Oct. 20, 1936. E. L. MORELAND ET AL 2,057,903

WASHING AND DRYING APPARATUS

Filed Aug. 15, 1934 4 Sheets-Sheet 1

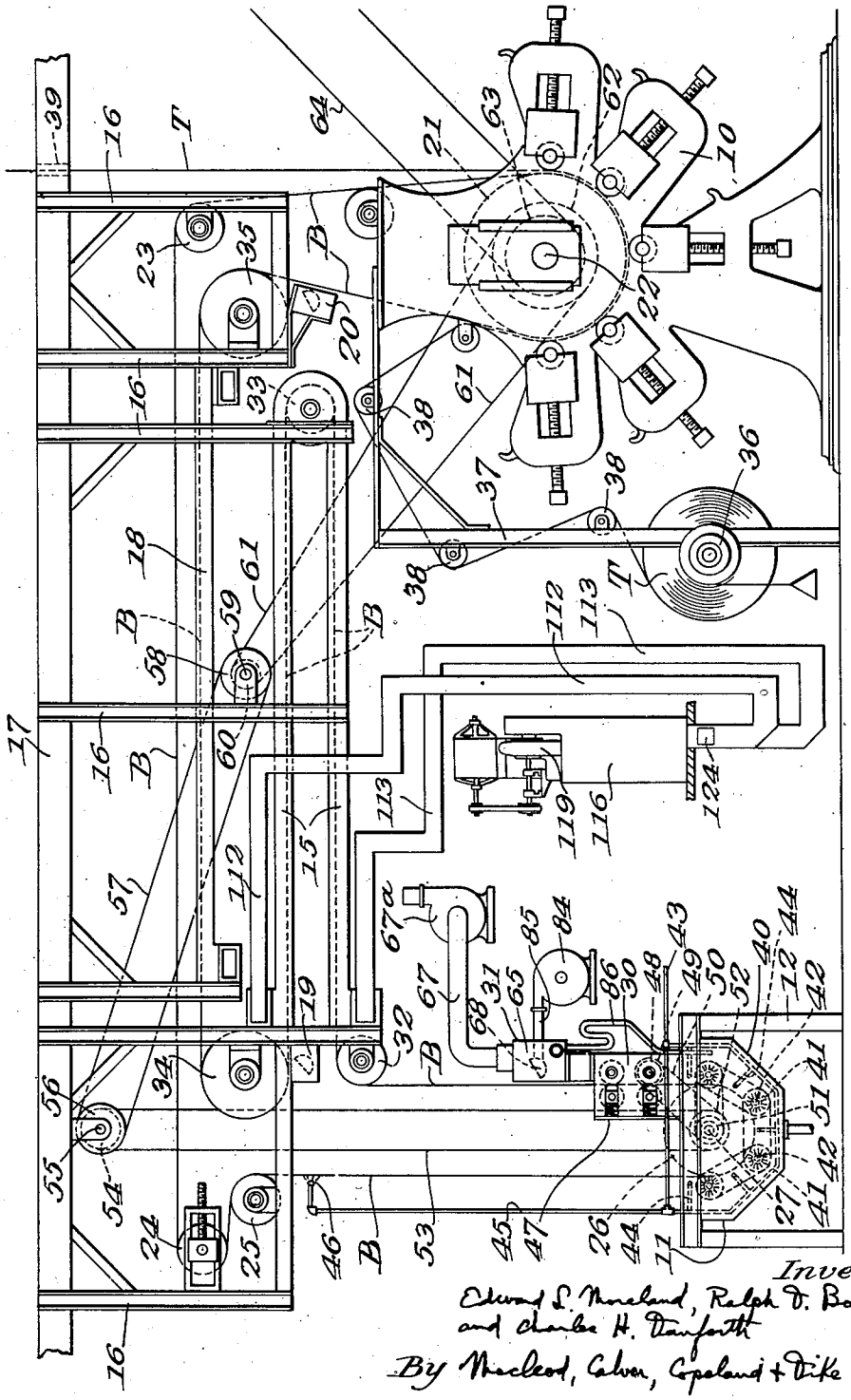


Fig. 1

Inventors:
Edward L. Moreland, Ralph D. Booth
and Charles H. Danforth
By Macleod, Calvin, Copeland & Dike
Attorneys.

