A. J. & J. A. RAU.

DYEING APPARATUS.

APPLICATION FILED MAR. 11, 1914.

1,131,084. Patented Mar. 9, 1915.

Fig. 1.

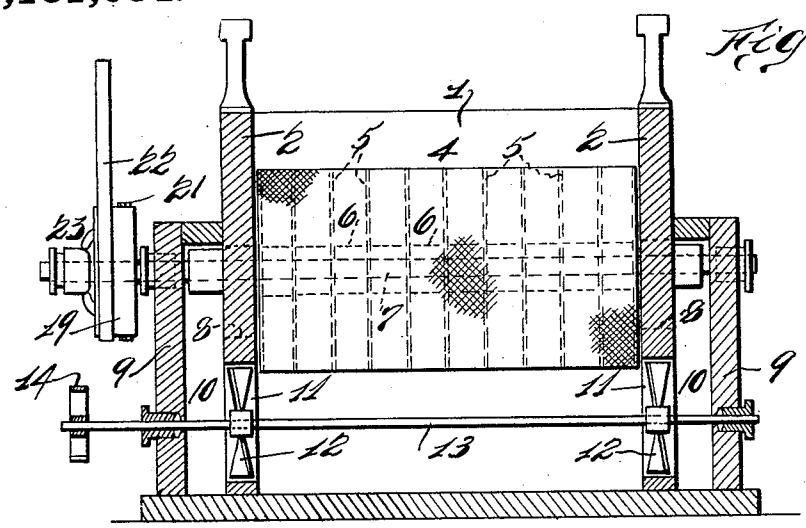


Fig. 2.

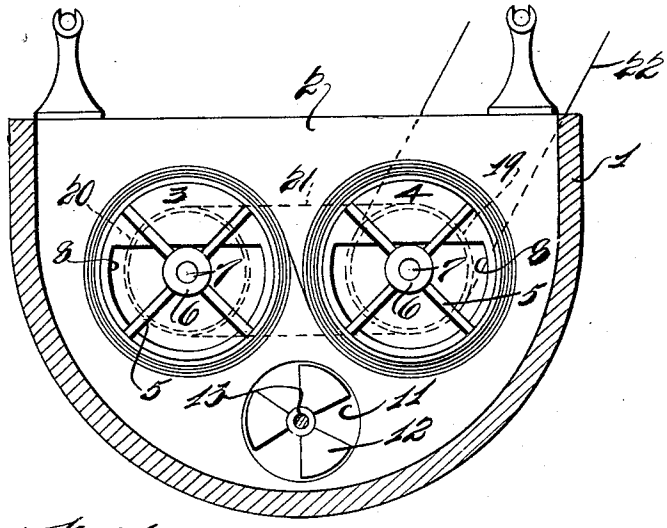


Fig. 4.

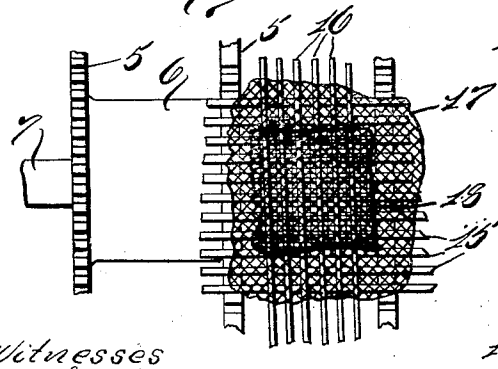
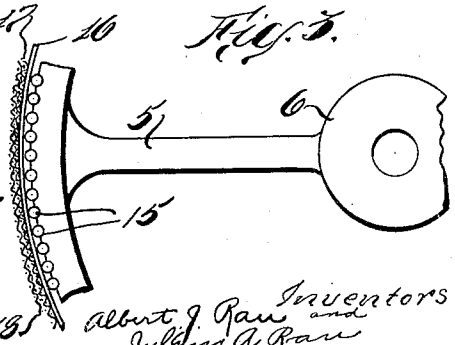


Fig. 3.



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UNITED STATES PATENT OFFICE.

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DYEING APPARATUS.

1,131,084. Specification of Letters Patent. Patented Mar. 9, 1915.

Application filed March 11, 1914. Serial No. 823,847.

To all whom it may concern:

Be it known that we, ALBERT J. RAU and JULIUS A. RAU, citizens of the United States, residing at Clifton, New Jersey, have invented certain new and useful Improvements in Dyeing Apparatus, of which the following is a clear, full, and exact description.

This invention relates to dyeing apparatus and particularly to such apparatus as are used for dyeing fabrics.

A principal object of the invention is to provide a simple apparatus which will insure a uniform dyeing effect throughout the entire length of the material dyed.

A further object of the invention is to effect the dyeing in such a way that the dye liquor of the bath comes directly in contact with the surface of the fabric, first on one side and then on the other, so that the dye liquor is forced through the fabric, first in one direction and then in the other.

Further objects of the invention will appear more fully hereinafter.

The drawing illustrates a suitable embodiment of the invention.

In the drawing, Figure 1 is a longitudinal vertical section; Fig. 2 is a transverse vertical section through the apparatus shown in Fig. 1; Fig. 3 is a detail of a portion of a drum constituting a feature of the apparatus; Fig. 4 is a detail showing a portion of the rim of the drum; Figs. 3 and 4 are upon an enlarged scale.

