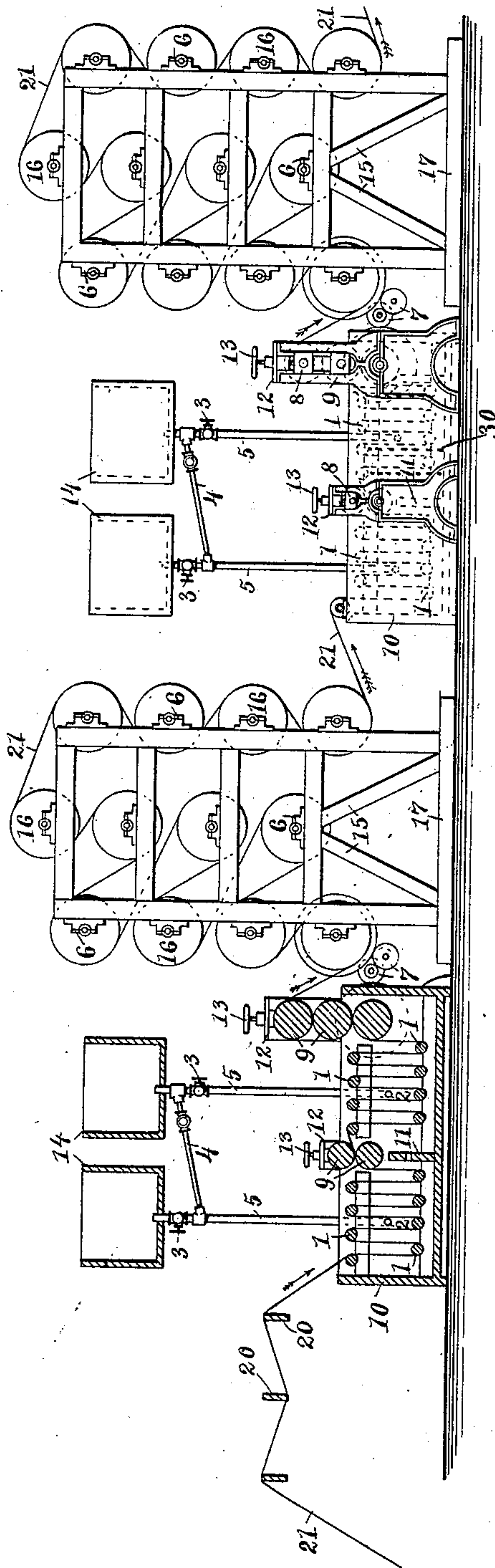


(No Model.)

W. HARTLEY, Jr.  
DYEING APPARATUS.

No. 355,930.

Patented Jan. 11, 1887.



WITNESSES:

Chas. H. Luther Jr.  
Willis Fowler.

INVENTOR:

William Hartley Jr.  
by Joseph A. Miller & Co.



# UNITED STATES PATENT OFFICE.

WILLIAM HARTLEY, JR., OF LONSDALE, RHODE ISLAND.

## DYEING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 355,930, dated January 11, 1887.

Application filed June 12, 1886. Serial No. 204,923. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM HARTLEY, Jr., of Lonsdale, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Dyeing Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification.

My invention relates to apparatus or a set of certain co-operating devices for dyeing, or the process of impregnating fibrous material with coloring substances.

The objects of my invention are to provide apparatus for dyeing, whereby the process of dyeing may be rapidly, efficiently, and economically accomplished, and whereby cloths which resist or do not readily take the dye are easily and uniformly colored or dyed.

To the above purposes my invention consists in the new and novel arrangements and constructions of the several features of the apparatus, all as hereinafter fully described and claimed.

