May 25, 1948. S. CONVERSE ET AL 2,441,991

APPARATUS FOR BOILING OUT CLOTH

Filed Oct. 10, 1946 4 Sheets-Sheet 1

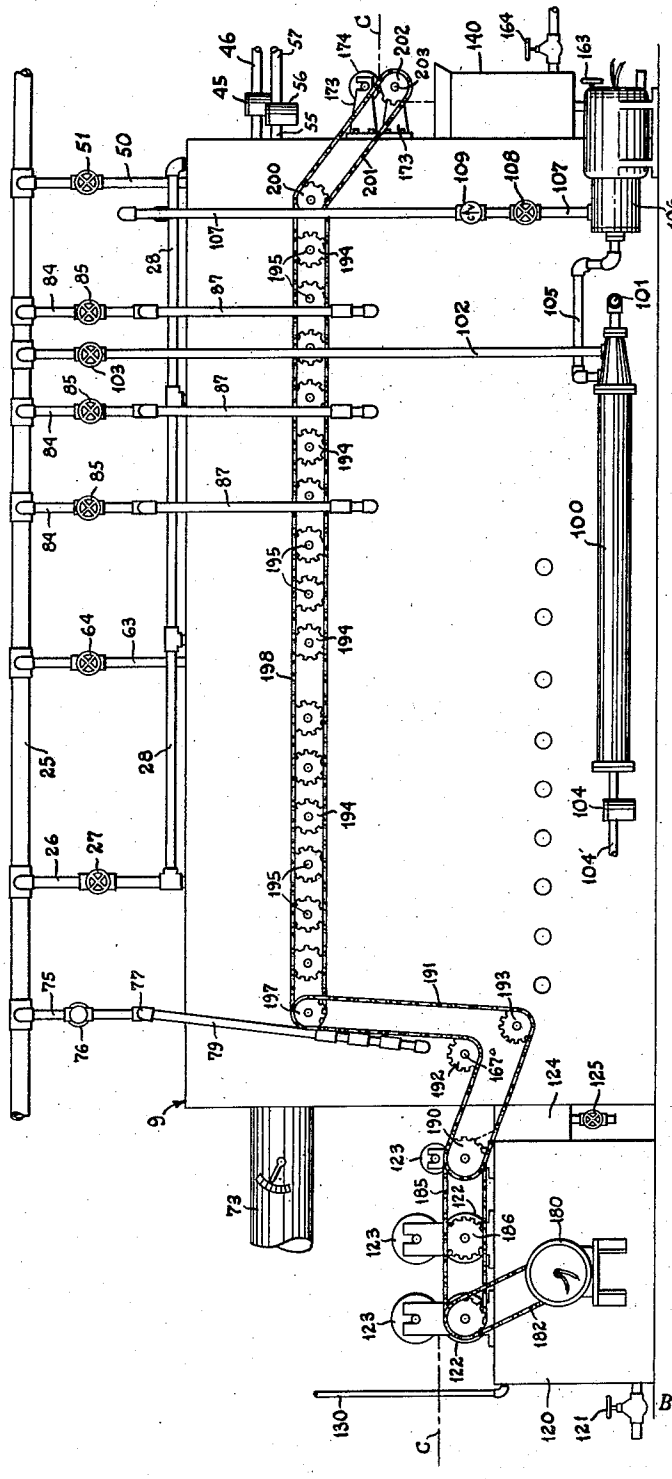


Fig. 1

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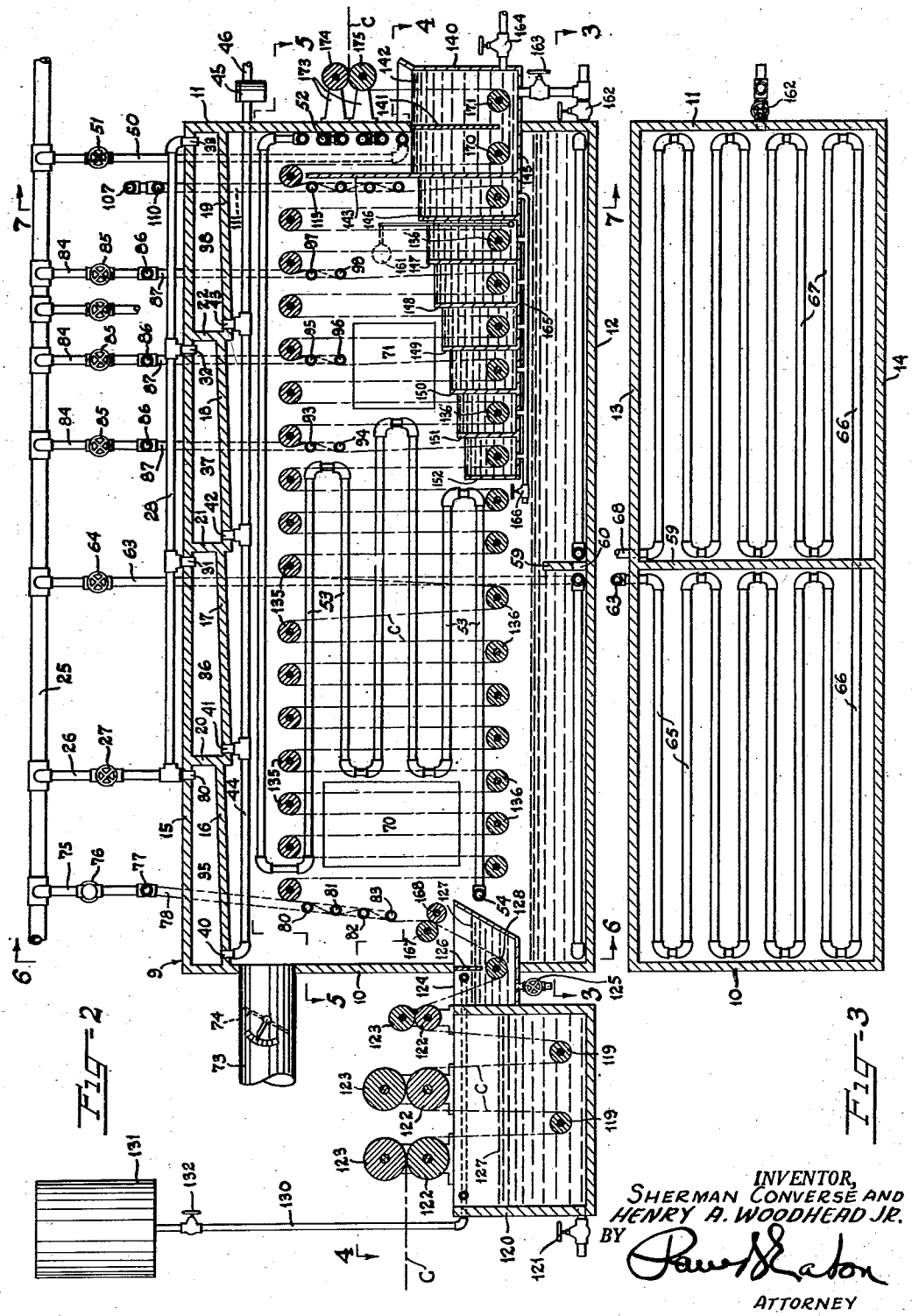


