURE 1 is a perspective view of my improved trouser finishing apparatus;

FIGURE 2 is a vertical view, partially in section, taken

inside the front wall of the device and looking toward the back thereof;

FIGURE 3 is a vertical section having parts broken away for convenience of illustration and showing an alternate position of the movable head by dot and dash lines, said section being taken substantially 90° from that of FIGURE 2;

FIGURE 4 is a horizontal cross section taken on planes indicated substantially by line 4—4 of FIGURE 3;

FIGURE 5 is a fragmentary rear view showing the buck operating motor;

FIGURE 6 is a fragmentary perspective view disclosing particularly the cuff-holding mechanism;

FIGURE 7 is a fragmentary perspective view showing the waist-band securing and tautening means;

FIGURE 8 is a flow sheet disclosing the several steps of the improved method;

FIGURE 9 is a diagram disclosing the timing sequence of certains steps of the said method; and

FIGURE 10 is a line drawing showing the wiring diagram.

Referring now to the drawings in detail, in which like numerals are employed to designate like parts, the numeral 10 generally designates a supporting frame which includes side walls 11 and 12, a front wall 13 and a bottom wall or supporting plate 14. The front wall 13 includes door 15—15 which are hinged along the outer edges on vertical axes so that the doors 15 may swing from the center outwardly to provide to the operator access to the finishing apparatus.

As seen in FIGURE 2, the supporting frame 10 includes an internal frame 16, which is comprised of spaced vertical posts 17—17 interconnected at locations upwardly spaced from the bottom wall 14 by laterally extending parallel bars 18 and 19. The upper bar 19 supports additional laterally spaced vertically parallel standards 20—20 interconnected at their upper ends by a bar 21.

Substantially midway of the lateral width of the device, the supporting plate 14 carries a vertically disposed hollow pressing member 22 which, it will be seen, is a hollow steam chest and therefore may be heated according to manual selection, and is provided with conventional padding 23 on the surfaces thereof. This pressing member 22 together with a pair of movable bucks 24 constitute means for pressing the leg portions of trousers mounted on the apparatus as subsequently described.

The bucks 24 are also hollow steam chests and are heated by conventional steam lines (not shown) to provide temperature means for adequately pressing a portion of the trousers T. Inspection of FIGURE 3 will reveal that the pressing member 22 diverges upwardly as do also the bucks 24 and inspection of FIGURE 2 will show that the bucks 24, for a major portion of their lengths, are parallel and adapted to fit on opposite sides of the pressing member 22 and at the upper ends thereof the bucks 24 terminate at 25 with their upper ends in spaced apart recurvate portions 24*a*.

Between the spaced apart portions 24*a* I provide adjustable means 46 for fixing the trousers T at its waist-band with the waistband substantially wrinkle free.

The bucks 24 are provided with brackets 26 to which the swinging support arms 27—27 are pivotally secured. The arms extend rearwardly and are journaled for lateral swinging movements at their forward ends about the axes of laterally spaced vertical shafts 28 carried by the plates 18 and 19. It will thus be seen that the bucks 24 may be moved outwardly away from the pressing member 22 to substantially the broken line position shown in FIGURE 4 of the drawings and inwardly to the full line representations of FIGURES 2 and 4 wherein they are disposed in the pressing position.

Links 29 (FIGURE 4) are pivotally secured at 30 to the brackets 26 and at 31 to either plate 18 or plate 19 (here shown to plate 18) so that a parallelogram is effected with the support arms 27—27 thus insuring the continual parallel positioning of the pressing faces of the bucks 24 with respect to each other and the pressing member 22 throughout the aforesaid movements.

By means of universal joints 32, rearward ends of the arms 27 are interconnected to the shaft 33 with links 34—34. The fluid motor 35 is pivotally anchored at 36 to the bottom wall or supporting plate 14 and a conventional hydraulic pressure system with suitable controls is employed to actuate the motor 35 to extend and withdraw the shaft 33 and thus respectively pivot the forward ends of the arms 27 inwardly to move the bucks 24 into pressing engagement with the pressing member 22 and conversely remove them from pressing engagement therewith. Means 37 are provided to insure simultaneous and coincident swinging movements of the arms 27 and may be accomplished by any one of a number of well-known interconnecting linkages.