Referring to the illustration shown in the accompanying drawing, the dye-boxes 10 are rectangularly-shaped vats or tubs with open tops and of suitable heights, and are formed into two compartments by means of a shallow perforated partition, 11, fixed across the boxes at their bottoms and near their centers. Each compartment is provided with a jig, consisting of an upper and a lower set of rotary jig-rolls, 1, set across the boxes in horizontal and parallel positions, and suitably journaled in the opposite sides of the boxes. As shown, the corresponding upper and lower rolls, 1, of the jigs lie out of vertical alignment. Above the partition 11 is arranged a squeezer consisting of two rotary presser-rollers, 9, which are set through the opposite sides of the boxes, and are journaled in the frames 12. The upper roller is journaled in a movable bearing, 8, sliding vertically in guideways formed in the frames 12, and is adjustable therein and set relative to the lower roller by means of the hand-wheel 13, controlling the sliding bearing, in a manner well known for this form of device. The rollers 12 lie parallel to and between the jigs. At the far ends of the boxes, between the last jigs and said ends, are placed squeezers, constructed on the same principle as the ones just described, and having their presser-rollers of larger diameter than the cen-

tral squeezer, with the two upper rollers adjustable by the hand-wheel device relative to each other and to the lower roller.

The rectangular reservoirs or supply-tanks 14 are elevated above the level of the dye-boxes, one for each compartment of the boxes, and are suitably supported. The supply-tanks are designed to contain the dye in solution or bath, and each one is provided with a discharge-pipe, 5, leading therefrom into the sides of their respective compartments, as at 2. The discharge-pipes are in communication with each other by means of the pipe-section 4. Each of these respective pipes are provided with a small stop-cock, 3, to regulate and cut off the flow of the dye-solution from the tanks to the dye-boxes.

The racks 15 are suitably constructed with side and cross pieces for securing the bearings 6, in which are journaled the ordinary rotary drying-cans 16, at each end of the cans. These cans I have shown in three vertical tiers, and are of the usual hollow form, in order to be supplied with internal heat in any suitable manner. These racks 15 are placed one between the dye-boxes and one after the second or right-hand dye-box. I prefer not to heat highly the drying-cans, but to have a rather low uniform temperature maintained therein, and to compensate for this reduction of temperature in the cans, I propose to introduce hot-air blasts from the base of the racks 15, and within the area of the same, as at a point, 17, so that the wet cloth in its zigzag path across the racks and over the cans may be rapidly dried.

The second or right-hand dye-box 10 is furnished with a steam-chamber, 30, suitably supplied with steam. At the bottom of said chamber is arranged one of the lower jig-rolls, 1, so that the cloth in its course over the jigs will be carried in turn through the steam-chamber and thoroughly steamed. The ordinary smoothing-beams, 20, are placed to the left of the drawing, and before the first dye-box. They are flat pieces of wood placed about on a level and transverse to the path of the traveling cloth 21, and are suitably supported by frames. (Not shown.)

The last squeezer of each dye-box has one of its rollers, 12, arranged with a gear-wheel on the outside thereof and in mesh with gears 7, intermediate between said wheel and the initial drying-can 16 of rack 15, for the pur-



pose of communicating rotary motion between the squeezers and cans, as shown.

The counter-shafts furnishing the power for the operation of the apparatus may be attached to one of the sets of gears 7, and intermediate cog-wheels and rotary shafts may be placed suitably between the squeezers of each dye-box, so as to revolve the rollers thereof by the transmitted motion of said counter-shafts.

The drying-cans may be provided on the far ends with fixed band-pulleys, and belts may be suitably intertwined about said pulleys to revolve them by the motions of the counter-shafts.