FIG. 2

FIG. 3

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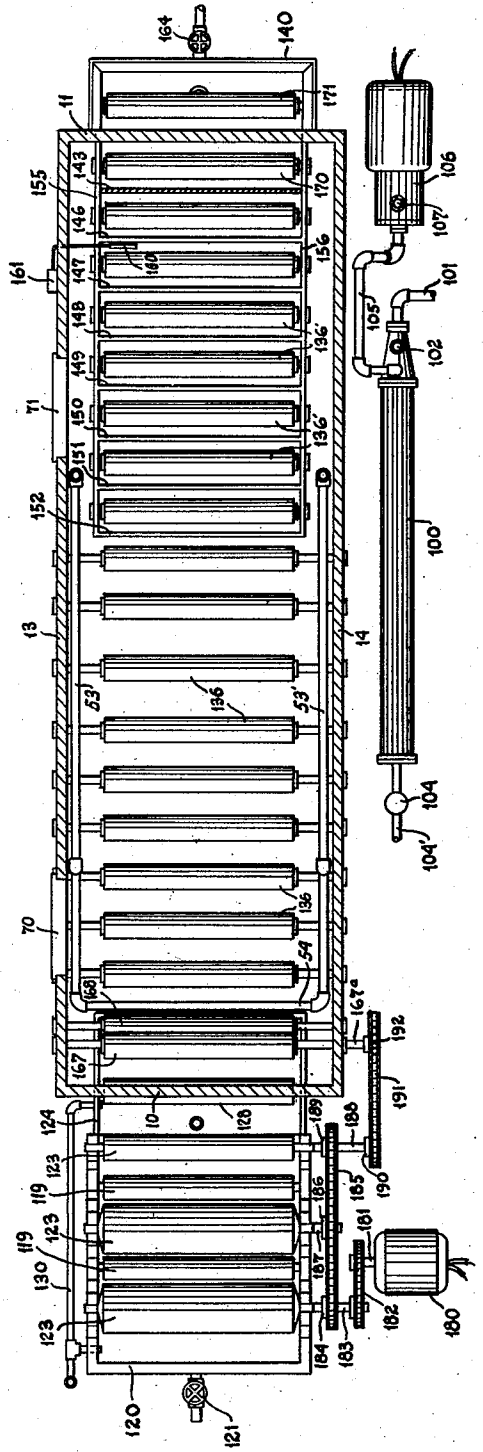


Fig-4

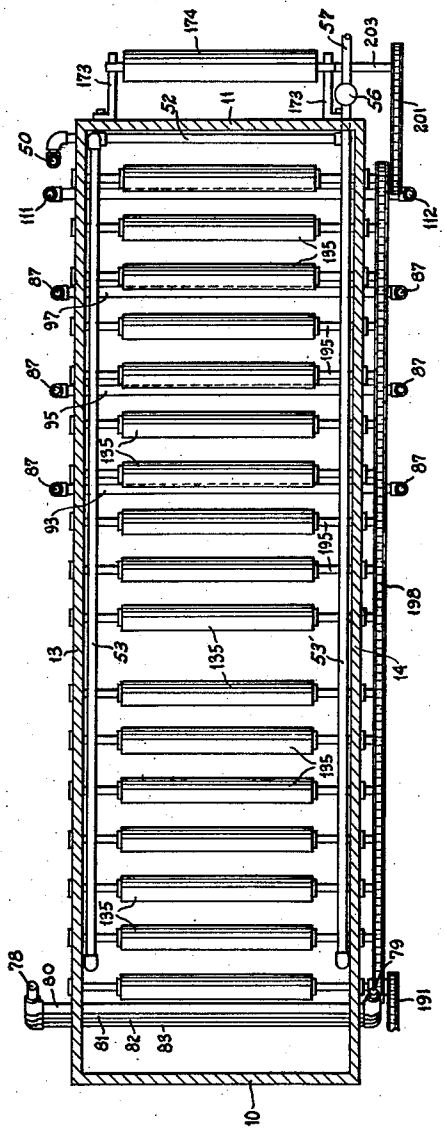


Fig-5

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APPARATUS FOR BOILING OUT CLOTH