Oct. 20, 1936. E. L. MORELAND ET AL 2,057,903

WASHING AND DRYING APPARATUS

Filed Aug. 15, 1934 4 Sheets-Sheet 2

Fig. 2

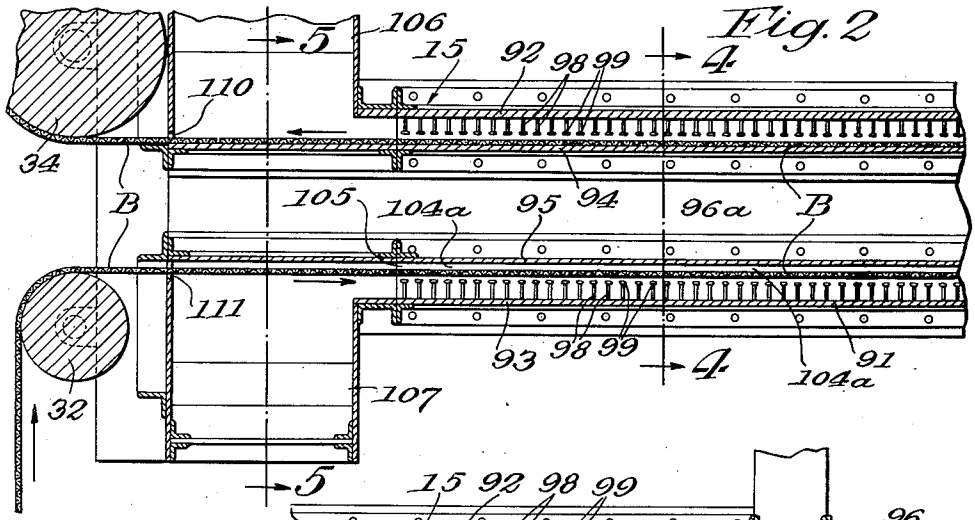


Fig. 3

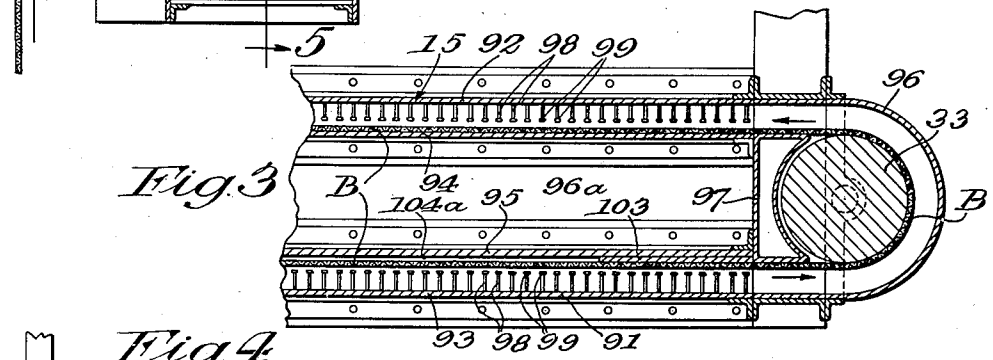
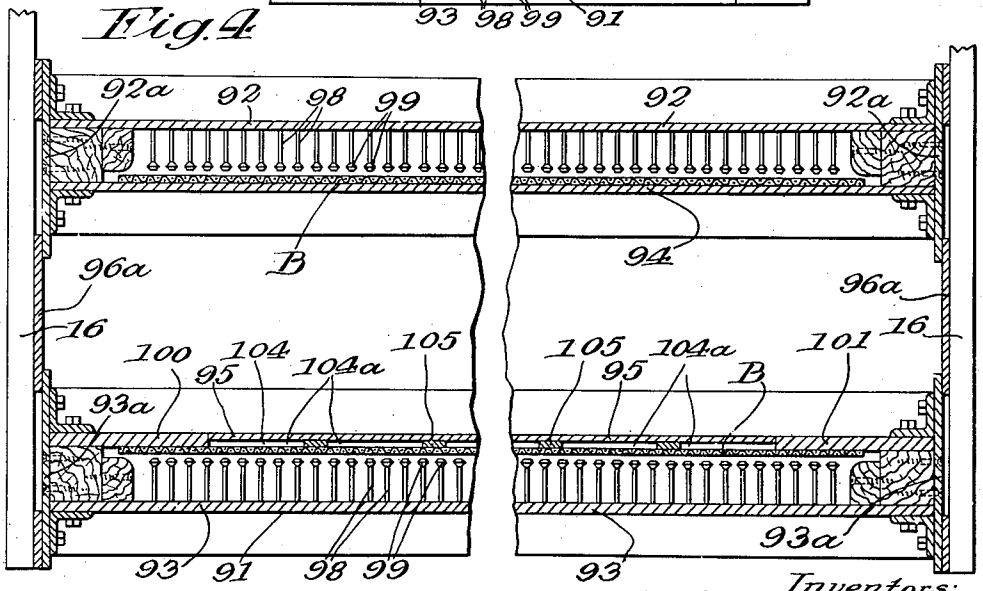


Fig. 4



Inventors:
Edward L. Moreland, Ralph T. Booth
and Charles H. Dunforth
By Marshall, Calver, Copeland & Dike
Attorneys.

