

[54] SCREEN PRINTING AND DRYING MACHINE

[76] Inventor: Michael S. Martin, 1219 Fay Cir., Sacramento, Calif. 95831

[22] Filed: Nov. 3, 1972

[21] Appl. No.: 303,359

[52] U.S. Cl. 101/41, 101/126, 101/407 BP

[51] Int. Cl. B41f 15/12, B41f 15/26

[58] Field of Search..... 101/38 A, 38 R, 126, 114, 101/115, 123, 407 R, 407 A, 407 BP, 41

[56] References Cited

UNITED STATES PATENTS

2,034,003	3/1936	Shurley	101/126 UX
2,461,281	2/1949	Jackson et al.	101/114 UX
2,484,671	10/1949	Bauman	101/115
3,112,692	12/1963	Cookson	101/38 R
3,379,526	4/1968	Limberger et al.	101/467 X
3,427,964	2/1969	Vasilantone	101/126 X

3,514,597 5/1970 Haes et al. 101/467 X

Primary Examiner—Robert E. Pulfrey
 Assistant Examiner—R. E. Suter
 Attorney, Agent, or Firm—Blair & Brown

[57] ABSTRACT

A screen printing and drying machine of turret construction in which a central stand has a plurality of supports for printing, drying and cooling in successive steps on a garment or other panel. The printed object is supported on a glass plate made of tempered heat resisting glass and the support is rotated to be beneath a heater to dry the printed garment. The support is then rotated to bring the garment under a first cooling position and then further rotated to bring it under a second cooling position wherein air is blown over the garment to cool it. As the supports are rotated to their several positions a new garment is printed on the support underlying the screen printer at each step.

1 Claim, 20 Drawing Figures

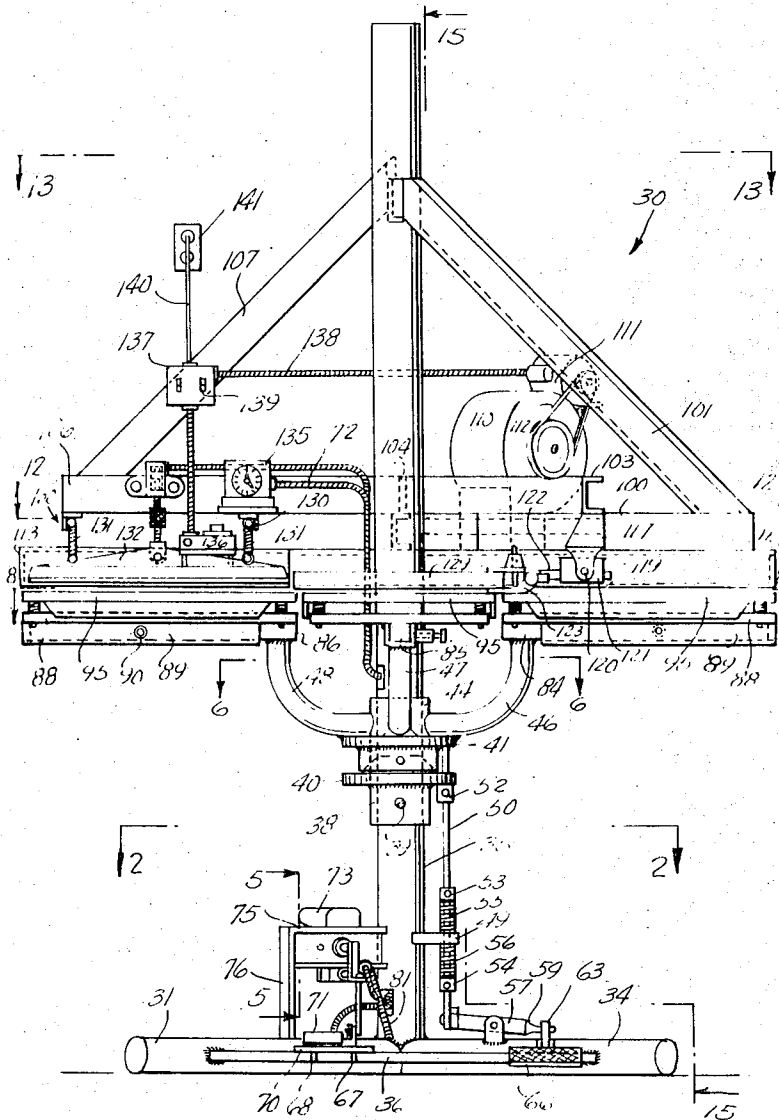
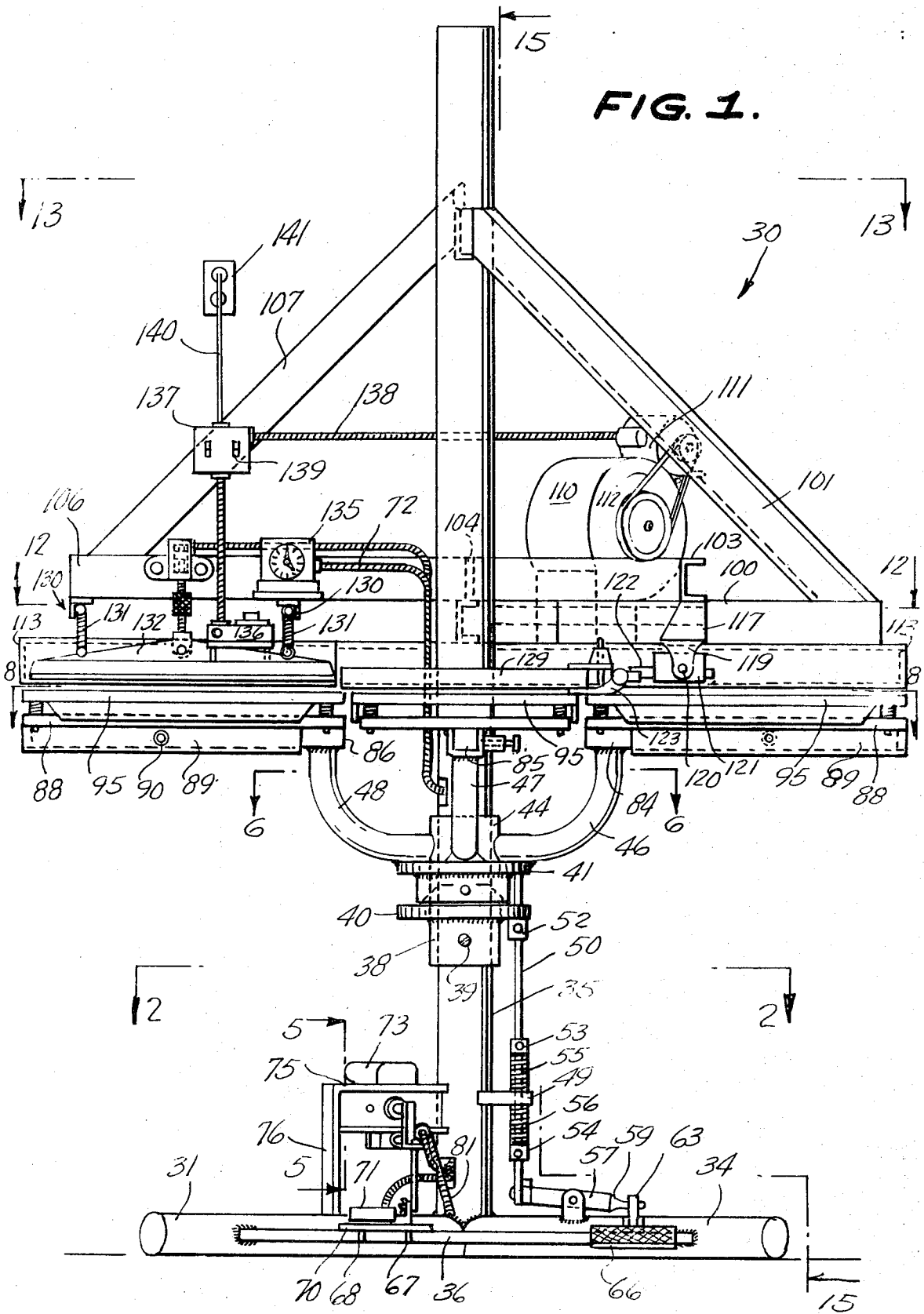


