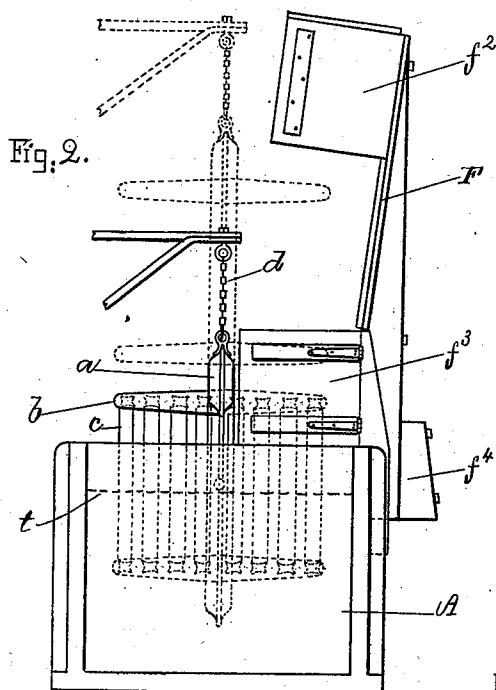
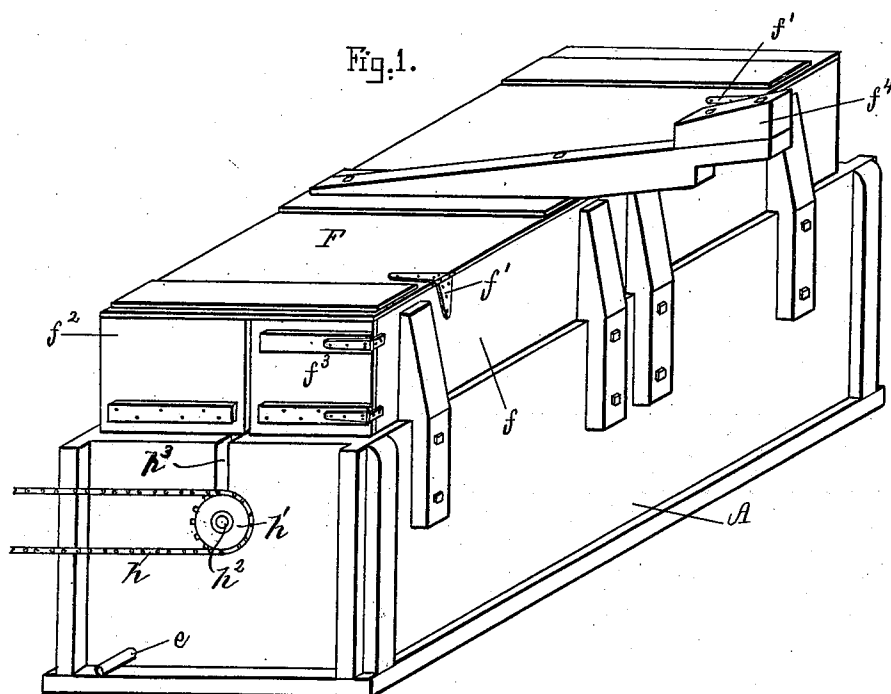


(No Model.)

S. C. AYERS.
APPARATUS FOR DYEING.

No. 504,291.

Patented Aug. 29, 1893.



Witnesses.

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UNITED STATES PATENT OFFICE.

SAMUEL C. AYERS, OF CLINTON, MASSACHUSETTS, ASSIGNOR TO THE
BIGELOW CARPET COMPANY, OF SAME PLACE.

APPARATUS FOR DYEING.

SPECIFICATION forming part of Letters Patent No. 504,291, dated August 29, 1893.

Application filed February 15, 1892. Serial No. 421,558. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL C. AYERS, of Clinton, county of Worcester, State of Massachusetts, have invented an Improvement in Dyeing Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object to produce a dyeing apparatus by which the process of dyeing may be rendered less expensive than heretofore, and at the same time a greater uniformity of color secured in the dyed goods produced, the invention being particularly adapted for use in connection with apparatus employed for dyeing yarns and in carpet weaving.

Prior to this invention it has been customary to place these yarns upon a suitable reel which is revolved in a vat containing the dye-liquor, the level of the dye-liquor for the best results being such that a portion only of the reel will be immersed, so that as the reel revolves, the yarns or material carried by it will be alternately dipped into the dye-liquor and then withdrawn therefrom and exposed to the air, this alternate dipping and exposure being desired for the production of a good color. When, however, it becomes necessary to stop the rotation of the reel for an examination of the yarns or material being dyed, or for any other purpose, a portion of the yarns or material will remain immersed in the dye-liquor, while the remaining portion carried by that part of the reel which is above its axis of rotation and the level of the dye-liquor, will be exposed to the air, that portion of the yarns or material which remains immersed in the liquor being thus subject to the action thereof for a longer period than that portion which is removed from the liquor, so that it will partake of a deeper or stronger color than the portion which is above the liquor. To obviate this, it has been customary to provide suitable means for lifting the reel bodily out of the dye liquor in the vat whenever it is necessary to stop the rotation of the reel for examination of the yarns or other material, thus removing all the yarns or material from the dye-liquor at once, in or-

der that they may partake of a uniform color; but this necessitates leaving the vat entirely open at the top in order that the reel may be removed.