Oct. 20, 1936. E. L. MORELAND ET AL 2,057,903

WASHING AND DRYING APPARATUS

Filed Aug. 15, 1934 4 Sheets-Sheet 3

Fig. 5

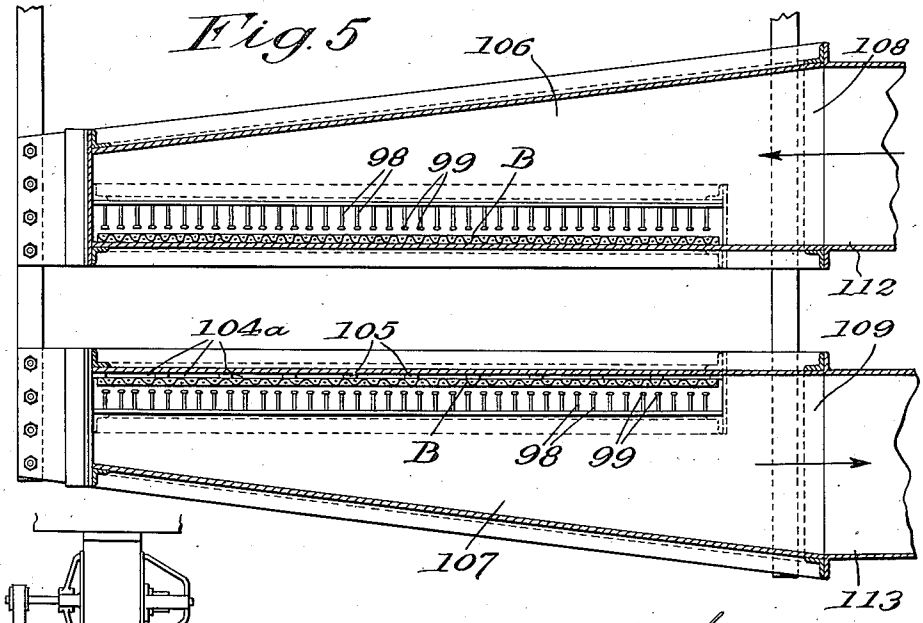


Fig. 6

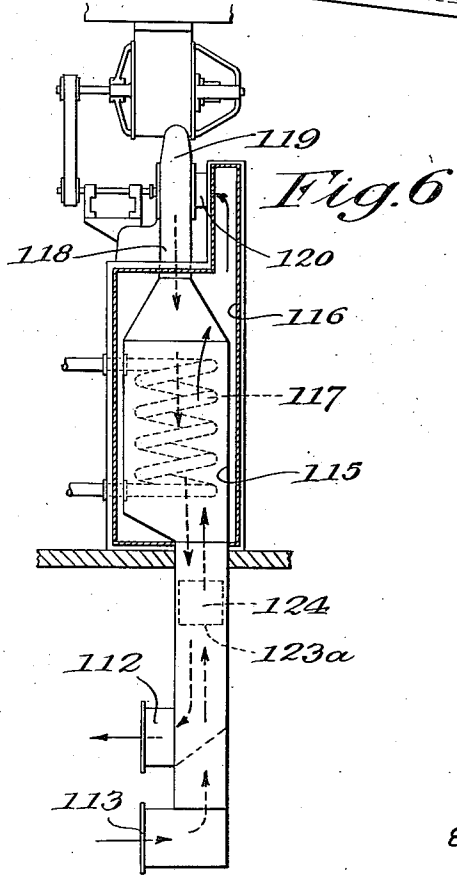
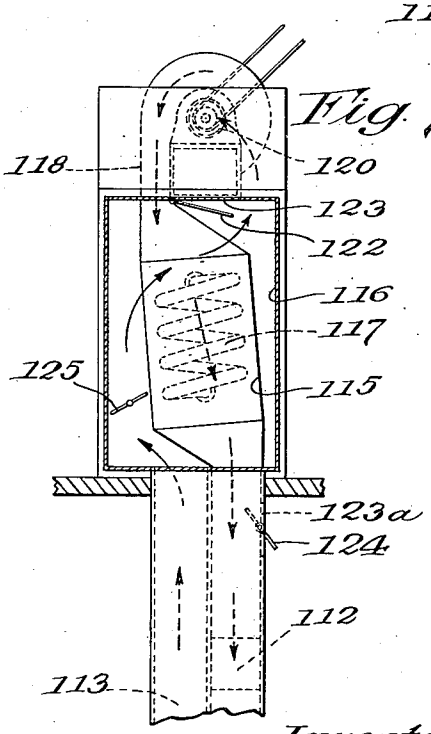