FIG. 1.



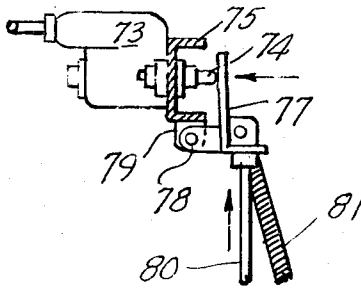


FIG. 5.

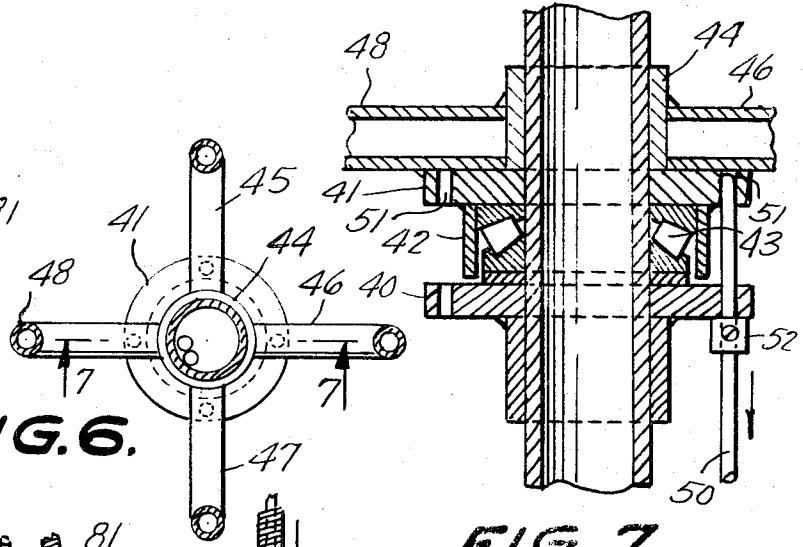


FIG. 6.

FIG. 7.

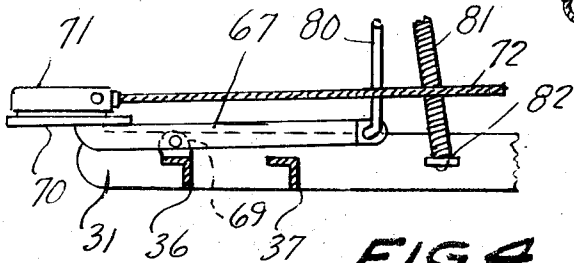


FIG. 4.

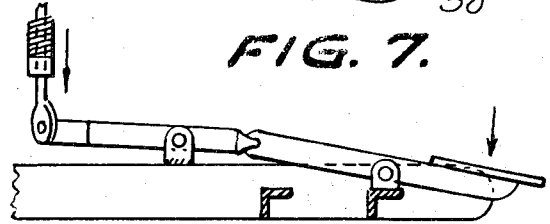


FIG. 3.

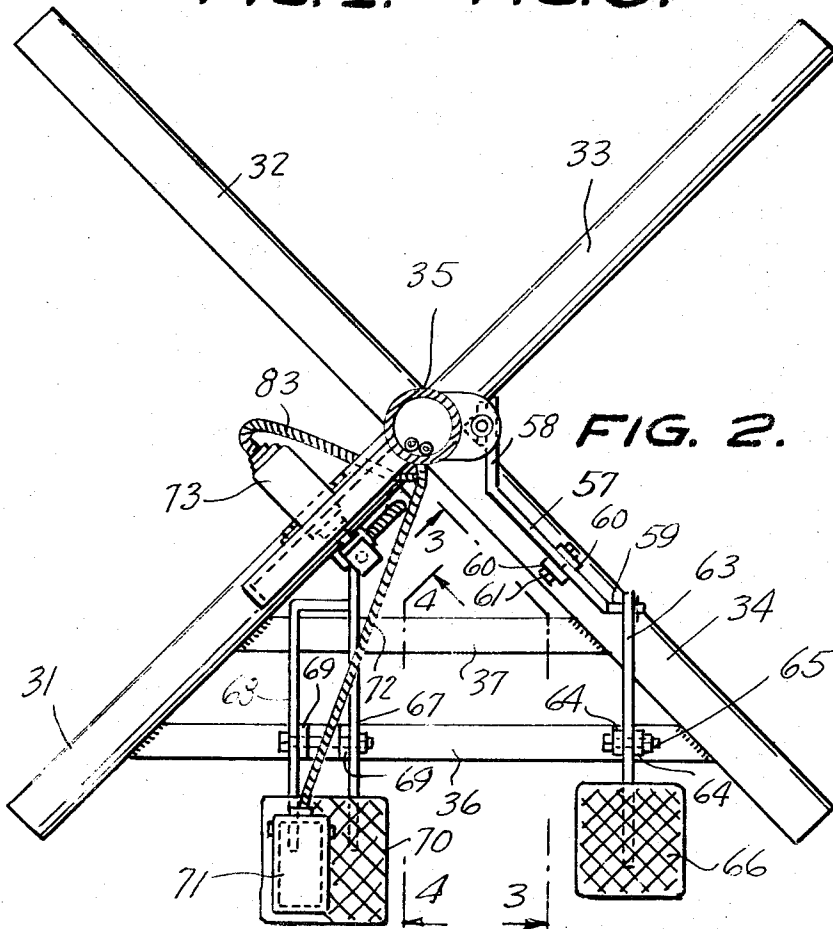


FIG. 2.

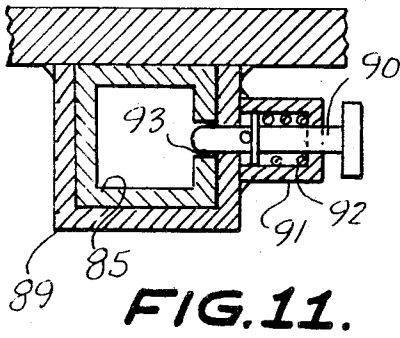


FIG. 11.

