July 14, 1942. M. PAYEN 2,289,930

TREATING APPARATUS

Filed May 16, 1940 5 Sheets-Sheet 1

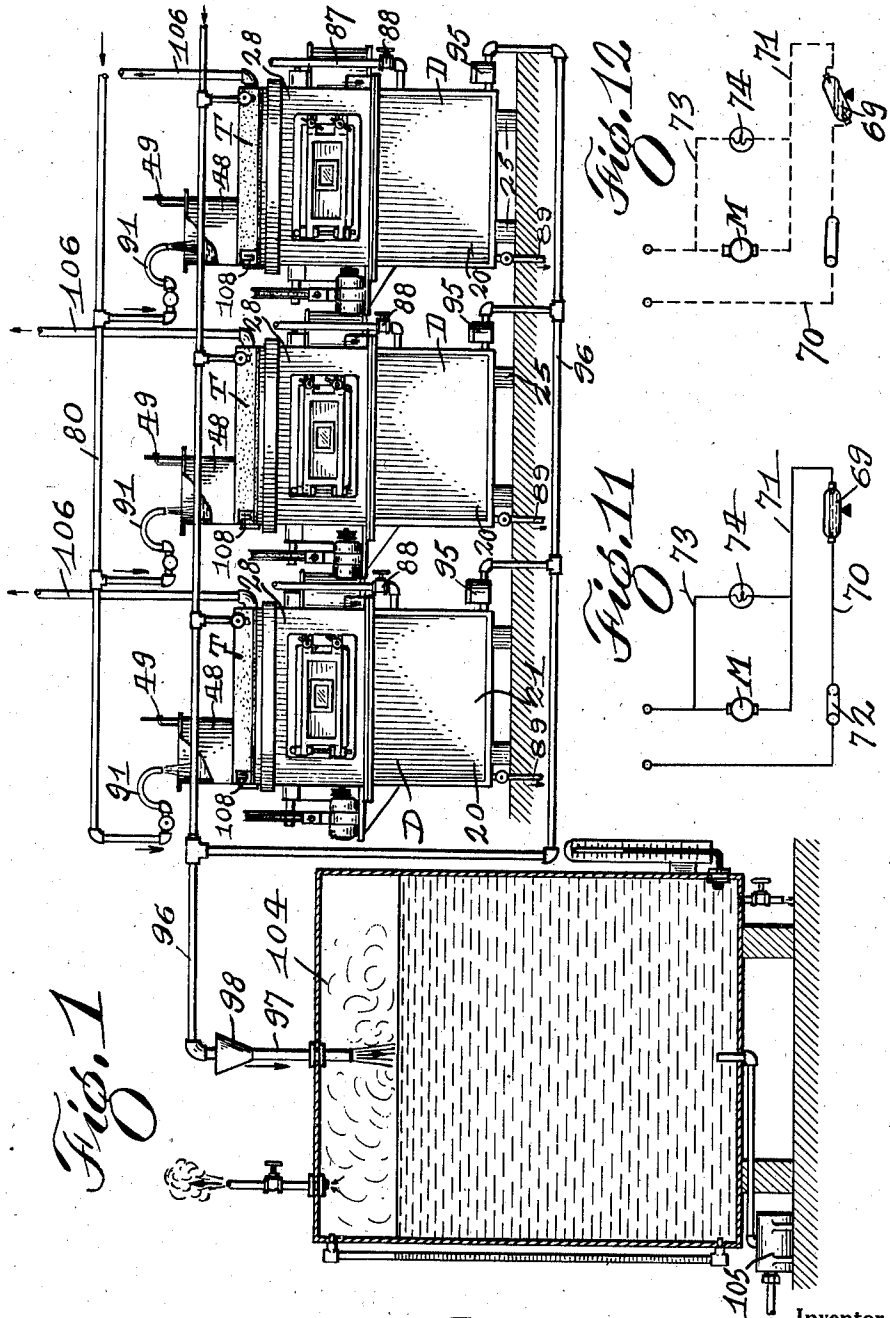


Fig. 1

Fig. 12

Fig. 11

Inventor

Marcel Payen

By Robic & Bastien

Attorneys