Fig. 7



Inventors:
Edward L. Moreland, Ralph D. Booth
and Charles H. Danforth

By Macleod, Calver, Copeland & Dike

Attorneys.

Oct. 20, 1936. E. L. MORELAND ET AL 2,057,903

WASHING AND DRYING APPARATUS

Filed Aug. 15, 1934 4 Sheets-Sheet 4

Fig. 8

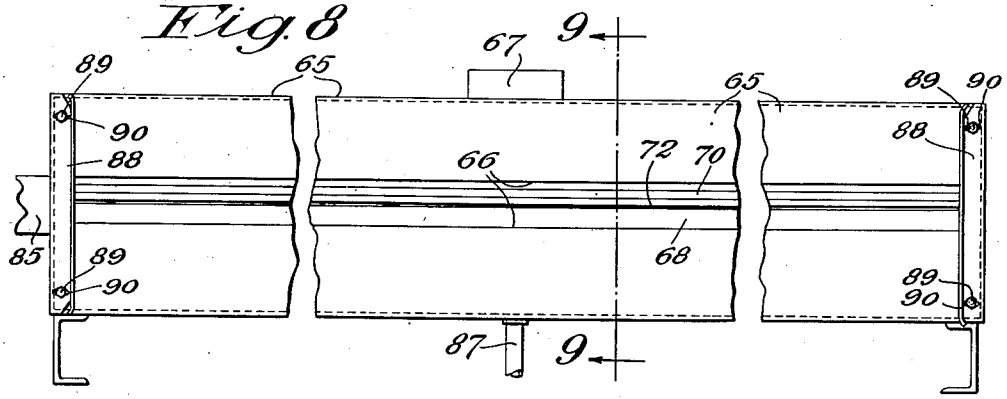


Fig. 9

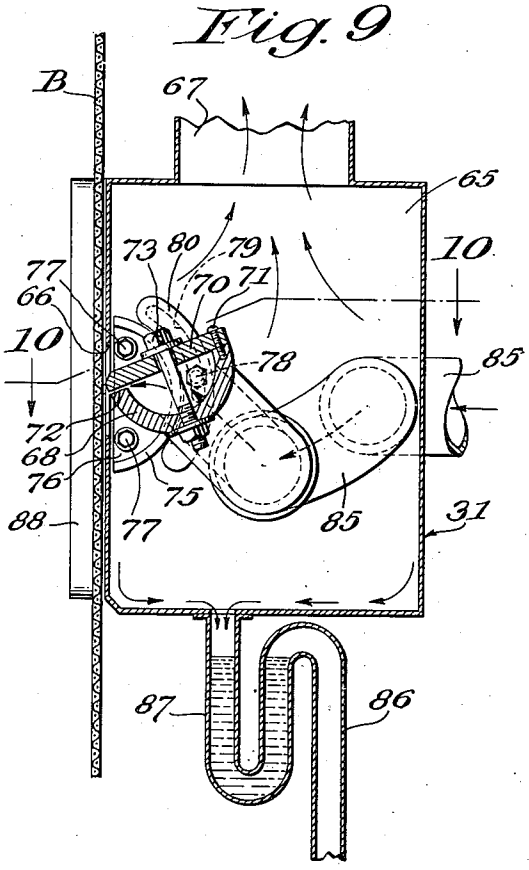
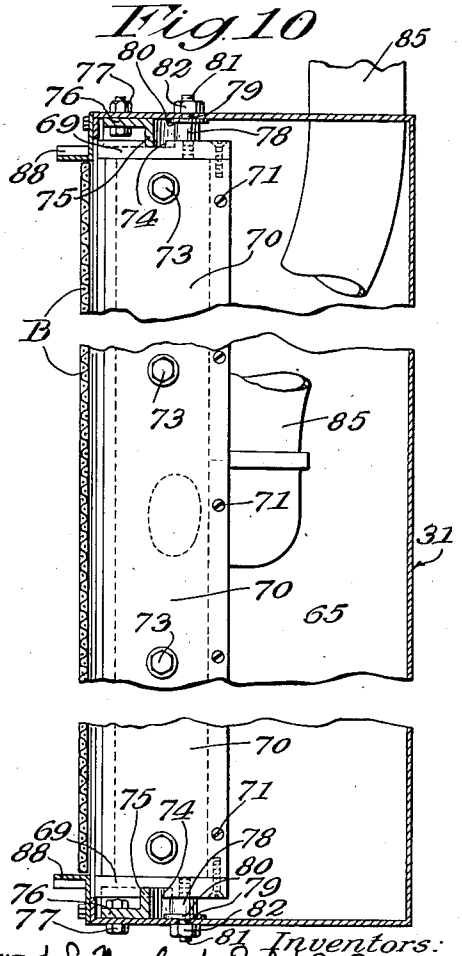