At the upper end of the posts 20, pillow blocks 38 are provided to journal a head 39 which is movable between the full line position of FIGURES 1, 2 and 3 and the dot and dash line position shown in FIGURE 3. The head 39 is provided with a combined hydraulic servo-motor-shock-absorber 40 pivotally secured at 41 to the rear end of the head 39 and also at 42 to the frame 16 at any convenient point. It will thus be seen that by a conventional hydraulic system and controls (not shown) the head may be shifted alternately between the full and dot and dash line positions of FIGURE 3.

Head 39 carries a motorized fan unit 43 which is designed to provide air under pressure from the atmosphere into the hollow head 39 and constitutes a source of air under pressure. It is to be understood that it is not my intention to limit the scope of this invention by using the terms "air under pressure" or similar phrases, but I employ the term generically to mean any suitable pressurized gaseous medium which will function to accomplish the purposes as clearly set forth in this specification. Passage of the pressurized air through the head 39 is controlled by the gate 44 which also is supplied with a hydraulic servo-motor 45 and is automatically controlled as will hereinafter appear, to raise and lower the gate 44 and control the flow of pressurized air from the fan unit 43 through a steam radiator 46*a* disposed within the head 39 and by which the pressurized air may be heated when passing through the head. The air then passes forwardly and downwardly through an opening in the bottom wall of the head 39 through conduit means in the means 46 for fixing trousers at its waist-band; the flow of the heated air or pressure medium being downwardly through the means 46 as indicated by the arrow 47 of FIGURE 7 wherein said means 46 is particularly disclosed. This conduit means provides a convenient method for introducing the pressurized air interiorly of the trousers mounted on the apparatus. Obviously, other apparatus for introducing the air under pressure into the trousers to distend the trousers as subsequently described may function equally as well.

The means 46 for fixing the trousers at the waist-band has supported relative thereto a fly-pressing member 48 fixed to the head 39 and carried thereby and with which is associated a movable fly-pressing buck 49 also shown in the pressing position in full line and in the open position in broken lines of FIGURE 3. A hydraulic servo-motor 50 mounted on the head 39 actuates an arm 51 which in turn carries and actuates the fly-pressing hollow chest or buck 49 to close upon the closed trouser fly when energized by manual selection in a conventional manner with the conventional hydraulic system. The fly-pressing buck 49 is heated by the steam conducted through conduits 52.

In mounting the trousers, the waist-band is secured at

the normal open fly and the fly is positioned on the fly-pressing member 48 subsequent to which the hydraulic motor 50 is actuated to close the fly-pressing buck 49 thus gripping and pressing the fly of the trousers. The waist-band is then brought up around the U-shaped form 53 which is movable from full line position of FIGURE 7 to the broken line position thereof perpendicular to the axis of its arcuate portion by means of a conventional hydraulic circuit including fluid motor 54. It will be seen that when the hydraulic circuit is energized to move the U-shaped member 53 from the full line position to the broken line position of FIGURE 7, the intermeshing of the gear trains and rack bars 55 will cause simultaneous forward movement of the elongated members or rollers 56 from their full line positions to their dotted line positions. The ratio of movement however, is not one to one but is more nearly 2½ to 1, that is, the U-shaped member 53 will move rearwardly 2½ inches, while the elongated members or rollers 56 move forwardly 1 inch. This provides compensation for various sized waist-bands of trousers and still positions the elongated members or rollers 56 directly above the desired location for creases in the trousers. In the prototype of the present device trousers having waist-band variations from 28 inches to 50 inches have been very successfully fixed thereto with their waistbands substantially wrinkle free.

The force of the servo-motor 54 is regulated in any conventional manner such as by a hydraulic relief or constant pressure valve (not shown) to apply approximately 4 or 5 pounds pressure to the movement of the rollers 56 and the U-shaped member 53, and thus stretches the waist-band sufficiently to overcome normal shrinkage of the fabric from laundering.

With attention directed particularly to FIGURES 2 and 6, I have provided means 57 for tautening the fabric of the trousers between the waist-band and the cuffs so that the legs, while in the relaxed moist condition are stretched ¾ of an inch just prior to pressing the legs to overcome the natural tendency to shrink from laundering. This means includes a pair of vertically disposed bars 58—58 which are hinged at 59 to the plate 21 and extend downwardly and at their lower ends are provided with movement guiding means 60. The bars are thus freely movable laterally at their lower ends while their upper ends are hinged on parallel axes extending from the front to the rear of the apparatus.