July 14, 1942. M. PAYEN 2,289,930

TREATING APPARATUS

Filed May 16, 1940 5 Sheets-Sheet 2

Fig. 2

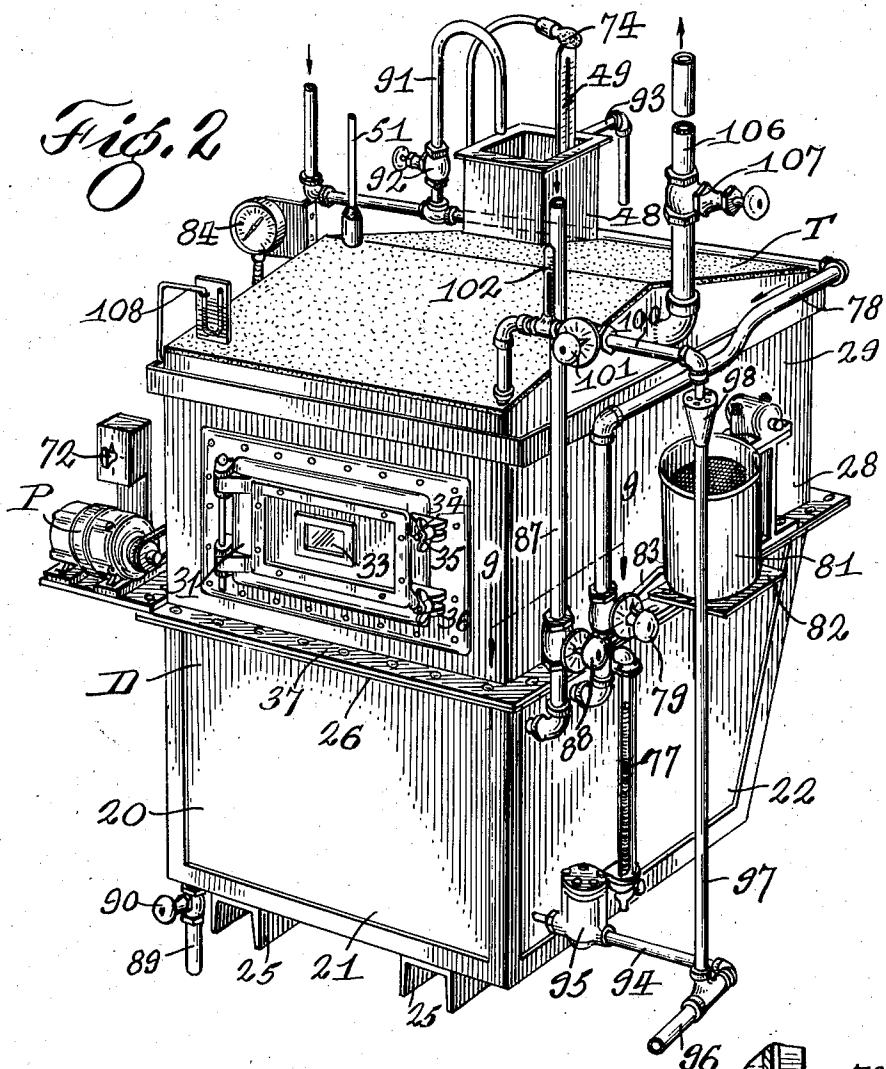


Fig. 10

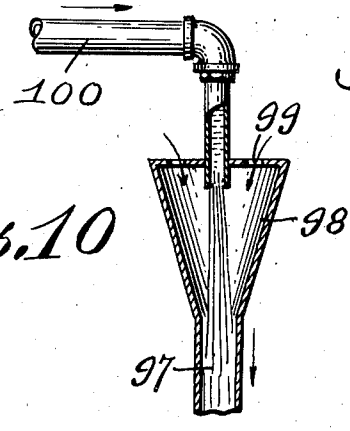
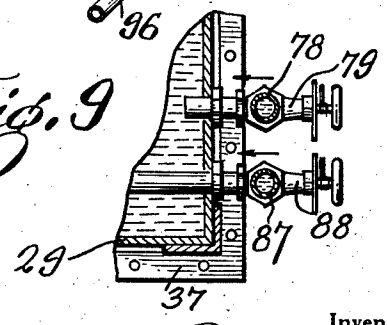