Fig. 10



Inventors:
Edward L. Moreland, Ralph D. Booth
and Charles H. Lamfoth
By Macleod, Calver, Copeland & Dike
Attorneys.

Patented Oct. 20, 1936 2,057,903

UNITED STATES PATENT OFFICE

2,057,903

WASHING AND DRYING APPARATUS

Edward L. Moreland, Wellesley, Mass., Ralph D. Booth, Salem, N. H., and Charles H. Danforth, West Roxbury, Mass., assignors to Jackson & Moreland, Boston, Mass., a copartnership composed of Edward L. Moreland, Frank M. Carhart, and Ralph D. Booth

Application August 15, 1934, Serial No. 740,026

8 Claims. (Cl. 34—48)

In the rotary method of printing textiles or other goods, a backing blanket for the goods to be printed is fed continuously over the surface of a roll of the printing machine to serve as a backing for the goods to be printed and for removing excess color. After leaving the printing machine that portion of the blanket is washed to remove the color and is dried before being returned to the printing machine. Heretofore, considerable trouble has been experienced due to insufficient elasticity of the blanket causing imperfect register of the component parts of the printed design, also, because of inadequate absorbing and/or adsorbing power of the blanket causing smearing of the back and edges and leaving the printed material with excess color. Also, the blanket has been short lived and its maintenance cost has been high due to methods used after washing to dry the particular blanket.

It is an object of the present invention to provide a more satisfactory blanket for use with a rotary textile printing machine.

Another object of the invention is the provision of a method of and apparatus for drying which is suitable for use in drying a blanket used in rotary printing of textile goods.

The invention will be more clearly understood from the following description in conjunction with the accompanying drawings: in which,

Fig. 1 is a diagrammatic view of a rotary textile printing assembly embodying the invention;

Fig. 2 is a fragmentary sectional elevational view of one end of a chamber of a drying unit;

Fig. 3 is a fragmentary sectional elevational view of the other end of the drying chamber;

Fig. 4 is a sectional view taken upon the line 4—4 of Fig. 2;

Fig. 5 is a sectional view taken upon the line 5—5 of Fig. 2;

Fig. 6 is an elevational view, partly in section, of another portion of the drying unit;

Fig. 7 is an elevational view, partly in section, of the portion of the drying unit shown in Fig. 6 and as viewed from the right of Fig. 6;

Fig. 8 is a front elevational view of another unit for removing liquid from the blanket after washing;

Fig. 9 is an enlarged sectional view taken upon the line 9—9 of Fig. 8; and

Fig. 10 is a sectional view taken upon the line 10—10 of Fig. 9.

Before explaining in detail the present invention, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation, and it is not intended to limit the invention claimed herein beyond the requirements of the prior art.

The invention is illustrated in the accompanying drawings as applied to an assembly for the rotary printing of textile or other goods and comprises, as shown in Fig. 1, a rotary printing machine 10, a washing apparatus 11 carried by a suitable frame structure 12 and a drying unit having a chamber 15 carried by a suitable frame structure 16 depending from a ceiling or floor 17 above the printing machine 10. If desired, a cooling chamber 18 may also be carried by the frame structure 16, together with cooling chisels 19 and 20.