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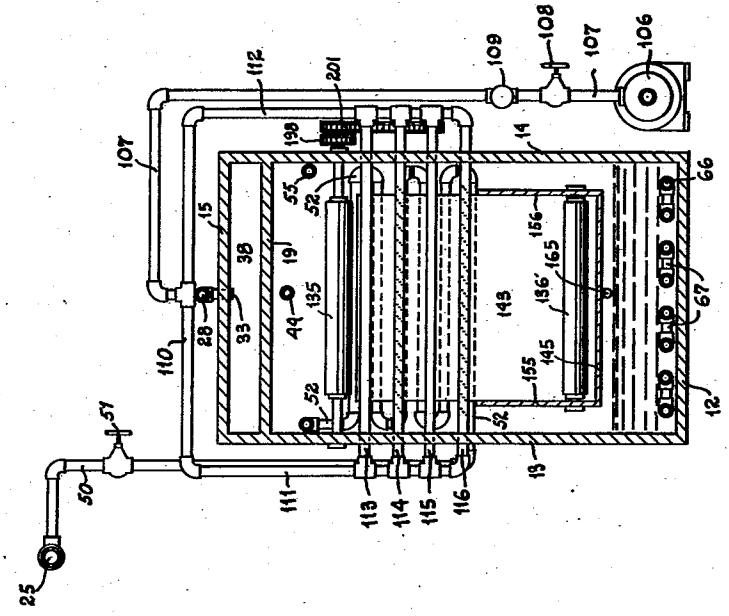


FIG-7

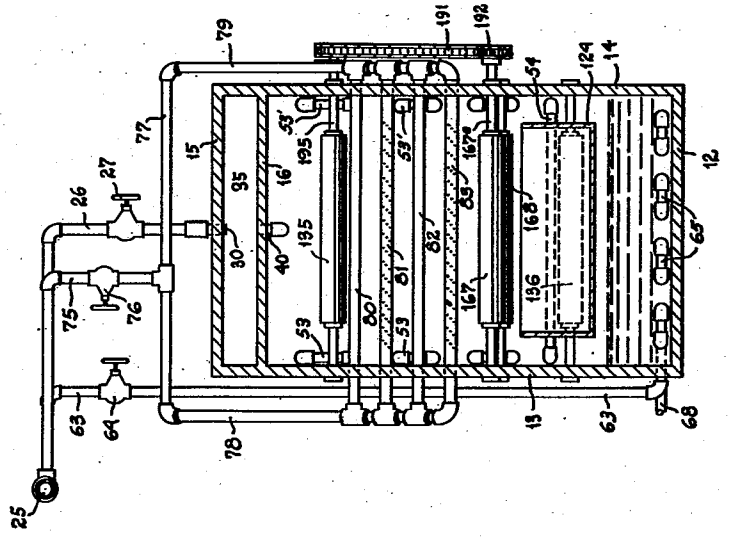


FIG-6

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UNITED STATES PATENT OFFICE

2,441,991

APPARATUS FOR BOILING OUT CLOTH

Sherman Converse and Henry A. Woodhead, Jr., Aiken, S. C.

Application October 10, 1946, Serial No. 702,530

3 Claims. (Cl. 68—5)

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This invention relates to an apparatus for treating cloth, and more especially to a boil out mechanism wherein the cloth is fed through a caustic soda solution for a plurality of times and through squeeze rolls and then is fed into an air-tight chamber through a suitable liquid seal and in contact with a plurality of perforated pipes for forcing steam through the cloth, and then the cloth is passed over a plurality of rollers in an up and down manner and is finally passed between a plurality of perforated pipes having steam therein under pressure to force the steam through the cloth and, during the steaming, the cloth is passed through a plurality of wash boxes to wash the caustic soda solution and extraneous matter therefrom and finally the cloth is passed in contact with a plurality of perforated pipes through which hot water is forced through the cloth at approximately one hundred pounds pressure and at a temperature just below the boiling point to thoroughly wash the cloth finally before it passes out of the closed chamber through a suitable liquid seal, thus rendering it clean and absorbent and in a suitable condition to be dyed, bleached, or bleached and dyed.

It is an object of this invention to provide apparatus for treating cloth comprising a closed chamber which is heated by means of a plurality of steam coils immersed in water in the bottom thereof and along the sides and one or more ends as well as having the top portion thereof heated by steam as the cloth is being passed through a suitable caustic soda solution and then into the chamber through a suitable water seal and then subjected to steam sprays and hot water sprays and to washing baths to thoroughly treat the cloth and finally emerging from the chamber through a suitable liquid seal.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings in which:

Figure 1 is a side elevation of the apparatus;

Figure 2 is a longitudinal vertical sectional view taken substantially centrally through the apparatus;

Figure 3 is a horizontal sectional view taken substantially along the line 3—3 in Figure 2;

Figure 4 is a horizontal sectional view taken substantially along the line 4—4 in Figure 2;

Figure 5 is a sectional view taken substantially along the line 5—5 in Figure 2;

Figure 6 is a vertical sectional view taken along the line 6—6 in Figure 2;

Figure 7 is a vertical sectional view taken along the line 7—7 in Figure 2.