Fig. 9



Inventor

Marcel Payen

By Bakie & Bastien

Attorneys

July 14, 1942. M. PAYEN 2,289,930

TREATING APPARATUS

Filed May 16, 1940 5 Sheets-Sheet 3

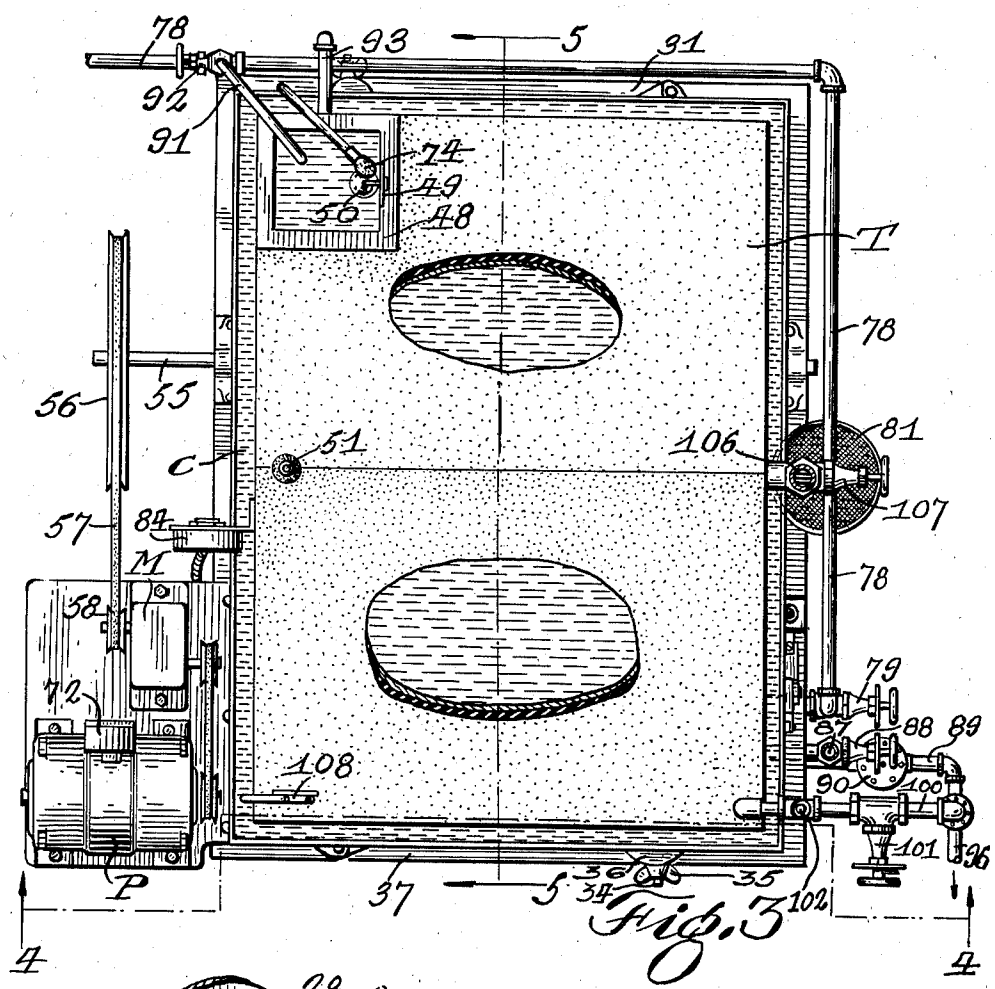


Fig. 3

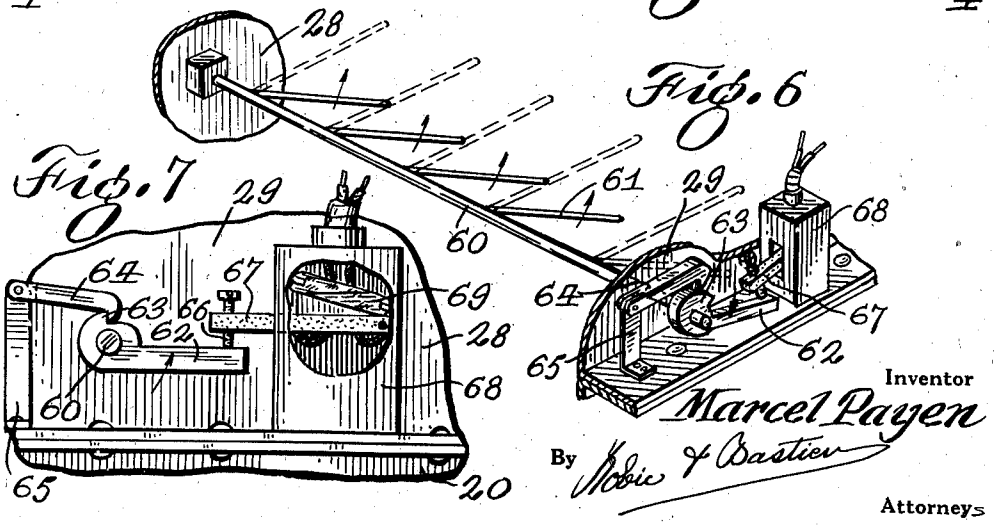


Fig. 6

Fig. 7

Inventor
Marcel Payen
By Mobie & Bastien
Attorneys

July 14, 1942. M. PAYEN 2,289,930

TREATING APPARATUS

Filed May 16, 1940 5 Sheets-Sheet 4