The apparatus preferably comprises a vat 1 having end walls or heads 2 between which we prefer to mount two rotatable drums 3 and 4. These drums are preferably constructed on a plurality of spiders 5 having hubs 6 by means of which they are attached rigidly to the shafts 7. The ends of the drums are open and the length of the drums is such that each drum substantially bridges the distance between the heads 2; in this way the extremities of the drum substantially close off communication between the space around the drums and the interior of the drums adjacent the heads. The heads 2 are preferably provided with openings 8 of segmental form, and the vat is formed with false heads 9 which are inclosed so that conduits 10 are formed at each end of the vat communicating with the interior of the drums through the openings 8. In the lower part of the heads 2, openings 11 are formed in which are mounted impellers 12 attached to a common shaft 13 which is arranged to be rotated from the exterior by any suitable means such as belt pulley 14.

The outer surface of each drum is preferably built up by attaching longitudinal bars or rods 15 on the rims of the spiders in some such manner as indicated in Figs. 3 and 4. On these rods 15 we wrap helically about the drum a continuous fine wire 16 and then on this wire we lay an envelop or inner covering 17 of coarse mesh wire gauze. Over this we place an outer cover 18 of fine mesh gauze wire. The shafts 7 are preferably provided with belt pulleys 19 and 20 respectively which are connected by a horizontal belt 21 so that when pulley 20 is rotated by a driving belt 22, pulley 19 will also be rotated. Adjacent each pulley a clutch 23 is provided corresponding to each drum. When one of the clutches 23 is thrown in, its corresponding pulley will be rotated so as to rotate its corresponding drum.

By the use of the improved apparatus, the fabric to be dyed is wrapped in a coil 24 upon one of the drums. This may be accomplished while unwrapping it from a roller 25 supported on bearings 26 on the vat. As illustrated, this coil is formed on the right hand drum in Fig. 2. The clutch of the right hand drum is then thrown open and the corresponding clutch of the left hand drum is closed. The end of the web is then attached in any suitable manner such as by pinning it to the surface of the left hand drum and the belt 22 is then driven so as to rotate the left hand drum in the direction of the arrow. This winds the web from the right hand drum to the left hand drum so that the layers of the web on the right hand drum pass over and form a coil of layers on the left hand drum. While this is taking place, the shaft 13 is rotated so that the impellers 12 which are of opposite pitch draw the dye liquor from the ducts 10 into the space 27 under and surrounding the drum. This produces a circulation in the direction indicated by the arrows, and produces an excess of hydrostatic pressure on the outer sides of the drums which forces the dye liquor through the layers of the fabric into the interior of the drums. After the web has completely passed from one drum to the other, it is passed back again in the same manner, the direction of rotation of the shaft 13 being the same as be-

fore so that the direction of the circulation of the dye liquor is the same as before. In this way it will be seen that the entire length of the web on one side is subjected to direct contact with the bath under hydrostatic pressure, forcing the dye liquor through the fabric from that side. On account of the fact that the web is wrapped in opposite directions on the two drums, it will be seen that the entire length of both sides of the cloth will be brought directly in contact with the bath and subjected to hydrostatic pressure, forcing the dye through the fabric. In this way a very efficient and uniform dyeing effect results.

During the dyeing process the drums and the web of fabric are completely immersed in the bath of dye liquor, the level of which is indicated at line 28. The hydrostatic pressure forces the dye liquor through the entire mass of the web on each drum, passing through the layers in succession. Of course the layers of the fabric on one drum are arranged in reverse order with respect to the layers of fabric on the other drum. While we prefer an apparatus which acts by forcing the dye liquor through a plurality of layers of the fabric, it is evident that in practising the invention a single web of material could be guided around the drums so that the sides of the material would be exposed on the outside of the drums in succession, in which case the dye liquor would be forced through a single layer of the material in one direction first, and then in the other direction.

It is understood that the embodiment of our invention described above is only one of the many embodiments or forms the invention may take, and we do not wish to be limited in the practice of the invention nor in the claims to the particular embodiment described.

What we claim as new is:—

1. In dyeing apparatus or the like, the combination of means for forming a plurality of layers of fabric in a position adjacent to each other, means for forming a plurality of layers of the same fabric in a reverse order, and means for forcing a liquid through the said layers in succession.

2. In dyeing apparatus or the like, the combination of means for forming a plurality of layers of fabric in a position adjacent to each other, means for forming a plurality of layers of the same fabric in a reverse order, and means for forcing a liquid through the said layers in succession, both of said means for forming a plurality of layers being movable so that the fabric may be passed from one of said means to the other.

3. In dyeing apparatus or the like, the combination of means for forming an open coil of layers of fabric, means for forming a second coil of the same fabric of layers, and for coiling the same in a reverse direction with respect to the direction produced by the first said means, and means for forcing a liquid through the said layers in succession.

4. In dyeing apparatus or the like, the combination of a bath for containing a liquid, two separate means for forming a plurality of layers of the same fabric in a reverse order with respect to each means, and means for forcing a liquid through the said layers in succession, both of said first means being adapted to immerse the layers of fabric in the liquid in said bath, and means for causing a circulation of the liquid in the bath.

5. In dyeing apparatus or the like, the combination of a bath for containing a liquid, two rotatable drums immersed in said bath and adapted to wind a fabric on them in a reverse direction on each with the opposite surfaces of said fabric presented toward said drums in succession, and means for causing a circulation of the liquid.

Signed at New York, N. Y., this 4th day of March, 1914.

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Signed at Passaic, New Jersey, this 5th day of March, 1914.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."