An endless blanket B is trained around a roll 21 mounted upon a shaft 22 which is mounted for rotation in the frame of the machine 10 and is trained over rolls 23, 24 and 25 carried by the frame structure 16 to a roll 26 carried upon a shaft 27 which is mounted for rotation in the frame of the washing machine 11. The blanket then passes between the rolls of a wringer 30 and past an air chisel 31 and is trained through the drying chamber 15 by rolls 32 and 33 and a cooling drum 34. The blanket is then trained through the cooling chamber 18 by a cooling drum 35 and then passes the cooling chisel 20 to the drum 21 of the printing machine.

A roll of textile or other goods T is mounted upon a suitable rotatable carrier 36 mounted upon a frame structure 37. The sheet of textile material T is trained around rolls 38 carried by the frame structure 37 and is passed around the roll 21 of the printing machine simultaneously with the blanket B and is then led through a passage 39 in the floor 17 for further treatment.

The washing apparatus 11 may be of any usual construction and may comprise an open vessel 40 carried by the frame structure 12. The roll 26 is carried by a shaft 27 which is rotatably mounted in the vessel 40. A plurality of brushes 41 carried by shafts 42 are also rotatably mounted within the vessel 40 adjacent the surface of the roll 26. A conduit 43 for supplying color solvent extends into the vessel 40 and is provided with a plurality of spray nozzles 44 adapted to direct the color solvent upon the surface of the blanket B as it passes around the roll 26. The conduit 43 is provided with a branch 45 having a spray nozzle 46

adapted to direct color solvent upon the blanket above the washing apparatus and previous to the travel of the blanket through the washing apparatus.

The wringer 30 may also be of any usual construction and may comprise a frame 47 in which a plurality of wringer rolls 48 are rotatably mounted. One of the wringer rolls 48 may be provided with a sprocket wheel 49 which is connected by a chain 50 to a sprocket wheel 51 carried by the shaft 27. The shaft 27 is also provided with a sprocket wheel 52 which is connected by a chain 53 with a sprocket wheel 54 carried by a shaft 55 which is mounted for rotation in suitable bearings carried by the frame structure 16. The shaft 55 is also provided with a sprocket wheel 56 which is connected by a chain 57 to a sprocket wheel 58 carried by a shaft 59, which is rotatably mounted in suitable bearings carried by the frame structure 16. The shaft 59 is provided with a sprocket wheel 60 which is connected by a chain 61 to a sprocket wheel 62 upon the shaft 22. The shaft 22 is also provided with a sprocket wheel 63 which is connected to any suitable source of power by a chain 64.

The air chisel 31 is positioned adjacent the path of travel of the blanket B as the latter leaves the wringer 30 and comprises a closed chamber 65 having an opening 66 in its front wall which extends substantially across the width of the blanket B. A guide 88 is adjustably mounted upon opposite ends of the front wall of the chamber 65 by bolts 89 passing through elongated slots 90 in the guides and engaging the wall of the chamber 65. The guides 88 serve to guide the blanket past the opening 66 in the chamber 65. The chamber 65 is connected by a conduit 67 to a suction fan 67a of any suitable type adapted to exhaust the entrapped air from within the vessel 65.

A plenum tube is adjustably mounted within the chamber 65 and comprises a substantially semi-cylindrical body portion 68 closed at its ends by end walls 69 and provided with a cover portion 70 which is secured at one side to the portion 68 by screws 71 so as to provide an orifice 72 between it and the other side of the body portion 68. The size of the orifice 72 may be adjusted by bolts 73 extending through the cover portion 70 and the body portion 68. Each of the end walls 69 is provided with an arcuate slot 74 adapted to be engaged by a similarly shaped flange 75 on a plate 76 which is secured to the wall of the chamber 65 by bolts 77. A pin 78 is fixed in each of the end walls 69 and extends through an arcuate slot 79 in the end wall of the chamber 65. A plate 80 is fixed upon each of the pins 78 and covers or seals the slot 79 in the end wall of the chamber 65. The outer end of each of the pins 78 is provided with a threaded portion 81 adapted to receive a nut 82 for securing the plenum tube in its adjusted position. A gas, such as air, under pressure is conveyed into the plenum tube from an air pump 84 by a conduit 85. The bottom wall of the chamber 65 is provided with an opening communicating with a drain conduit 86 which extends into the washing apparatus 11 and is provided with a liquid seal or trap 87.

The cooling chisels 19 and 20 may be identical in construction to the air chisel 31 except that the chamber in which the plenum tube is positioned is not closed.