Fig. 4

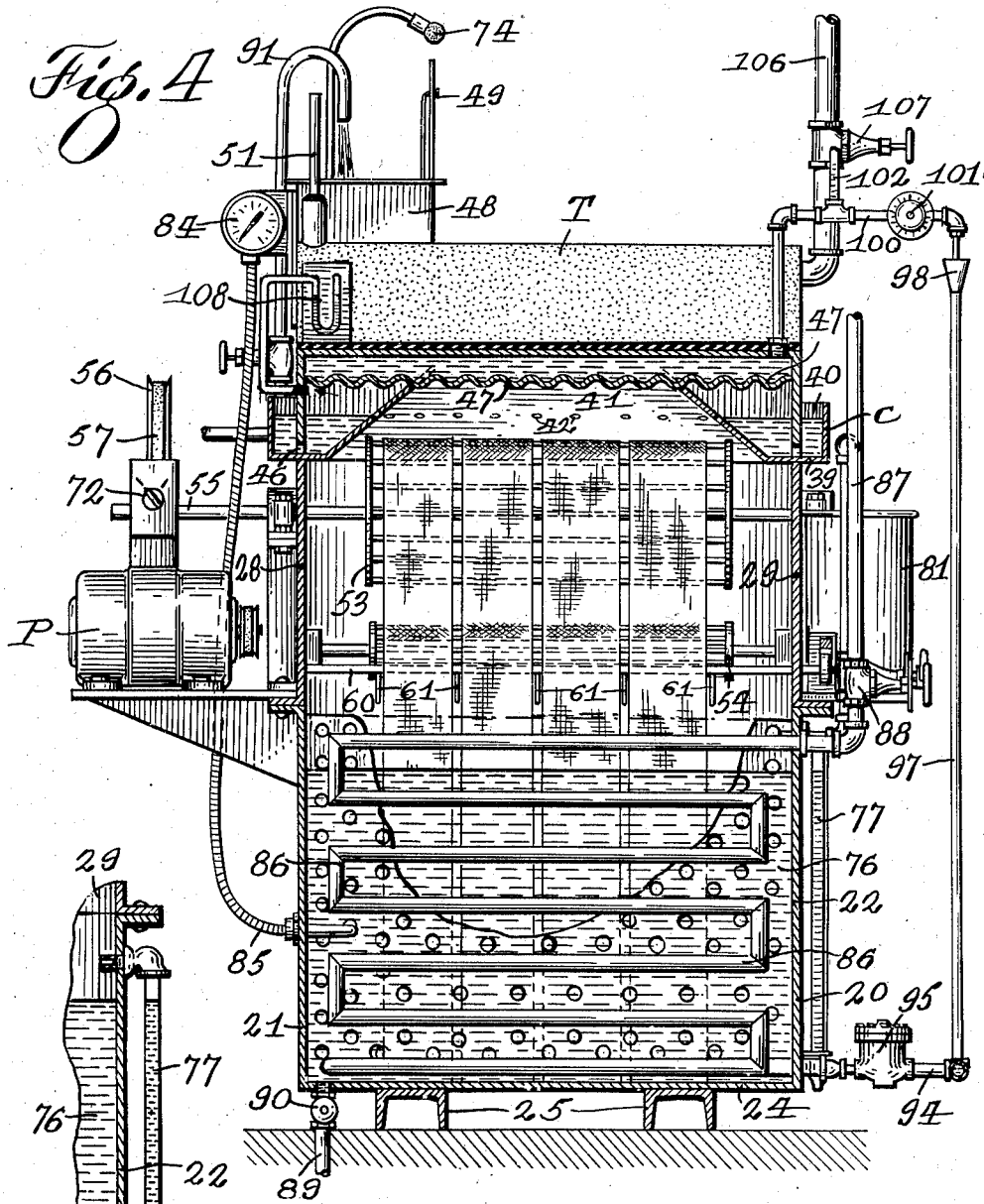


Fig. 8

Inventor

Marcel Payen

By Bobic & Bastien

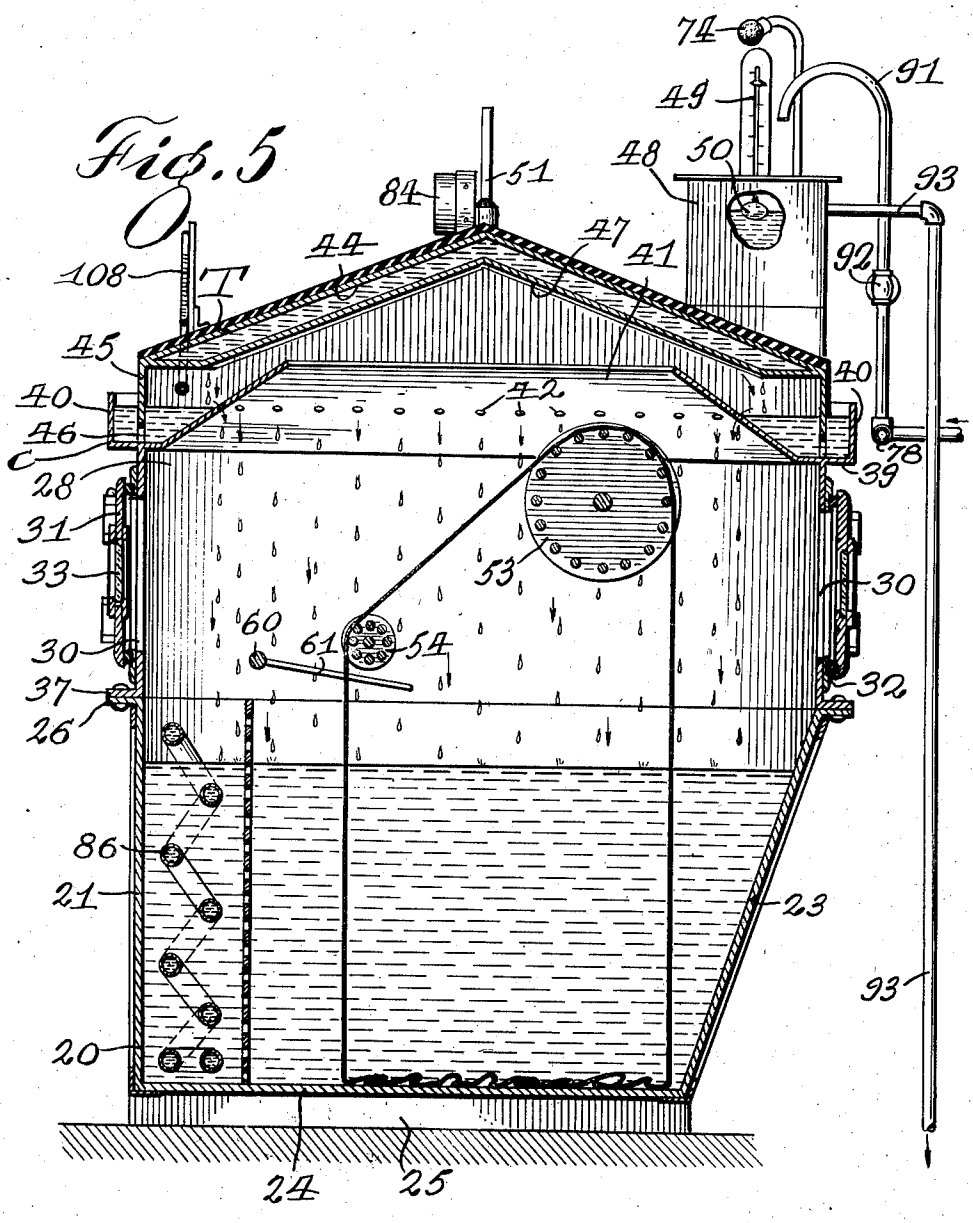
Attorneys

July 14, 1942. M. PAYEN 2,289,930

TREATING APPARATUS

Filed May 16, 1940 5 Sheets-Sheet 5

Fig. 5



Inventor

Marcel Payen

By Robie & Bastick

Attorneys

Patented July 14, 1942

2,289,930

UNITED STATES PATENT OFFICE

2,289,930

TREATING APPARATUS

Marcel Payen, St. Johns, Quebec, Canada, assignor of one-half to Franco-Canadian Dyers Limited, St. Johns, Quebec, Canada, and one-half to Rene Marcel Payen, Montreal, Quebec, Canada

Application May 16, 1940, Serial No. 335,575

3 Claims. (Cl. 68—18)

The present invention relates to improvements in apparatus for treating or handling material and has particular reference to apparatus for dyeing textiles and the like.