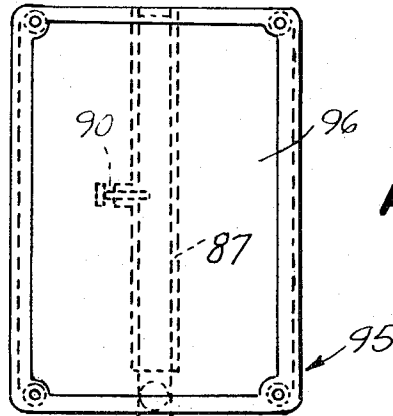


FIG. 8.

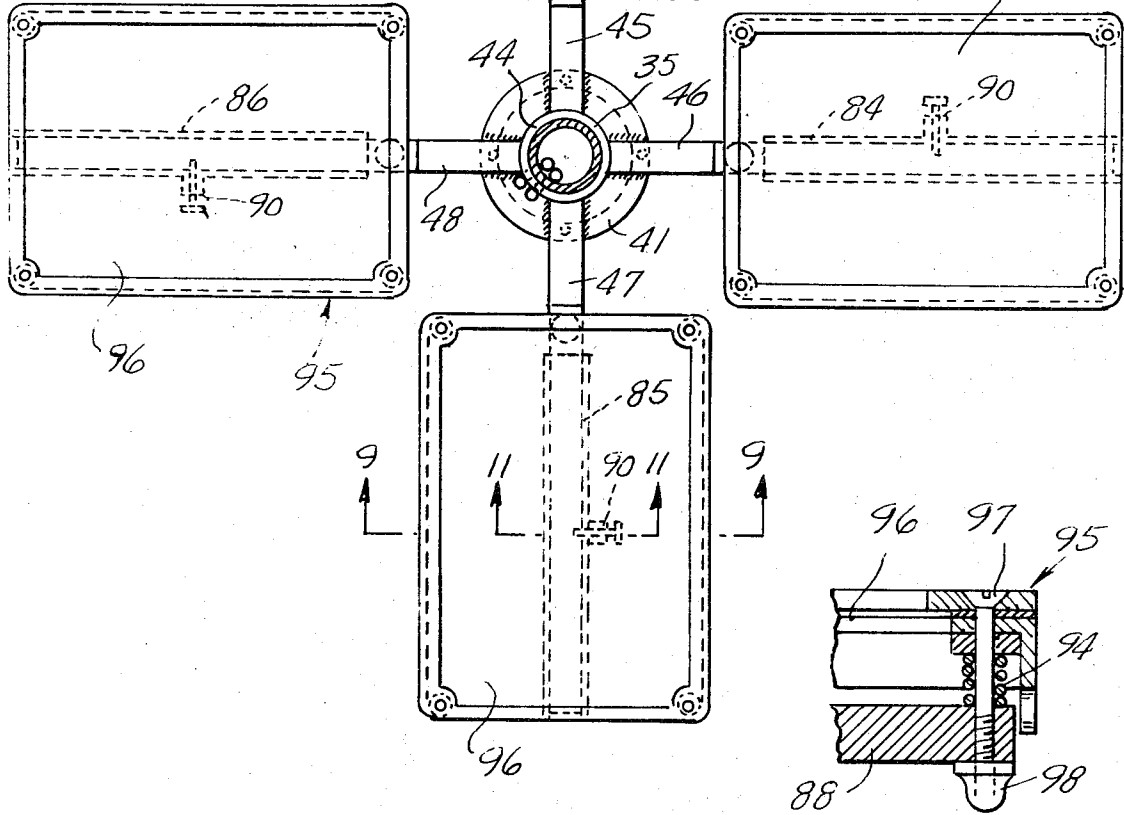


FIG. 10

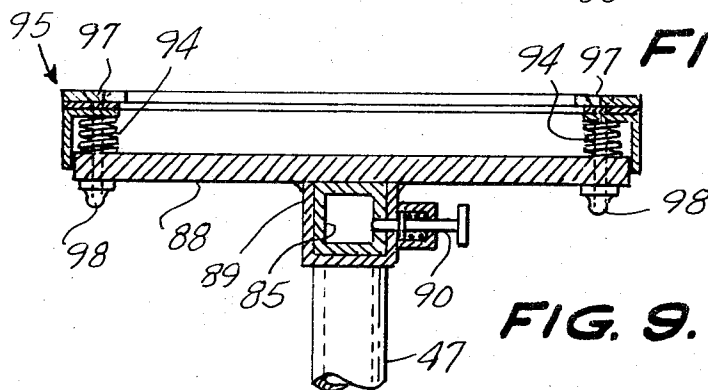


FIG. 9.

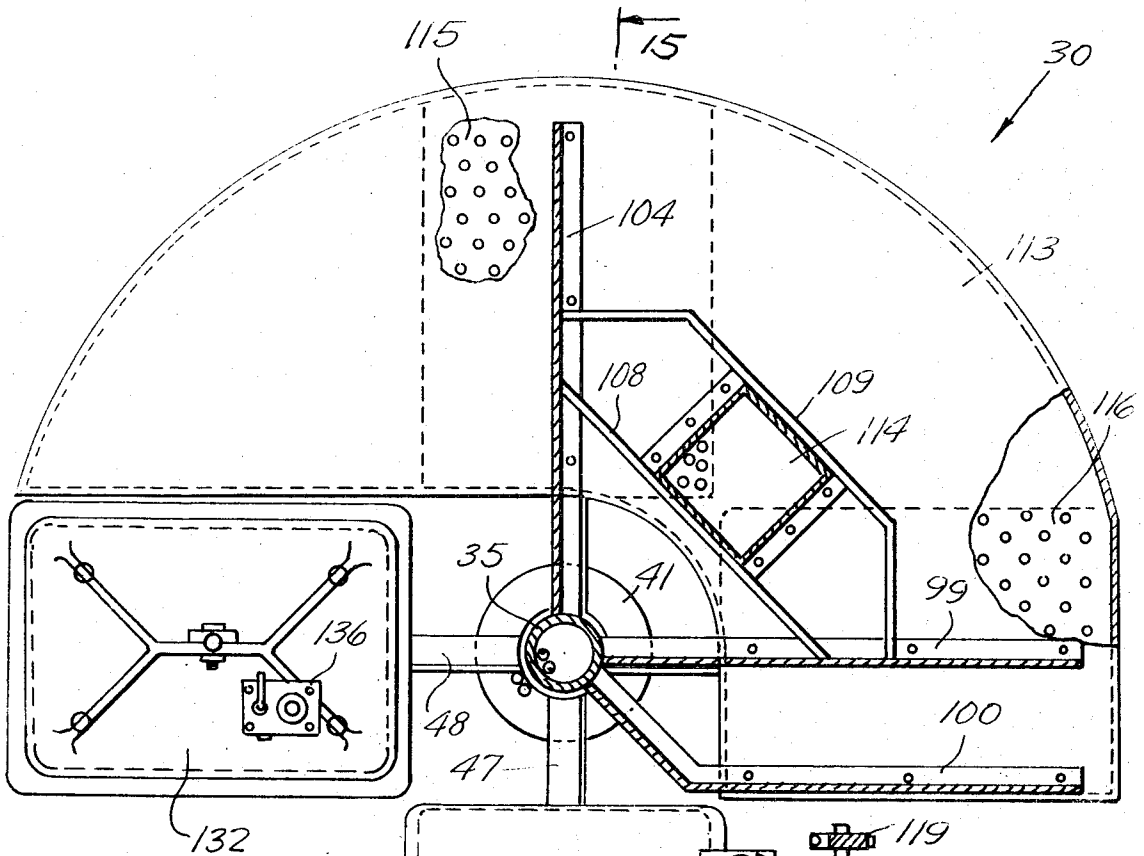


FIG. 12.