Referring more specifically to the drawings, the numeral 9 broadly indicates the closed chamber through which the cloth is passed. This chamber comprises front and rear end walls 10

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and 11, a bottom 12, and side walls 13 and 14. It also has a top 15 and immediately below the top it has false top members 16, 17, 18 and 19 divided by suitable partitions 20, 21 and 22.

A steam pipe is indicated at 25 and is led from a suitable source of steam, not shown. This steam pipe has a branch 26 having a manually operated valve 27 therein to which is connected a horizontally disposed pipe 28 having a plurality of branches 30, 31, 32, and 33 opening into steam jackets 35, 36, 37, and 38.

Leading from the bottom of the steam jackets 35 to 38, inclusive, are branch return pipes 40, 41, 42, and 43, all of which are connected to the return pipe 44 which has a trap 45 therein and a return pipe 46 leading back to the source of steam.

Leading from the main steam pipe 25 is a steam pipe 50 having a manually controlled valve 51 therein which leads down to the bottom of a back and forth steam coil 52 which runs back and forth on the inside surface of the end wall 11 and has its upper end joined to a side steam coil 53 which runs back and forth along the side wall 13 and is joined by a pipe 54 which leads from the lower end of this side coil 53 across to the lower leg of a similar back and forth coil 53', being connected with the lower branch of said coil which extends back and forth in the same manner as the side coil 53 and its top leg is led through the back end wall 11 as at 55 into a suitable trap 56 and a return pipe 57 leads back to the source of steam.

In the bottom of the compartment is adapted to be disposed water of a suitable depth and in this water is immersed suitable steam coils. This bottom member 12 has secured thereto in transverse relation a partition 59, having an opening 60 therethrough, which is not only secured to the bottom 12 but has its ends also secured to the side walls 13 and 14 for reinforcement purposes.

Leading downward from main steam pipe 25 is a pipe 63 having a manually controlled valve 64 therein and which pipe 63 extends downwardly to near the bottom of the compartment and penetrates the side wall 13 in a water-tight manner and is connected to one end of a back and forth coil 65 which extends in a back and forth manner between the partition 59 and the end wall 10.

At the other side of the compartment from the entrance point a pipe 66 leads all the way along the side wall 14 and is connected to a back and forth coil 67 disposed in the rear end of the compartment adjacent to the floor 12 thereof. The other end of the coil is connected by a pipe 68 to a suitable trap, not shown but similar to trap 45, and is led back to the source of steam.

The compartment has suitable openings 70 and 71 closed by suitable doors, these openings being

located in either of the side walls 13 or 14 but preferably in side wall 13 as shown in Figure 2.

The end wall 10 has a suitable vent pipe 73 therein with a suitable valve or vane 74 pivoted therein which can be regulated as to position to prevent pressure from being built up in the compartment on account of the great amount of steam within the compartment. It prevents the entrance of outside air but allows the excess pressure created within the compartment 9 to be vented through this pipe 73.

Leading from the main steam pipe 25 is a pipe 75, having a manually controlled valve 76 therein, which leads down and is connected to a horizontal and transverse pipe 77. Pipe 77 is connected at each end to vertically disposed pipes 78 and 79 which have connected thereto transverse perforated pipes 80, 81, 82, and 83 which lead through the side walls 13 and 14. Pipes 80 and 82 are perforated on the rear side or remote from the observer, as viewed in Figure 6, and pipes 81 and 83 are perforated on the near side towards the front of the machine.