An object of the invention is the provision of treating apparatus of generally improved construction.

Another object of the invention is the provision of treating apparatus which will effect substantial economy in operation.

A further object of the invention is the provision of treating apparatus which is designed to preclude the dispersion of vapor and substantially reduce deterioration and injury resulting therefrom.

A still further object of the invention is the provision of treating apparatus in which the treating bath is tightly enclosed.

Still another object of the invention is the provision of treating apparatus which is designed to afford a compact conveniently operable construction.

Other objects and advantages of the invention will become apparent as the description progresses.

In the accompanying drawings forming a part of this specification and in which like reference characters are employed to designate corresponding parts throughout the same:

Figure 1 is a front elevational view, partly in section, showing a battery installation embodying the invention,

Figure 2 is a perspective view illustrating one of the treating units,

Figure 3 is a top plan view of the same,

Figure 4 is a vertical sectional view taken on the line 4—4 of Figure 3,

Figure 5 is a vertical section taken on the line 5—5 of Figure 3,

Figure 6 is a fragmentary perspective view of a switch operating mechanism,

Figure 7 is an enlarged end view of the same,

Figure 8 is a fragmentary vertical section through the bath gauge,

Figure 9 is a fragmentary horizontal section taken on the line 9—9 of Figure 2,

Figure 10 is an enlarged fragmentary section through one of the pipe connections,

Figure 11 is a diagrammatic view of an electric circuit with the switch in closed position, and

Figure 12 is a similar view with the switch in open position.

Referring to the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention, as employed for dyeing fabrics, D generally designates one of the treating units which embodies a bottom section composed of an approximately rectangular shaped vat 20 formed of sheet metal or the like having vertical front and side walls 21 and 22 and an inclined rear wall 23 formed so that the top edge protrudes rearwardly relative to the bottom edge. The flat normally horizontal bottom 24 of this section is preferably supported upon a pair of spaced base channels 25 while the top edge is formed with a continuous outwardly directed flange 26.

On the bottom vat section 20 is mounted an upper section 28 of rectangular form composed of four vertical walls 29 provided with elongated openings 30 at the front and rear. Each of these openings is normally closed by a hinged door 31, preferably equipped with a suitable sealing ring indicated at 32, and having, in its center portion, a transparent window pane 33. These doors are tightly fastened in closed position by means of pivot bolts 34, which carry wing nuts 35 and engage slotted lugs 36 on the door. This upper section is formed with a flange 37 which rests on and is riveted or otherwise fastened to the flange 26. Along the top edge of this section is formed a continuous channel C having a flat bottom 39, a vertical outer wall 40, offset outwardly from the wall of the section, and an inclined inner wall 41 provided with a horizontal row of apertures 42.

On the channel C is positioned a top or cover section T having a sheet metal roof structure formed with complementary parts 44 sloping downwardly from a centre ridge and formed with depending vertical walls 45 at the outer edges. The walls 45 are adapted to rest directly on the channel and assume vertical planes with the walls of the section 28, the lower edges being provided with spaced recesses or notches 46. As shown to advantage at Figures 4 and 5, the sloping roof structure is formed to provide interiorly arranged walls 47 parallel and spaced from the outer walls 44 to form a double roof providing a narrow space or chamber adapted to receive liquid. At one corner of the top this roof chamber communicates with an upstanding rectangular shaped open top receptacle 48, preferably equipped with a gauge 49 operable by a float 50 to indicate the height of the liquid level in the receptacle. A vent pipe 51 on the ridge also communicates with the chamber of the double roof.