Slide blocks 61 are carried by the bars 58 and these blocks support forwardly extending arms 62 each of which has a rigid vertical finger 63 at its outer end and a spring biased finger 64 movable longitudinally of the arms 62 and extending upwardly parallel to the finger 63 said arms 62 and their cooperating fingers 63 and 64 aforesaid constituting means for engaging the legs of trousers at the cuffs with the cuffs in a stretched condition.

The inner and outer seams of each leg are manually aligned and the cuffs are hooked over the finger 63 and 64. The tension of the spring 65 stretches the cuffs and thereby substantially closes the leg openings at the cuffs and dictates the crease locations by means of alignment of the side seams S and S1. By mounting trousers on the apparatus in this manner, they are supported substantially without distortion of the fabric so that the finished article is substantially free from unwanted wrinkles and creases thus providing in the finished product only the creases in the legs which are conventionally desirable.

The stretching of the legs, previously mentioned, is occasioned by the weight of the elements 61—65 sliding downwardly upon the bars 58 by means of gravity. To facilitate the mounting of the trousers thereon, I provided a hydraulic servo-motor 66 which operates a pair of cables 68 each of which is connected as at 69 to a slide block 61 and at manual selection the blocks are slid upwardly on the bars 58 by the action of the cylinder of the motor 66 pulling the cables 68 over their idler pulleys 70 carried by plate 21 (FIGURE 3).

It will be noted that to each of the bars 58 is connected, by a ball socket joint 71, a link 72 which, by means of a lost motion spring-biased connection 73, is associated with the arm 27 coincident thereto. When the arms 27 are pivoted outwardly to remove the bucks 24 from the pressing member 22, the bars 58 are also caused to swing outwardly thus removing the arms 62 from the pressing member 22 and thus positioning the devices for easy removal and mounting of trousers.

While the present apparatus is admirably adapted to effect a series of steps, obviously some or all of these steps may be accomplished by other devices and by manual manipulation if desired. However, to produce an acceptable finished fabric trouser, I find it most desirable to follow the following sequence disclosed in the flow sheet of FIGURE 8.

Preferably the pants are mounted at the waist and thence stretched at the cuffs while the leg seams are aligned at each cuff. Pressure is then applied to stretch the pants, the mounting being such as to prevent distortion or wrinkling of the fabric. In the event the trousers are moist when mounted, a moistening step may be omitted, but if they are dry, I find it advisable to moisten them, preferably with steam. When moistening by steam, I find it acceptable to admit the steam into the trousers for a period of from 6 to 8 seconds, at which time the air under pressure is in the magnitude of approximately 6 inches static air pressure. The air is heated to any desired degree within safe limits for the fabric being treated and the pressure is such as to cause the trousers to distend. Since the material is moist and soft, substantially all of the wrinkles are blown from the cloth before the bucks close. Approximately one second after the air pressure is created within the trousers, the leg bucks 24 close in pressing relationship to the pressing member 22 and remain closed for the remainder of the operation of the air pressure or approximately 36 seconds. The total time for finishing a pair of trousers, not including the time of mounting and dismounting, is 43 seconds.

In FIGURE 10 of the drawings, the numerals 80, 81 and 82 identify the electrical service lines, which, for illustration, may carry 220 v. A.C. 3 phase, 60 cycle electrical energy. A circuit breaker 83 is included in the service lines as are also relay contacts 84, 85 and 86 which contacts selectively energize the fan unit 43. Fuses 87—87 are shown in two lines as protection for the motor of the fan unit 43.

From the service lines 80 and 81, the transformer 88 is energized and thereby supplies control and switching voltage, for example, 24 volts, for the control circuits.

For illustration, we will designate line 89 as the positive line and line 90 as the common. An off-on switch 103 is provided to energize the coil 92 of the relay which actuates the contacts 84, 85 and 86 to start the fan unit 43. Included in series in this circuit is an automatic overload release device 93.

Switches 94 and 95 which are normally open and connected in a series are provided to close the circuit through the fly relay coil 96, which automatically closes the fly relay contact 97 disposed parallel to the switches 94 and 95 and a circuit breaking contact 98 opened by the timing device or motorized switching mechanism 111 and connected in series with the fly relay coil 96 as well as the waist relay coil 99 are a pair of fly release switches 100 and 101 which are normally closed. Manual actuation of either one of them will release the fly pressing buck 49 when desired.