The drying apparatus comprises a casing providing a chamber 15 which, as illustrated, is of substantially U-shape. The casing providing the chamber 91 is formed by outer panels 92 and 93 and inner panels 94 and 95. The outer panels 92 and 93 are connected by a substantially semi-cylindrical panel 96. A closure member 97, spaced from the panel 96, connects the inner panels 94 and 95, the roll 33 being positioned between the closure member 97 and the panel 96 and serves to convey the blanket B from the lower to the upper portion of the chamber 91. The sides of the chamber 15 are closed by panels 92a connecting the adjacent side edges of the panels 92 and 94 and by panels 93a connecting the adjacent side edges of the panels 93 and 95. The portion of the chamber 15 between the panel 96 and the closure member 97 is closed at its sides by panels 96a. Casings 106 and 107 having inlet and outlet openings 108 and 109 respectively are connected to the open ends of the casing forming the chamber 15. The casings 106 and 107 are provided with slots 110 and 111 respectively for the passage of the blanket B. A plurality of pegs 98 are fixed in the outer panels 92 and 93 so as to project into the chamber 15. Each of the pegs 98 is provided with an enlarged head 99 spaced from the inner panels 94 and 95. The inner panel 95 is provided with thick longitudinal edge portions 100 and 101 and a thick back portion 103 which provides a depression 104. Spaced longitudinally extending strips 105 are fixed to the panel 95 in the depression 104 and extend from the portion 103 substantially coextensive with the portions 100 and 101 and divide the depression 104 into a plurality of pockets 104a which communicate with the outlet passage.

A conduit 112 connects the inlet passage 108 and a chamber 115 which is positioned within a chamber 116. A heating coil 117 is positioned within the chamber 115 and is supplied from any suitable source with a heating medium, such as steam. The chamber 115 is connected by a conduit 118 to the outlet of a fan or air pump 119 and the chamber 116 is connected by a conduit 120 to the intake of the pump 119. A conduit 113 connects the chamber 116 with the outlet passage 109. The flow of gases through the chambers 15, 115 and 116 is controlled by an adjustable damper 125 positioned in the chamber 116 and adjustable dampers 122 and 124 controlling an opening 123 in the outer wall of the chamber 116 and an opening 123a in the conduit 112 respectively.

In the operation of the apparatus, power is supplied through the chain 64 to rotate the drum 21 of the printing machine and the drum 26 of the washing apparatus and at the same time cause the endless blanket B to move progressively through the printing machine 10, the washing machine 11, the wringers 30 and past the air chisel 31 and thence through the drying chamber 15 and then through the cooling unit 18 and back to the printing machine. During this travel of the blanket, the sheet of textile material to be printed is drawn through the printing machine and the design printed thereon. Any excess color passing through or over the edges of the textile goods is absorbed and adsorbed by the blanket B. The color thus placed upon the blanket B is subjected to the action of the color solvent supplied by the spray 46, thus preliminarily dissolving the color upon the blanket. This portion of the blanket then passes through the washing apparatus 11 and is subjected to the action of further color solvent supplied by the sprays 44 and also to the scrubbing action of the brushes 42.

The wet blanket then travels through the wringer **30** where a portion of the color solvent is removed by squeezing. This portion of the blanket then travels along the front wall of the chamber **65** past the opening **66** therein and is subjected to the action of a narrow stream of gas, such as air, travelling at high velocity which is ejected through the orifice **72**. This high velocity stream of gas tends to cut the color solvent off the blanket.

The blanket B is then conveyed through the chamber **15**, past the cooling chisel **19** and over the cooling can **34** and through the cooling chamber **18** and over the cooling can **35** past the cooling chisel **20** to the printing machine. As the blanket passes through the chamber **15**, air is caused to be circulated by the pump **119** through the chambers **15**, **115** and **116**. The dampers **122** and **124**, controlling the air inlet passages **123** and **123***a*, and the damper **125** are adjusted so that during the circulation of the air from the pump **119** a certain quantity of the solvent saturated air is removed from the circuit and replaced by fresh air.

As the air is thus circulated through the chamber **15** the air stream is broken up by the pegs **98** thus causing the major portion of the air to contact with the blanket B. It has been found in practice that the provision of the pegs **98** in the path of the air stream instead of the customary baffles, not only produces a more efficient drying but reduces the time of drying, the required size of the drying unit and the power required to circulate the air.

Inasmuch as the pressure of the air stream flowing through the chamber **15** is greater at the inlet than at the outlet and inasmuch as the pockets **104***a* are directly connected to the outlet passage **112**, the pressure upon the side of the blanket adjacent the pockets is less than that upon the other side of the blanket. This difference of pressure tends to maintain the blanket out of engagement with the pegs **98** during the travel of the blanket through the chamber **91**.