Leading from the main steam pipe 25 is a plurality of pipes 84 having manually controlled valves 85 therein. The pipes 84 lead down and are connected to transverse pipes 86 and vertically disposed pipes 87 connect to each end thereof. Disposed between each pair of pipes 87 is a plurality of perforated pipes 93, 94, 95, 96, 97, and 98, which lead through the side walls of the machine, these pipes being connected to the lower end of pipes 87. The pipes 93, 95 and 97 are perforated on the rear side and pipes 94, 96 and 98 are perforated on the front sides.

For furnishing hot water at substantially 210° F. to certain spray pipes to be presently described, there is provided an instant steam hot water heater 100, known as the Johnson hot water heater, which is of conventional structure and has a plurality of steam coils therein around which water passes to quickly heat the same. The ordinary cold water from a suitable tank or city pressure enters this hot water heater through a pipe 101. A pipe 102 is connected to main steam pipe 25 and has a manually operated valve 103 therein, this pipe 102 leading into the water heater 100 and being connected to the coils, not shown, and the steam passes through trap 104 to a return pipe 104' which leads back to the source of steam.

The water, after being heated, emerges from the water heater 100 through a pipe 105 and into a suitable electrically driven pump 106 and emerges from this pump through a pipe 107 which has a manually controlled valve 108 therein, the pipe 107 also having a suitable check valve 109 therein. The pipe 107 leads upwardly and laterally and is connected to a transverse pipe 110 which has downwardly extending legs 111 and 112 to which are joined transverse pipes 113, 114, 115, and 116. The pipes 113 and 115 are perforated on their rear sides and the pipes 114 and 16 are perforated on their front sides and through which perforations the hot water will pass at a pressure of substantially 100 pounds to be forced through the cloth.

The apparatus has associated therewith an impregnating box 120 having a drain valve 121 and disposed above the box 120 is a plurality of lower squeeze rolls 122 and upper squeeze rolls 123 and within the box, immersion rolls 119.

Joined to the rear wall of box 120 is a seal trough 124 which has a suitable drain valve 125 in the bottom thereof. This seal trough 124

is disposed in an opening in the front side wall 10 and completely closes the same and extending downwardly from the front side wall 10 is a vane 126 which projects downwardly into the trough so that the liquid sealing medium 127 will cause the lower portion of the vane 126 to be submerged. There is an immersion roller 128 mounted in the seal trough 124.

A caustic soda solution 127 has been described as present in the seal trough 124, and this solution 127 is also present in the scouring box 120. This caustic solution is supplied to these two containers by means of a pipe 130 having openings into both of these containers and which pipe is joined to a suitable source of the caustic soda solution indicated at 131. A manually controlled valve 132 is disposed in the pipe 130 for admitting solution to the containers 120 and 124 as desired.

Mounted in the side walls and spanning the distance between the same is a plurality of upper rollers 135 and a plurality of bottom rollers 136, the bottom rollers being above the liquid level in the bottom of the compartment 9. Also the rear wall 11 of the compartment 9 has an opening therein into which a container 140 is adapted to be placed to completely fill the opening.

From the upper edge of the opening in the rear wall 11 and extending downwardly into the container 140 is a vane 141 which has its lower edge submerged by hot water 142 in the container 140. The front portion of container 140 extends substantially inside the compartment 9 and has a partition 143 rising from the bottom thereof and forming the front side wall of the container 140. This partition 143 prevents the hot water issuing from the spray pipes 113 to 116 from falling into the container 140 and contaminating the hot water therein with extraneous matter and caustic solution, which has been washed out of the cloth by the water spray pipes 113 to 116.

The bottom of the box 140 is indicated at 145 and extends a substantial distance inside the compartment or forwardly of the partition 143. Secured to this bottom are upwardly rising partitions 146, 147, 148, 149, 150, 151, and 152 which have suitable end walls joining these partitions together to form wash boxes.