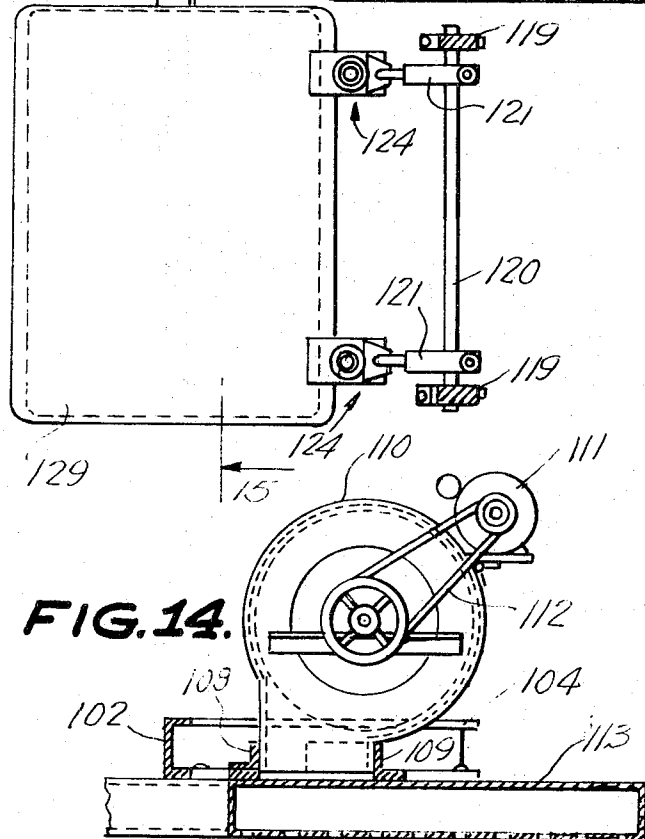


FIG. 14.