While the blanket B may be constructed of any material common for this purpose, it is preferable to employ an endless blanket formed from felted fibres or other material which is uniformly impregnated with a moisture resisting substance, such as a compound or emulsion containing vulcanized rubber. Such a blanket has the necessary adsorptive characteristics required and has been found to possess the desired degree of resiliency so that the proper register of the parts of the printed design is secured. If it is desired that the blanket shall possess absorptive characteristics, its surface may be treated so that some of the fibres are exposed.

We claim:

1. In an apparatus for printing textiles having a rotary printing machine, an endless blanket, means for washing and drying the blanket, and means for guiding the blanket through the printing machine and washing and drying means, characterized by drying means including a chamber through which the blanket passes, said chamber having pegs projecting therein from one side thereof, and means for forcing a gas through said chamber and around said pegs on one side of said blanket.

2. In an apparatus for printing textiles having a rotary printing machine, an endless blanket, means for washing and drying the blanket and means for guiding the blanket through the printing machine and washing and drying means, characterized by drying means including a chamber having an air inlet and outlet, said chamber having pegs projecting therein from one side thereof, and means for forcing a gas through said chamber on the other side of said blanket whereby the pressure within said chamber gradually decreases from said inlet to said outlet, said chamber having means adapted to cooperate with said blanket to provide pockets on the wall opposite said pegs communicating with said outlet whereby a different pressure is maintained on opposite sides of said blanket tending to hold the same away from said pegs.

3. In an apparatus for removing liquid from a material, a chamber, a plurality of pegs projecting into said chamber from one wall thereof and each terminating at a point spaced from said material, means for guiding the material through the chamber in one direction adjacent said pegs, and means for causing air to move through the chamber in the opposite direction around said pegs and in contact with said material.

4. In an apparatus for removing liquid from a material, a chamber, a plurality of pegs projecting into said chamber from one wall thereof and having enlarged portions spaced from the opposite wall of the chamber, means for guiding the material through the chamber adjacent said pegs, and means for causing air to move through the chamber in the opposite direction around said pegs and in contact with said material.

5. In an apparatus for removing liquid from sheet material, a chamber having an air inlet and an air outlet, a plurality of pegs projecting into said chamber from one wall thereof, means for guiding the sheet material through the chamber between said pegs and the opposite wall of said chamber, and means for causing air to flow from said inlet around said pegs and in contact with one side of said material to said outlet at a gradually decreasing pressure, said chamber having means adapted to cooperate with said material to provide pockets on said opposite wall communicating with said outlet whereby a different pressure is maintained on opposite sides of said material tending to hold said material away from said pegs.

6. In an apparatus for removing liquid from sheet material, a chamber having an air inlet and an air outlet, means for guiding the sheet material through the chamber, and means for causing air to flow from said inlet in contact with one side of said material to said outlet at a gradually decreasing pressure, said chamber having means adapted to cooperate with said material to provide pockets on the wall adjacent the other side of the material communicating with said outlet and closed to said inlet whereby a different pressure is maintained on opposite sides of said material.

7. In an apparatus for printing textiles having a rotary printing machine, an endless blanket, means for washing and drying the blanket, and means for guiding the blanket through the printing machine and washing and drying means, characterized by drying means including a chamber having an air inlet and outlet and means for forcing a gas into said chamber through said inlet and withdrawing the same through said outlet, whereby the pressure within said chamber gradually decreases from said inlet to said outlet, said chamber having means adapted to cooperate with said blanket to provide pockets on one wall thereof communicating with said outlet and closed to said inlet, whereby a different pressure

is maintained on opposite sides of said blanket tending to hold the same in engagement with said wall and thereby guide the same through said chamber.

8. In an apparatus for removing liquid from sheet material, a chamber having a narrow elongated opening in one wall, means for moving said sheet material along the outer surface of said wall past said opening, a high pressure gas nozzle within said chamber having an orifice for projecting through said opening upon said material a thin high velocity stream of gas extending continuously across said material, said nozzle having means for adjusting the thickness of said stream, means for creating a reduced pressure within said chamber tending to cause said sheet material to seal said opening and to exhaust air from said chamber, and means for adjusting said nozzle to change the angle of said stream of gas relative to the plane of said material while maintaining said orifice in a substantially fixed position relative to said opening.

EDWARD L. MORELAND.
RALPH D. BOOTH.
CHARLES H. DANFORTH.