Within the upper portion of the shell formed by the air-tight assembly of the horizontally divided sections are mounted a pair of trans-

versely extending rotary reels 53 and 54, of preferred known construction. These reels are rotatably journalled in the side walls of the shell section 28 and the shaft of the larger and uppermost reel 53 projects outwardly through the sides of the shell, as indicated at 55, and carries thereon a grooved, relatively large pulley wheel 56. A drive belt 57 connects the pulley 56 with a smaller pulley 58 forming part of a speed reduction gear mechanism, indicated at M, which is in turn driven by a drive motor P such as a conventional electric motor.

The material to be treated, as for instance fabric, is trained over the complementary reels and is suspended therefrom so that the major portion is immersed in the bath of the vat. It is a common practice to arrange such material in lengths disposed vertically in the dyeing unit and arranged in the form of an endless web, a number of which may be simultaneously disposed on the reels and treated, as shown to advantage at Figure 4.

As entanglement of the fabric would prevent uniform application of the dye and generally interfere with the proper operation of the apparatus, means are provided for automatically stopping the movement of the drive reel when such condition arises. This mechanism embodies a horizontally supported rock shaft 60 mounted adjacent to and parallel with the smaller reel 54.

Secured at spaced intervals to the rock shaft 60 and projecting radially therefrom are a plurality of tines 61 normally disposed to assume positions inclined slightly downward from the horizontal, as shown at Figures 5 and 6. On one end of the shaft 60 is fixed an arm 62 having the inner portion shaped to provide a projection or tooth 63 having co-operative relation with a hooked catch member 64 pivotally connected to a bracket 65. On the outer end of the arm 62 is supported the regulating screw 66 of a vertically movable pivoted lever 67, mounted in a switch housing 68 and disposed therein to actuate a tiltable switch member 69. This switch member is of a known type wherein a liquid such as mercury is disposed to cover end circuit contacts when the member is in approximately horizontal position and to uncover one of the contacts when it is tilted as shown at Figure 7, to close or open an electric circuit. A pair of conductors 70 and 71 connect the complementary contacts of the switch member 69 with an electric circuit including a control switch 72, the drive motor P and an auxiliary circuit 73 connecting with a signal lamp 74.

Should the fabric of one of the webs in the apparatus become entangled the enlargement of the web effected thereby will engage one of the tines 61 and elevate the same. The resulting rotary movement of the rock shaft 60 will swing the arm 62 from the position shown at Figure 6 wherein the automatic switch is closed, to the elevated position shown at Figure 7 whereat the catch 64 will engage the tooth 63 to retain the arm and the lever 62 in raised positions and effect inclination of the switch member 69 to open this switch and disconnect the circuit through the motor so that the reel will discontinue operation until an attendant has untangled the fabric and restored the switch mechanism to its normal operating arrangement.

The bottom vat section of the assembled shell or chamber contains the bath, that is the dye liquid solution indicated at 76, which is maintained at a predetermined level therein indicated by an exterior gauge 77. Water is supplied to the bath through a feed line 78 equipped with a control valve 79 and making connection with a main supply header 80. The dye is supplied by initially placing the same in a receptacle 81 supported on a platform 82 and communicating with the vat through a feed tube 83. The temperature of the bath is indicated on a dial thermometer 84 having connection with the bath through a tubular conductor 85.

The dye bath in the vat is maintained at a proper dyeing temperature by heating the same through the medium of a coil 86 making connection with a steam supply conduit 87 equipped with a control valve 88. The solution is drained from the vat through a discharge pipe 89 equipped with a valve 90, the said pipe connecting with the bottom portion of the vat as shown to advantage at Figure 4. Water is supplied to the double walled roof chamber through the medium of a goose-neck fitting 91 making connection with the water supply pipe line 80 and controlled by a valve 92 to discharge into the receptacle 48. A maximum level of the water in the receptacle is maintained by provision of an overflow pipe 93 connecting therewith. The discharge end of the heating coil 86 connects, through the medium of an outlet branch 94, equipped with a trap 95, with a header pipe 96. To this header is also connected an upstanding pipe 97 formed at the upper end with a flaring conical enlargement 98 having a plurality of vent openings 99. To a central aperture in the enlargement member 98 is connected the outer end portion of a conduit 100 which makes connection with a corner outlet of the double roof chamber.

The pipe 100 is fitted with a control valve 101 and a thermometer 102 adapted to indicate the temperature of water conducted through the pipe.

When a number of the vat chambers are connected in battery the pipe 96 may be advantageously extended to a storage tank 104 designed to receive the discharge fluid therein and from which the fluid may be pumped, by a pump 105, to any desired receivers. At one end of the top section of the chamber D is connected an upstanding vent pipe 106 equipped with a control valve 107 and making communication with the interior upper portion of the chamber.