A normally closed switch 102 and a normally open switch 91 are connected in series with a waist relay coil 99. A relay contact 104, actuated by the coil 99, is connected parallel to the switch 91 so that when the switch 91 is closed, the relay contact 104 closes and then upon release of the switch 91, the relay contact 104 may remain in contact until such time as the time actuated switch 98 is open. Switch 91 is actuated by pressure from the knee of the operator. Simultaneously with actuating the relay coil 99, the solenoid valve 105, which controls flow of fluid under pressure to the cylinder 54, is acutated whereupon the waist support mechanism 46 is moved to compensate for the waist size of the trousers.

Each of the doors 15 has a switch actuating finger 106 which actuates one of the reset switches 108 or 109. These reset switches 108 and 109 in series, connect to a normally closed contact 110 all of which are in series with a timing motor 111 which mechanically operates the series of switches shown in inter-relationship by the broken line 114.

In the position shown, the switches 108 and 109 are open. However, when the two doors 15 are closed, both switches 108 and 109 are closed making circuit through the timing motor 111 which immeidately closes holding contact 112 and opens the contact 110 and also opens mechanical reset switches 108 and 109 which will not again close until the doors 15 are opened and reclosed. After the motor has run its full circle actuating the several switches to produce the timed sequences of FIGURE 9, the switches 110 and 112 again reverse, that is, as 112 opens, 110 closes to be ready for the next sequence.

A manually controlled switch (off-on) 113 is provided in the control circuit 89—90 so that the balance of the electrical control circuitry may be disconnected when desired.

A timer operated switch 115 is provided to actuate the trouser leg stretcher fluid control solenoid 116 while switch 117 operates the fluid control solenoid 118 which raises and lowers the head 39. Switch 119 controls the steam valve solenoid 120 to introduce steam for a period of time into the trousers. Time switch 121 operates the fluid solenoid 122 which actuates the motor 45 for lifting the plate 44 according to predetermined sequence and switch 123 actuates the solenoid 124 adapted to control the fluid which moves the bucks 24—24 into and out of pressing engagement.

Having thus described my invention I desire to secure by Letters Patent of the United States the following:

1. Apparatus for finishing fabric trousers, comprising: a source of air under pressure; adjustable means for fixing trousers at the waistband with the waistband substantially wrinkle free; means spaced from the said adjustable means for engaging each trouser leg at the cuff in a stretched condition with its side seams aligned; means for tautening said trousers between the waistband and cuffs; said adjustable means including a conduit means; means for communicating the source of air under pressure with said conduit means to yieldably distend trousers when positioned thereon as aforesaid; means for pressing the leg portions of said trousers to form creases as dictated by the aligned side seams; and control means operable to control sequentially said source of air under pressure, said means tautening said trousers, and means pressing the leg portions for distending and tautening the trousers while the means for pressing the leg portions are moving to the pressing position.

2. Apparatus for finishing fabric trousers, comprising:

a source of heated air under pressure;

adjustable means for fixing trousers at the waistband with the waistband substantially wrinkle free;

means spaced from the said adjustable means for engaging each trouser leg at the cuff in a stretched condition with its side seams aligned;

means for tautening said trousers between the waistband and the cuffs;

means for communicating the source of air under pressure interiorly of trousers to yieldably distend said trousers when positioned thereon as aforesaid;

means for pressing the leg portions of said trousers to form creases as dictated by the aligned side seams; and

control means operable to control sequentially said source of air under pressure, said means tautening

said trousers, and means pressing the leg portions for distending and tautening the trousers while the means for pressing the leg portions are moving toward the pressing position.

3. Apparatus for finishing fabric trousers, comprising:

a source of air under pressure;

means for fixing trousers at the waistband;

said last named means being adjustable according to the waistband size for maintaining the waistband substantially wrinkle free;

means spaced from the said adjustable means for engaging each trouser leg at the cuff in a stretched condition;

means for tautening said trousers between the waistband and cuffs;

means for communicating the source of air under pressure interiorly of trousers to yieldably distend said trousers when positioned thereon as aforesaid;

means for pressing the leg portions of said trousers to form creases from substantially their crotch downwardly for their entire length; and

means operable to control sequentially said source of air under pressure, said means tautening said trousers, and means pressing the leg portions for distending and tautening the trousers while the means pressing the leg portions are moving toward the pressing position.

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