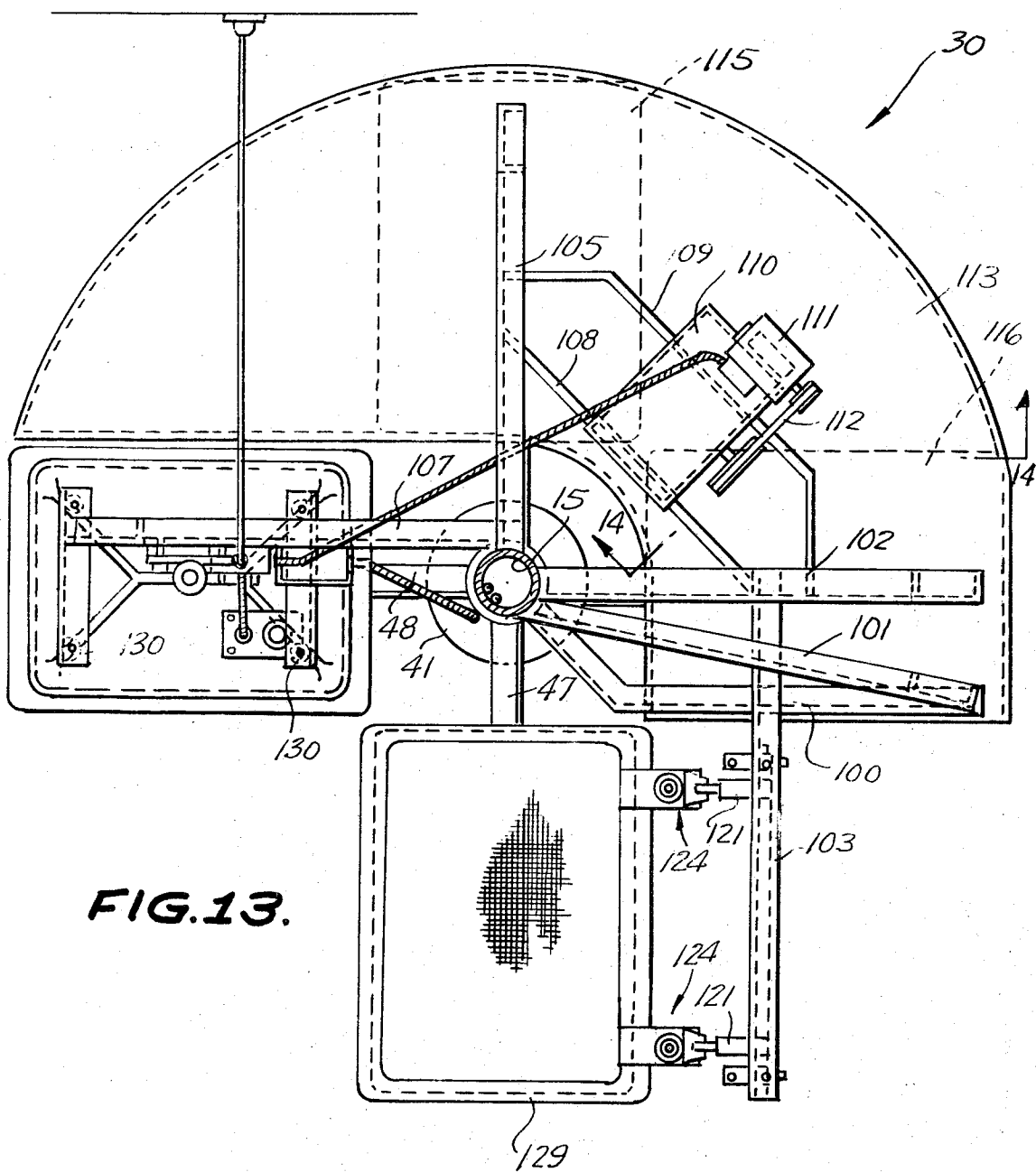
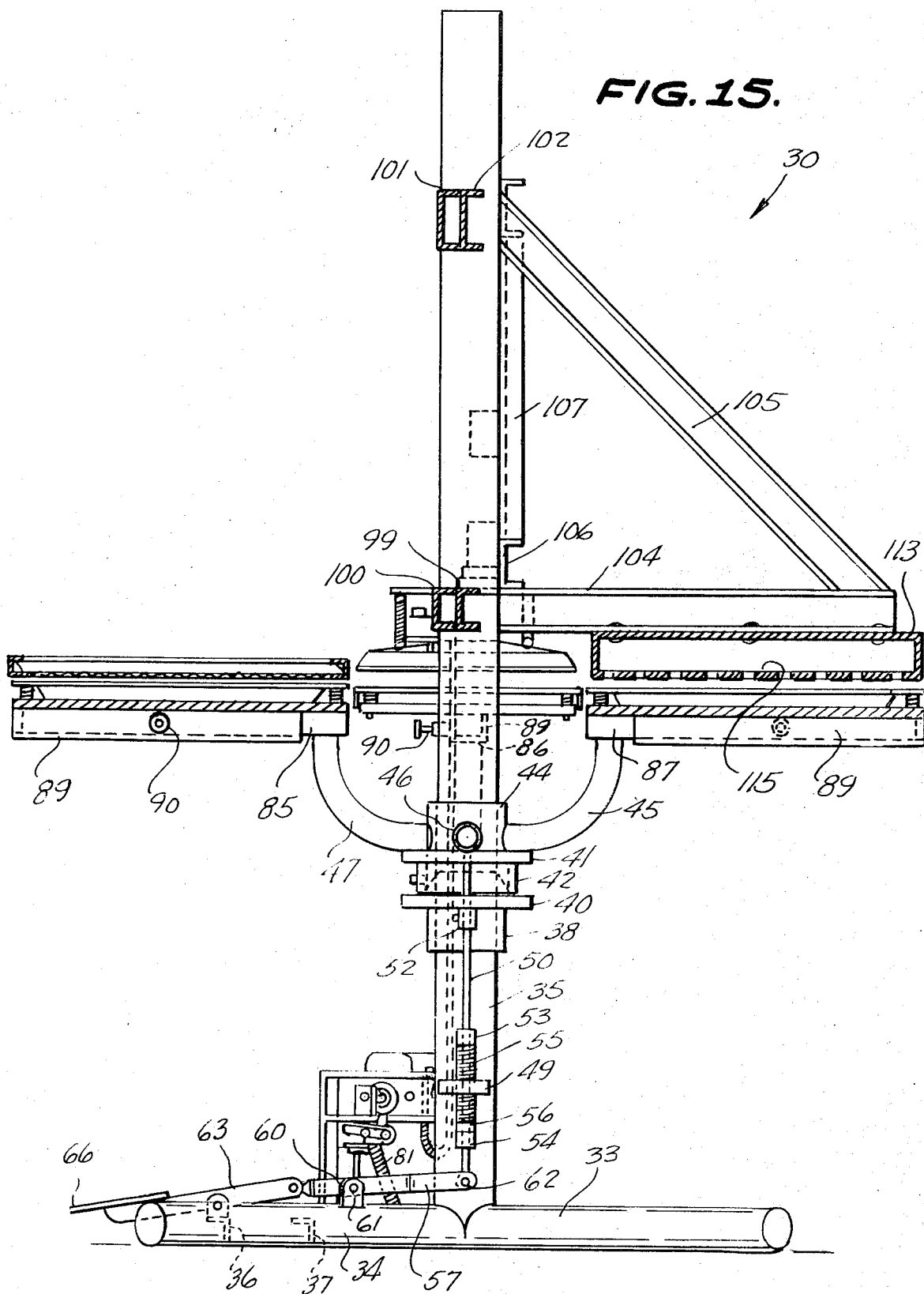
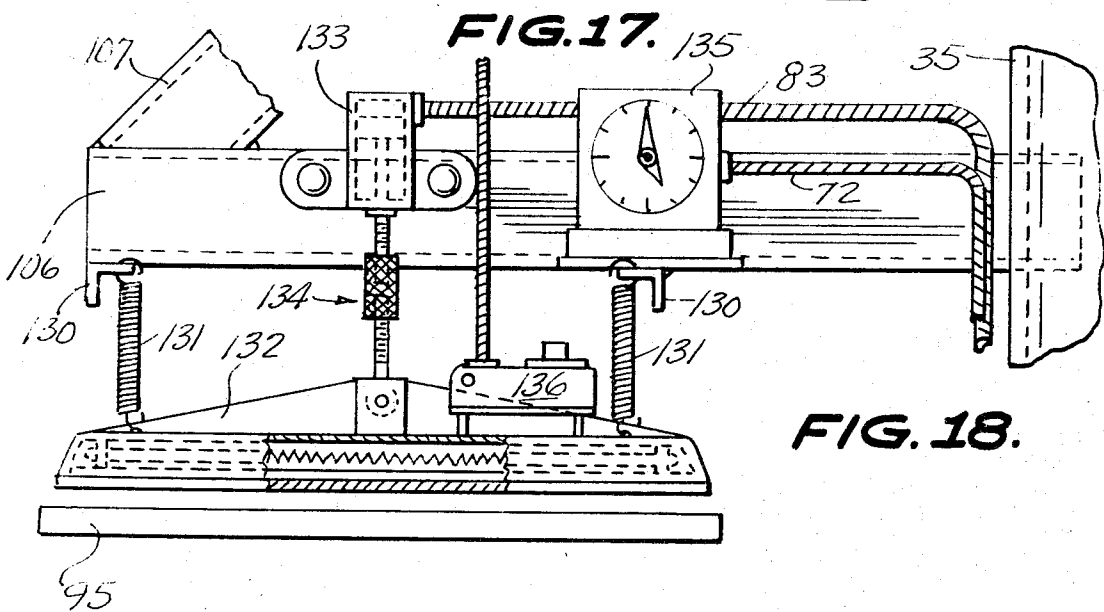
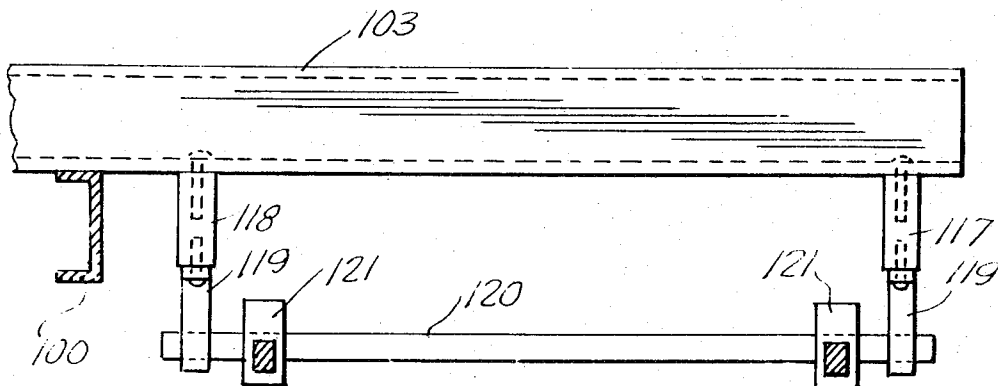
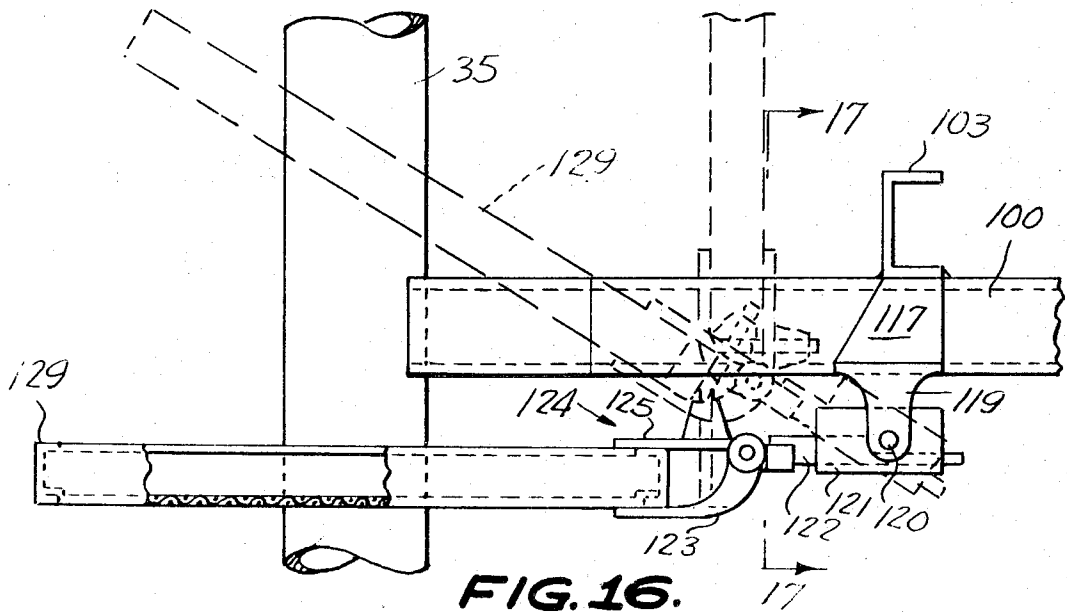