When the vat chamber is in operation it is tightly closed and the vapour arising from the heated bath is condensed as it contacts with the interior wall 47 of the double roof, which may advantageously be corrugated. This condensation is effected by reason of the circulation of water through the narrow roof chamber which is supplied thereto at a comparatively low temperature, as for instance ordinary tap temperature. Such condensate flows downwardly along the inclined sections of this inner wall and drips from the lower marginal portion into the channel C. As the water attains a predetermined level in this channel it drips through the apertures 42 into the bath of the vat, as shown at Figure 5. Also, the water accumulating in the channel is normally maintained at a level above the high points of the recesses 46 so as to provide a water-seal connection between the top section and the upper chamber section 28. The water heated by the rising vapour in the double walled top roof is constantly conducted therefrom for utilization in any desired part of the dyeing plant and relatively cool water circulated through the roof chamber to

maintain a condensing temperature. The pressure in the main chamber is indicated by a pressure gauge 108 making connection with the interior thereof.

The lengths of fabric are moved vertically through the dyeing bath by the rotary action of the reels. Should any of the fabrics become entangled the automatic control mechanism is actuated thereby to move the switch 69 and disconnect the electric circuit through the motor P, extinguishing the normally illuminated light 74 and stopping the operation of the reels. When the fabric has been untangled, the switch 69 is re-set to its normally closed position to re-start the reels and continue the dyeing operation.

It will be evident that my improved apparatus not only provides an efficient construction for eliminating the many objections to the common practice of dyeing in open vats, but by condensing vapour from the bath enables maintenance of a uniform bath solution in a most convenient and economical manner. Furthermore, this apparatus provides means whereby the dyeing operation may be effected at atmospheric pressure and under the most advantageous conditions, affording a tightly sealed bath enclosing chamber as well as means for conserving the heat of the bath by enabling utilisation of the water circulated through the double top condensing chamber.

Therefore, it is apparent that my apparatus presents several advantages among which are complete elimination of free steam in the workshop, thereby reducing greatly the upkeep costs such as special electric wiring, rotting of timber, rusting of steel parts, special sewers, etc.; improvement of working atmosphere for workmen and general increase of industrial hygiene; recuperation of a great quantity of hot water due to the operation of the condensing top, which quantity of water is immediately usable and represents a great economy of fuel; permits the use of indirect heating of the vats as by steam coils, without the disadvantage of concentrating the dye baths which remain unchanged in strength during the whole operation; elimination of dripping water from overhead beams and fittings, thus faciliating manipulation of goods without requiring the protecting hoods generally used; since indirect heating is feasible, no necessity exists for heating the increasing volume of the bath heated directly that is, the steam condensed in the bath and changing its volume and the dye concentration; minimum cost of the heating operation due to the high efficiency of the device; since indirect heating is used, the steam condensed in the coils is trapped and recovered as high-temperature water.

It is to be understood that the form of my invention herein shown and described is to be taken as a preferred example of the same, and that various changes as to the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In treating apparatus, a shell comprising a bottom vat section, an upper section secured on the said vat section, a top cover section removably seated on the said upper section, a double walled roof in the said top section adapted to receive cooling fluid therein for condensing vapor from a bath in the said section, and a channel formed on the upper edge of the upper section in which the top section is seated, the said channel being adapted to collect liquid condensed on the double walled roof and to cause said liquid to flow back into the vat section.

2. A treating device having a vat adapted to contain a treating bath, means for boiling said bath, a channel formed on the upper edge of the vat, a double-walled top removably seated in said channel, and means for circulating a cooling fluid inside the top for condensing thereon the vapors of the bath, said condensed vapors collecting first in the channel to form an hydraulic seal and overflowing thereafter back into the bath.

3. An apparatus of the character described, comprising a vat adapted to contain a bath, means for heating said bath to the boiling point at atmospheric pressure, a double-walled top removably secured to the upper edge of the vat, a cooling liquid reservoir disposed above the top, means for conducting liquid from the reservoir to the inside of the top for condensing on said top the vapors of the bath, means at the upper edge of said vat for collecting condensed vapors to form an hydraulic seal between vat and top and to return also to the vat the condensate, a pipe for removing heated liquid from inside the top, and regulating means on said pipe for controlling the flow of liquid in the top.

MARCEL PAYEN.