The lower rollers which are mounted in the wash boxes formed by partitions 143, 146 to 152, inclusive, are indicated at 136' and instead of being mounted in side walls of the compartment are mounted in the end walls 155 and 156 joining all of the wash boxes together. It is to be noted that the walls 146 to 152, inclusive, are progressively lower as they are stepped down from rear to front to allow the water in wash box 146, for example, to overflow into the wash box formed by partitions 146 and 147 and so on, so that the water will thus cascade forwardly and finally flow over the wall 152 into the bottom of the compartment. This water in these wash boxes is supplied from the hot water spray pipes 113 to 116, inclusive, and it is thus seen that the most contaminated water would be in the front wash box whereas the purest water would be in the rearmost box which is formed by partitions 143 and 146.

Disposed within one of the wash boxes, for example between partitions 146 and 147, is a temperature responsive element 160 which leads to a suitable thermometer 161 on the outside of the compartment so that an observer can ascertain

the temperature of the water in the wash boxes at any time desired.

The lower end of the compartment 9 has a drain valve 162 by means of which the water can be completely drained from the compartment 9. The seal box 140 has a drain valve 163 by means of which the water can be drained from the box 140. This box has an inlet valve 164 connected to a suitable source of water for admitting additional water 142 to the box 140. All of the wash boxes formed by the partitions 143 and 146 to 152 have suitable drain pipes connected to a common drain pipe 165 having a drain valve 166 by means of which all of the wash boxes can be drained into the compartment 9 and in turn this water will drain out of the drain valve 162.

The compartment also has mounted therein squeeze rolls 157 and 158 through which the cloth C passes after passing beneath the immersion roll 128 and out of the seal box 126.

The seal box 140 at the exit end of the compartment has mounted therein immersion rollers 170 and 171 and above the seal box 140 and on the exterior of the end wall 11 are mounted suitable brackets 173 in which squeeze rolls 174 and 175 are rotatably mounted.

Mounted in any suitable position but shown as being mounted on the side of the box 120 is an electric motor 180 which has a suitable sprocket wheel on its motor shaft 181 on which is mounted a sprocket chain 182 which is also mounted on a shaft 183 extending from the first bottom roll 122. This shaft 183 also has a sprocket wheel 184 thereon on which a sprocket chain 185 is mounted. This sprocket chain also engages a sprocket 186 on shaft 187 extending from the second lower roll 122. The third lower roll 122 has extending therefrom a shaft 188 on which a sprocket wheel 189 is mounted and on which also the chain 185 is mounted. This shaft 188 also has a sprocket wheel 190 secured thereon on which a sprocket chain 191 is mounted. This sprocket chain 191 engages sprocket 192 on shaft 167a on which squeeze roll 167 is fixed and which extends to the exterior of the compartment and also engages an idler sprocket 193. The sprocket chain 191 also engages sprocket 197 on shaft 195 of the first upper roll 135 which extends through the machine.

All of the upper rolls 135 have shafts 195 extending through the side wall 14 of the compartment and each shaft has a sprocket 194 mounted thereon. The shaft 195 of the front top roller 135 not only has the sprocket wheel 194 thereon but also has an additional sprocket wheel 197 thereon. Each of the sprockets 194 on shafts 195 extending from the top rolls 135 are engaged by a sprocket chain 198, the upper portion of this sprocket chain 198 is the driving portion and the bottom portion is the idler portion and would probably sag down somewhat from the position shown in Figure 1. At the extreme rear end of the machine, the last top roller shaft 195 has an additional sprocket 200 thereon on which a sprocket chain 201 is mounted which is also mounted on a sprocket wheel 202 secured on shaft 203 extending from the lower squeeze roll 175 for imparting rotation to the squeeze rolls 175 and 174.