FIG.13.

FIG. 15.





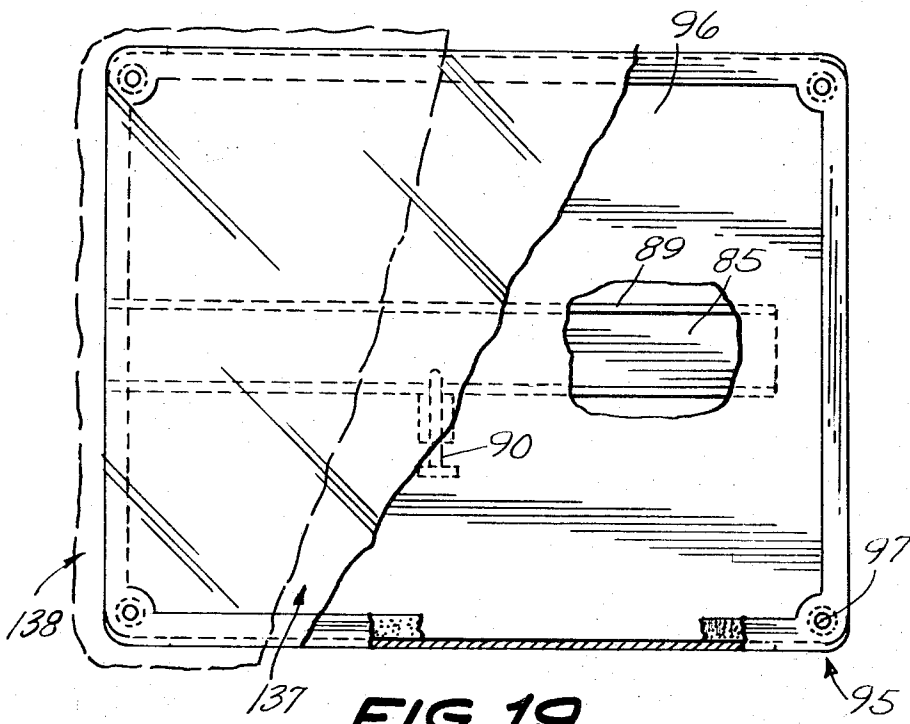


FIG. 19.

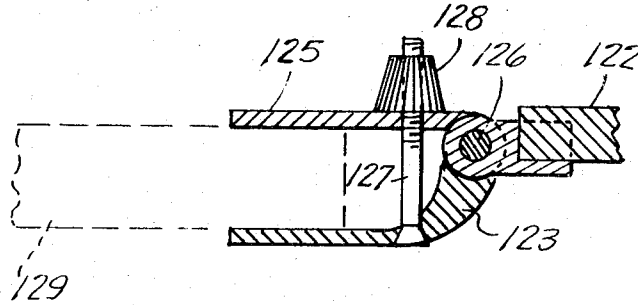


FIG. 20.

SCREEN PRINTING AND DRYING MACHINE

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to a turret top printer in which continuous printing, heating to dry and cooling of the printed material is conducted.

SUMMARY OF THE INVENTION

The continuous printer has a central support with four turret supports mounted for revolving horizontally about the central support. A printer is mounted in a position to engage the support in the first position whereupon it is rotated to underlie a heat dryer and then rotated to underlie a cooling flow of air in the last two positions. Additional garments are printed after each rotation of the supports.

The primary object of the invention is to continuously print, dry and cool garments by a silk screen process.

Other objects and advantages will become apparent in the following specification when considered in the light of the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation of the invention;

FIG. 2 is a horizontal sectional view, taken along the line 2—2 of FIG. 1, looking in the direction of the arrows;

FIG. 3 is a fragmentary vertical sectional view, taken along the line 3—3 of FIG. 2, looking in the direction of the arrows;

FIG. 4 is a fragmentary vertical sectional view, taken along the line 4—4 of FIG. 2, looking in the direction of the arrows;

FIG. 5 is a fragmentary vertical sectional view, taken along the line 5—5 of FIG. 1, looking in the direction of the arrows;

FIG. 6 is a fragmentary horizontal sectional view, taken along the line 6—6 of FIG. 1, looking in the direction of the arrows;

FIG. 7 is an enlarged fragmentary vertical sectional view, taken along the line 7—7 of FIG. 6, looking in the direction of the arrows;

FIG. 8 is a horizontal sectional view, taken along the line 8—8 of FIG. 1, looking in the direction of the arrows;

FIG. 9 is an enlarged fragmentary vertical sectional view, taken along the line 9—9 of FIG. 8, looking in the direction of the arrows;

FIG. 10 is an enlarged vertical sectional detail view of one of the support mounts;

FIG. 11 is an enlarged fragmentary vertical sectional view, taken along the line 11—11 of FIG. 8, looking in the direction of the arrows;

FIG. 12 is a horizontal sectional view, taken along the line 12—12 of FIG. 1, looking in the direction of the arrows;

FIG. 13 is a horizontal sectional view, taken along the line 13—13 of FIG. 1, looking in the direction of the arrows;

FIG. 14 is an enlarged fragmentary vertical sectional view, taken along the line 14—14 of FIG. 13, looking in the direction of the arrows;

FIG. 15 is a vertical sectional view, taken along the line 15—15 of FIG. 12, looking in the direction of the arrows;

FIG. 16 is an enlarged detailed view of one of the printing screen supports;

FIG. 17 is a vertical sectional view, taken along the line 17—17 of FIG. 16, looking in the direction of the arrows;

FIG. 18 is a detailed elevational view shown partially broken away and in section for convenience of illustration of the heating station;

FIG. 19 is a top plan view of one of the support plates shown partially broken away and in section for convenience of illustration; and

FIG. 20 is an enlarged vertical sectional view through one of the pivot clamps supporting the printing screen.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail, wherein like reference characters indicate like parts throughout the several figures, the reference numeral 30 indicates generally a turret type silk screen printer and drying machine constructed in accordance with the invention FIG. 1.