The process of dyeing with my improved apparatus may be described as follows: The first or left-hand dye-box, 10, is properly supplied with a bottoming bath or decoction from the adjacent supply-tanks 14. Likewise the second or right-hand dye-box is supplied with a developing bath or decoction. The cloth 21 to be dyed is brought from a reel, (not shown,) and is twined about the smoothing-beams 20, as illustrated; then it is passed over the first upper jig-roll, and under the first lower jig-roll, and so on through the jig; then between the presser-rollers 9 of the first squeezer, through the second jig; then about the rollers of the second squeezer; thence around the drying-cans and across the rack, and thence through the second dye-box in the way described for the first; also, through the steam-chamber 30 and over the second rack; then it is wound onto a cloth-beam. (Not shown.) The devious course of the cloth through the apparatus is clearly illustrated by the lines in the drawing, and said cloth is passed there-through in the direction indicated by the arrows from left to right. By virtue of these arrangements it will be seen that the cloth is first saturated with the bottoming-bath in the first dye-box by means of a jig therein, submerging the cloth a number of times, then pressed by a squeezer, then thoroughly saturated again in the same box by means of another jig, then pressed by a more powerful squeezer, then is completely dried by its passage over the drying-cans, (and by the hot-air blast, if used,) and in this dried condition it is passed through the second dye-box containing the developing-bath and the steam-chamber, where it is completely permeated with the steam therein, in order to make the cloth take a better finish and in an obvious manner, from where it is taken over a second rack of drying-cans and thoroughly dried, and may then be rolled up in a finished dyed state.

Considering the use of my apparatus with cloths that are refractory, or are not disposed to take the dye evenly and uniformly, and which for this reason have a mottled or cloudy look when dyed by ordinary apparatus, it is evident that when in my apparatus the cloth is passed into the second dye-box for the developing-bath that the cloth is very thoroughly impregnated with coloring-matter and yields

readily to the developing-bath, whereby a uniform dyeing is accomplished.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In combination, a pair of dye-boxes and suitable supply-tanks therefor, a series of jigs within each of said boxes, a series of squeezers or sets of presser-rollers coacting one with each jig and arranged within the open area of said boxes, a group of suitably-mounted drying-cans intermediate between said dye-boxes, substantially as described.

2. In combination, a pair of dye-boxes having compartments therein, a supply-tank for each compartment, a jig and a squeezer or set of presser-rollers for each compartment, said jigs and squeezers alternating in order of arrangement, a pair of racks provided with drying-cans and alternating with said pair of dye-boxes in the order of a dye-box and a rack, and so on, substantially as and for the purpose described.

3. In combination, a series of dye-boxes having compartments therein formed by a shallow perforated partition, an elevated supply-tank communicating with each of said compartments, the tanks of each box having their discharge-pipes communicating, a jig arranged in each compartment and consisting of a number of parallel rotary upper and lower jig-rolls, a series of squeezers having two or more presser-rollers and arranged one after each jig, a series of racks provided with a number of sets of drying-cans suitably heated, said racks provided with hot-air blasts for supplying air-currents to the spaces between the said sets of drying-cans, said boxes and racks alternating in arrangement, beginning with a box, substantially as and for the purpose described.

4. In combination, the pair of dye-boxes 10, provided with jig-rolls 1, the squeezer for each jig, and consisting of a set of presser-rollers 9, mounted in frames 12, the rack 15, provided with drying-cans 16 and lying between said dye-boxes, substantially as described.

5. In combination, the pair of dye-boxes 10, provided with partitions 11, the jigs composed of the jig-rolls 1, the squeezers composed of the presser-rollers 9, mounted in frames 12, the pair of racks 15, provided with drying-cans 16 and alternating and co-operating with said dye-boxes, substantially as described.

6. In combination, the dye-boxes 10, provided with perforated partitions 11, the jigs composed of the jig-rolls 1, the squeezers composed of the presser-rollers 9, mounted in frames 12, the supply-tanks 14, provided with discharge-pipes 5, communicating with said dye-boxes, the pipe-section 4, and stop-cocks 3, the racks 15, provided with the drying-cans 16, the intermediate gears, 7, between said cans, and a presser-roller, 12, all substantially as and for the purpose described.

Witnesses: WILLIAM HARTLEY, JR.

M. F. BLIGH,

J. A. MILLER, Jr.