In the drawings and specifications, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

We claim:

1. Apparatus for treating cloth comprising a container for holding a caustic solution having squeeze rolls thereabove and immersion rolls therein, and through which the cloth is adapted to be passed, an elongated closed chamber having an entrance port and an exit port, a trough disposed in each of said ports for containing a liquid, means for sealing the entrance and exit ports against the entrance of atmosphere, said troughs having an immersion roller therein beneath which the cloth is passed as it enters and leaves the chamber, a plurality of perforated pipes between which the cloth is directed after leaving the entrance seal trough, means for forcing steam through the perforated pipes and through the cloth passing therebetween, said chamber having a plurality of top rolls and a plurality of bottom rolls over which the cloth is passed for a plurality of times, a second set of perforated steam pipes past which the cloth is led for forcing steam therethrough, a plurality of wash boxes disposed adjacent the exit end of the chamber and having an immersion roll in each of the wash boxes beneath which the cloth is passed, said wash boxes being disposed in side by side relation and having partitions dividing the same with the partitions gradually increasing in height from the front towards the rear of the chamber whereby water will cascade from the rearmost wash box into the next forward wash box and so on until it spills over the front wash box into the bottom of the chamber, a plurality of steam coils disposed in the bottom of the chamber for heating the water therein and creating steam vapors for impregnating the cloth while it is passing through the chamber, the rearmost wall of the rearmost wash box extending substantially upwardly into the chamber and having a plurality of perforated pipes adjacent thereto and between which the cloth passes after it leaves the rearmost wash box, means for forcing hot water through the last-named perforated pipes and through the cloth passing therebetween, said chamber also having steam coils on each side thereof for heating the same.

2. A boil-out mechanism for treating cloth comprising an elongated closed chamber having entrance and exit openings, liquid seal means for the openings and each of the same having an immersion roller therein, means for applying a caustic solution to the cloth before it enters the chamber, a plurality of steam coils disposed on the inner surface of the side walls of the chamber and on the bottom of the chamber for heating the inside of the chamber, a plurality of sets of perforated pipes between which the cloth is passed and means for supplying steam to said perforated pipes for forcing steam through the cloth, a plurality of top and bottom rollers over which the cloth is passed, the rearmost end of the chamber having a plurality of wash boxes disposed in spaced relation to the bottom of the chamber with immersion rollers therein and beneath which the cloth is passed as it travels towards the exit opening of the chamber, means for forcing hot water through the cloth prior to its passing from the chamber, means for supplying liquid to the seal means, said wash boxes having their forward sides decreasing in height as they progress toward the front of the chamber whereby water will cascade from the rearmost wash box forwardly to the next adjacent wash box and spill from over the front of the front wash box into the bottom of the chamber.

3. Boil out mechanism for treating cloth comprising a closed chamber having an entrance port and an exit port through which the cloth enters and leaves the chamber, a liquid trough disposed in each of said parts and the walls of the chamber adjacent said ports extending downwardly below the liquid level to seal the interior of the chamber from outside atmosphere, each of the troughs in the ports having an immersion roller beneath which the cloth is passed as it enters and leaves the chamber, means for squeezing excess liquid from the cloth immediately after it leaves the liquid in the trough, disposed in the entrance port, a plurality of top rolls and a plurality of bottom rolls over which the cloth is passed through the chamber, means for driving the top rolls, a plurality of wash boxes adjacent the exit end of the chamber and surrounding the lower rolls at that end of the chamber, the wash boxes being divided by vertically disposed partitions decreasing in height as the wash boxes extend forwardly of the chamber so that water will cascade from the rearmost wash box forwardly over the adjacent wash boxes and finally spill into the bottom of the chamber, a steam coil disposed in the bottom of the chamber for heating the water therein and creating steam vapors for filling the chamber, a plurality of other steam coils for heating the interior of the chamber, the top of the chamber having a plurality of steam compartments therein for also heating the interior of the chamber, a plurality of sets of perforated pipes between which the cloth is passed in its

up and down movements as it progresses through the chamber, means for supplying steam to the perforated pipes to force steam through the cloth as it passes the perforated pipes, a plurality of perforated pipes adjacent to the rear end of the chamber and between which the cloth is passed immediately before it leaves the chamber, means for forcing hot water through the last named set of perforated pipes and through the cloth passing therebetween, said water issuing from the last named perforated pipes falling into the rearmost wash box to supply water to all of the wash boxes and to the bottom of the chamber, and means disposed on the exterior of the chamber above the exit port for squeezing excess liquid from the cloth as it emerges from the trough sealing the exit port of the chamber.

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