The machine 30 includes four feet 31, 32, 33 and 34 arranged in circumferential equi-spaced relation and arranged with their axes extending radially outwardly from the axis of an upright post 35 secured at its lower end to the central ends of the feet 31, 32, 33 and 34 by welding or the like FIG. 2. Generally horizontal spaced angle members 36, 37 are arranged in parallel relation and have their opposite ends connected to the feet 31, 34 respectively for reason to be assigned.

A sleeve collar 38 is mounted on the tubular post 35 for vertical adjustment thereon and is secured in adjusted position by a set-screw 39 FIG. 15. An annular flange 40 is secured to the collar 38 by welding or the like and extends radially outwardly from the post 35 beyond the collar 38. A plate 41 is mounted for rotation on the post 35 and has a depending circular cup 42 rigidly secured thereto. A roller bearing 43 rests on the flange 40 with the plate 41 supported thereon and with the circular cup 42 encompassing the bearing 43. The bearing 43 permits the plate 41 to rotate freely on the post 35.

A sleeve 44 encompasses the post 35 and is secured to the plate 41 extending upwardly therefrom. A plurality of tubular elbows 45, 46, 47, and 48 have their inner lower ends welded to the sleeve 44 and to the plate 41 as can be clearly seen in FIGS. 1 and 6.

A horizontal bracket 49 is secured to the post 35 spaced above and adjacent the feet 33, 34. A push rod 50 is mounted for vertical sliding movement in the bracket 49 and in the flange 40 as can be seen in FIG. 1. The push rod 50 is adapted to engage in a selected one of a plurality of bores 51 in the plate 41 to lock the plate 41 against rotation with respect to the post 35. A collar 52 is adjustably secured to the push rod 50 to stop the upward movement of the push rod 50 when the collar 52 reaches the flange 40. A pair of collars 53, 54 are detachably secured to the push rod 50 on opposite sides of and spaced outwardly from the bracket 49. Compression springs 55, 56 are positioned on the push rod 50 on opposite sides of the bracket 49 to maintain the push rod 50 in balanced vertical position with re-

spect to the post 35. A link 57 having an off-set end 58 and an opposite off-set end 59 is mounted between a pair of spaced parallel ears 60 secured to the foot 34 spaced outwardly from the post 35. The link 57 is mounted between the ears 60 and is pivotally secured thereto by a pivot bolt 61. The lower end of the push rod 50 is secured to the offset ends 58 of the link 57 by means of a pivot pin. A foot lever 63 is positioned between a pair of spaced parallel ears 64 mounted on the angle member 36. A pivot bolt 65 extends through the foot lever 63 and the ears 64 to pivotally secure the foot lever 63 thereto. The inner end of the foot lever 63 is pivotally secured to the off-set end 59 of the link 57. A foot pedal plate 66 is secured to the outer end of the foot pedal lever 63 to receive the foot of the operator. Downward pressure on the foot pedal plate 66 causes the end 59 of the link 57 to move upwardly so as to move the end 58 thereof downwardly and to lower the push rod 50 disengaging its upper end from the bores 51 in the plate 41. The plate 41 and the arms 45, 46, 47 and 48 are then free to rotate on the bearing 43 about the post 35.

A pair of spaced parallel foot levers 67, 68 are positioned on opposite sides of a pair of ears 69 mounted in spaced parallel relation on the angle member 36 FIG. 2. The foot levers 67, 68 are connected by a pedal plate 70 rigidly secured to the outer end thereof. An electric foot switch 71 is mounted on the pedal plate 70 and an electric cable 72 extends therefrom to the hollow post 35 and extends upwardly therefrom to a position to be described.

A hydraulic pump 73 has a plunger 74 extending outwardly therefrom FIG. 5. The pump 73 is secured to a frame member 75 supported at its inner end on the post 35 and at its outer end on a post 76 extending upwardly from the foot 31. A bell crank 77 is mounted by a pivot bolt 78 to ears 79 extending downwardly from the frame member 75. A connecting rod 80 has its lower end connected to the inner end of the foot pedal lever 67 and its upper end connected to the bell crank 77 so that as the foot pedal plate 70 is pressed downwardly the connecting rod 80 is moved upwardly to pivot the bell crank 77 to depress the plunger 74 to thus pump hydraulic fluid therefrom for reasons to be assigned. A coil spring 81 has its upper end secured to the bell crank 77 and its lower end connected to an ear 82 on the foot 31. The spring 81 normally returns the bell crank and the linkage connected thereto to a position of rest. A hydraulic hose 83 extends from the pump 73 to the hollow post 35 and extends upwardly therein for reasons to be assigned. Generally rectangular bars 84, 85, 86 and 87 are arranged horizontal and have their inner ends respectively secured to the elbows 45, 46, 47 and 48. The bars 84, 85, 86 and 87 are arranged on radiuses of the post 35.

A table 88 is provided with an elongate generally rectangular socket 89 extending across the base thereof and adapted to telescope over a selected one of the bars 84, 85, 86 and 87 FIG. 8. The plates 88 are each identical. A lock pin 90 is mounted in a box 91 on the side of the rectangular socket 89 and is spring biased inwardly by a coil spring 92 to engage in a bore 93 in the bar 85 to lock the rectangular socket 89 and table 88 thereon. A plurality of coil springs 94 are mounted on the table 88 at the corners thereof supporting a frame generally indicated at 95 carrying a tempered glass plate 96 thereon. A plurality of bolts 97 extend

downwardly through the frame 95, the spring 94 and through a corner of the plate 88 where it is secured with a cap nut 98. The bolt 97 secures the frame 95 to the plate 88.

A generally horizontal channel beam 99 is secured at its inner end to the post 35 and extends outwardly therefrom generally overlying the elbow 46 FIG. 8. A horizontally off-set generally horizontal beam 100 has its inner end secured to the post 35 and is arranged with its major portion extending parallel to the beam 99 and on the same horizontal plane therewith. A downwardly and outwardly sloping brace beam 101 is secured at its upper end to the post 35 adjacent the upper end thereof and is connected at its lower end to the outer end of the beam 100. A downwardly and outwardly sloping brace beam 102 extends from the upper portion of the post 35 to the outer end of the beam 99 and is rigidly secured thereto. A generally horizontal beam 103 is secured to the beams 99, 100 extending perpendicularly thereto in a generally horizontal plane.

A generally horizontal beam 104 has its inner end secured to the post 35 in the same plane with the beams 99, 100 FIG. 12. A downwardly and outwardly sloping brace beam 105 is secured between the upper end portion of the post 35 and the outer end of the beam 104. A generally horizontal beam 106 is secured at its inner end to the post 35 and extends outwardly therefrom in a plane above the beams 99, 100 and 104. A brace beam 107 extends between the upper end portion of the post 35 to the outer end portion of the beam 106 and is rigidly secured thereto. A horizontal frame member 108 extends between the beams 99, 104 and a second frame member 109 also extends between the beams 99, 104 with the central portion thereof generally parallel to the frame member 108. A blower 110 is mounted on the frame members 108, 109 for bottom discharge of air under pressure. The blower 110 has an electric drive motor 111 and a belt drive 112.

A housing 113 lies in a generally horizontal plane and is secured to the underside of the beams 99, 100 and 104 FIG. 14. The housing 113 is open at 114 to receive air from the blower 110 and also has a pair of generally rectangular perforate areas 115, 116 arranged 90° apart.

A pair of channel spacers 117, 118 are secured to the beam 103 in depending relation thereto and each has a shaft hanger 119 mounted thereon FIG. 16. A shaft 120 extending parallel to the beam 103 is carried by the shaft hanger 119 and is secured thereto so as to prevent rotation of the shaft 120. A pair of blocks 121 are mounted on the shaft 120 for rotation thereabout. The blocks 121 frictionally grip the shaft 120 so that the rotation of the blocks 121 about the shaft 120 is selectively restrained. A support bar 122 extends horizontally from each of the blocks 121 and has the lower jaw 123 of a clamp generally indicated at 124 secured thereto. An upper jaw 125 of the clamp 124 is secured to the jaw 123 by a pivot pin 126. A bolt 127 connects the jaws 123, 125 and a thumb nut 128 mounted on the bolt 127 is adapted to draw the jaws 123, 125 together to clamp a conventional screen printing member 129 therebetween. The printing member 129 when in use may swing on the blocks 121 from a position illustrated in full lines in FIG. 16 to a position illustrated in dotted lines in FIG. 16.

A pair of spaced parallel generally horizontal angle iron frame members 130 are secured to the beam 106

and extend outwardly therefrom FIG. 18. A pair of spring mounts 131 are secured to each of the frame members 130 at the corners of a rectangle and support an electric heating plate 132 therebelow in a generally horizontal form. The heating plate 132 is arranged to overlie the frame 95 and is vertically moveable to a position in contact therewith and into a position spaced vertically therefrom. A hydraulic ram 133 is secured to the beam 106 and has a threaded turnbuckle 134 secured to the piston rod thereof at one end and to the plate 132 at the opposite end. The turnbuckle 134 permits adjustment between the ram 133 and the plate 132. The hydraulic hose 83 extending from the pump 73 is connected at its upper end to the ram 133. An electric timer 135 is mounted on one of the frame members 130 for reasons to be assigned. An electric control including a thermostat 136 is mounted on the plate 132 for reasons to be assigned. Electric control switches 137 are secured to the brace beam 107 and an electric cable 138 connects a switch 139 to the electric motor 111. A power cable 140 extends to an electric outlet 141 to provide power for the machine 30. The electric cable 72 extending from the switch 71 is connected to the timer 135 to provide power for same.

In the use and operation of the invention a garment generally indicated at 137 in FIG. 19 is mounted on the frame 95 and plate 96 preparatory to printing. The silk screen printing member 129 is then moved downwardly into contact with the garment 137 to print thereon. The silk screen printing member 129 is then moved upwardly out of the way and a carrier sheet indicated generally at 138 is used to manually cover the garment 137. The carrier sheet is of flexible material and may be either teflon cloth, aluminum foil, or treated paper such as silicone treated paper, release paper, or parchment paper. The foot pedal 66 is then actuated to release the plate 41 and the assembly carrying the supports 88 is rotated 90° to bring the garment 137 to a position beneath the heating plate 132. The foot pedal 66 is released so as to lock the plate 41 in its new position and the foot pedal 70 is actuated to force the heating plate 132 downwardly into contact with the carrier sheet 138. The switch 71 is actuated by the foot to begin the timer 135 so as to apply heat from the heating plate 132 as controlled by the thermostat 136 the desired length of time. Upon expiration of the time on the timer 135 and the sounding of an indicator bell the operator releases the foot pedal 70 thus permitting the spring 131 to raise the heating plate 132 out of contact with the carrier sheet 138.

During the period that the garment 137 was being dried by the heating plate 132 a second garment 137 was positioned beneath the silk screen printing member 129 and the second garment was printed and covered with a carrier sheet 138 as in the first instance. The foot pedal 66 is again actuated to release the plate 41 and permit the assembly of support plates 88 to be rotated another 90°. With the parts in this position a new gar-

ment 137 is printed by the printing member 129 the second garment 137 is dried by the heating plate 132 and the first garment 137 is positioned beneath the perforate area 115 of the housing 113 where air from the blower 110 is blown thereover to cool the garment 137. The fourth step is carried on in exactly the same manner as the third step with the first garment 137 moved to underlie the perforate area 116 of the housing 113 where the cooling is continued until the printing is completed on the garment at the silk screen printing member position. After the completion of the printing of the fourth garment 137 the first garment 137 is removed from the machine 30 at the perforate area 116 of the housing 113. The supports 88 are again rotated and the action is continuous with a garment 137 being added and removed upon each 90° rotation.

It should be noted that the silk screen printing member 129 may be easily removed and replaced to change the indicia being printed.

The printing material used in the silk screen printing member 129 is a plastisol textile paint of the type which requires heat drying and is normally done in an oven in prior art methods.

Having thus described the preferred embodiment of the invention it should be understood that numerous structural modifications and adaptations may be resorted to without departing from the spirit of the invention.

What is claimed is:

1. A turret type silk screen printing, drying and cooling machine for printing on articles such as garments, comprising a center post, a plurality of article support heads positioned in circumferentially equi-spaced relation about said center post, printing means on said post for printing against said support heads, means mounting said heads on said post for rotation thereabout, means for locking said last named means in a plurality of adjusted positions spaced 90° apart, means on said post providing heating means positioned at right angles from said printing means for heat drying an article positioned thereunder, air cooling means positioned at right angles from said heating means for cooling an article positioned therebeneath, means provided for permitting movement of said printing means from a position in contact with said article to a position spaced above said article, means on said machine operatively connected to said heating means for selectively moving said heating means into contact with said article and for selectively moving said heating means out of contact with said article, said support heads for said article including a heat resistant spring mounted tempered plate positioned in generally horizontal position, said plate being made of tempered glass so as to provide a smooth non-sticking surface, and a blower secured to said machine and operatively connected to said cooling means for supplying cooling air to said cooling means immediately after the article is printed thereon.

* * * * *