In the process of dyeing, it is necessary to raise the temperature of the dye-liquor to about the boiling point, which is usually done by admitting steam to the vat at one or both ends, but the vat being open at the top permits free radiation of the heat and the escape of the hot vapors so that that portion of the liquor which is in the vicinity of the steam supply is constantly at a higher temperature than the portion or portions of the liquor remote from the steam supply, this difference in temperature resulting in a variation of color in the dyed yarns or material. The radiation of heat and escape of vapors also render the cost of maintaining the liquor at the required temperature exceedingly great, so great, in fact, that it has seriously retarded the general introduction of this process of dyeing.

In accordance with this invention, I provide the vat which is to contain the dye-liquor, with a cover which may be provided with suitable openings protected by doors, it completely inclosing the reel carrying the yarns to be dyed and thus confining within the vat all vapors rising from the heated dye-liquor, causing the said vapors to be distributed uniformly over the dye-liquor to thus aid in maintaining the latter at a substantially uniform temperature throughout, and effecting a material saving in the material employed to raise the temperature of the liquor. This cover may be then thrown back whenever it is necessary to raise the reel out of the dye-liquor for any purpose.

One part of this invention in dyeing apparatus therefore consists of a vat to contain the dye-liquor, a steam supply for said vat, a removable reel to sustain the article to be dyed, open bearings for the reel, and means for rotating it from the exterior of the vat, combined with a cover for the vat adapted to be thrown back when necessary to remove the article to be dyed, and independent doors at and forming a part of the ends of said cover, the doors being adapted to be opened when

the cover is down, whereby the contents may be inspected without raising the cover, substantially as will be described.

Other features of the invention will be hereinafter described and pointed out in the claim.

Figure 1 of the drawings, is an isometric view of a vat embodying this invention, the cover being shown as down and inclosing the reel within the vat; and Fig. 2, an end elevation of the vat shown in Fig. 1, with the cover thrown back on its hinges and a tackle attached to the reel preparatory to removing the latter from the dye-liquor.

Referring to the drawings, A represents any suitable or usual vat or tub to contain the dye-liquor, said tub being preferably rectangular in shape, as shown. The vat at its opposite ends is provided with suitable vertical guide-ways for the frame or yoke *a* in which is pivoted the rotatable reel *b* on which may be suspended the yarns *c* or other articles or material which are to be dyed. As will be seen by reference to full lines Fig. 2 of the drawings, the position of the reel is such that about one-half of it more or less together with the yarns carried by that half, are at all times above and out of the dye-liquor, the level of which is indicated by letter *l*, the remaining half or portion being immersed in the dye-liquor, and as the reel is rotated in suitable manner as by a belt or chain *h* passed about a wheel *h'* on the end of the journal *h*² of the reel which is extended through a slot *h*³ in the end of the vat, the yarn or material carried by the reel will be alternately dipped into the dyed liquor and then lifted therefrom at each revolution of the reel.

Whenever it is necessary to stop the rotation of the reel for examination of the yarns or for any other purpose, usual or suitable hoisting mechanism as *d* may be employed to lift the yoke or frame *a* out of the vat, to thereby bodily remove the reel with its yarns from the dye-liquor.

A suitable steam inlet *e* is provided, as herein shown at one end of the vat A, other steam supplies being provided if necessary through which steam or other heating medium is admitted to the dye-liquor contained in the vat to raise the temperature of the same preferably to at or near the boiling point, such temperature being desirable for the best results.

In accordance with this invention, the vat A is provided with a cover F which when turned down, as in Fig. 1, will completely cover the top of the vat and inclose the reel carrying the yarns, but which when thrown back as in Fig. 2, will permit said reel to be lifted clear of the dye-liquor, as shown by dotted lines. This cover is not necessarily of the particular construction shown but the form of cover shown has proved to be productive of excellent results, one side of the vat being provided with an upright extension board *f*, to the upper edge of which the

cover is secured by hinges *f'*, the cover being provided along its front edge and for a portion of its ends with a downwardly extending flange or rim *f*² the ends of the extension board *f* being also preferably provided with hinged doors *f*³, which co-operate with the flange *f*² to completely close the vat and to inclose within it the reel *b* carrying the yarns to be dyed. The cover F will preferably be provided with a counter-weight *f*⁴ which will make it easy to turn the cover back, when necessary, and which may also serve, as shown in the drawings, as a back stop to prevent the cover being thrown back too far. When the cover is down as in Fig. 1, steam admitted to the vat through the pipe *e* will circulate through the liquor and raise the temperature of the same, any vapors rising from the surface of the liquor being confined within the vat by the cover, so that a uniform temperature and pressure is maintained throughout the entire vat, insuring a uniform temperature of the dye-liquor and a uniform color in the goods dyed, the confined steam or vapor acting to assist in maintaining the dye-liquor at the required temperature.

Not only is the quality of the goods produced superior to any heretofore produced by the open vat, but the cost of running the apparatus is very materially lessened, for the wasteful escape of vapors from the dye-liquor and the radiation of heat also, is prevented by the cover, such surplus heat and vapors being utilized to maintain the temperature of the liquor, this utilization of the vapors and saving of the heat effecting a material saving in the cost of dyeing, and making it possible for many establishments to employ this class of apparatus where they have heretofore been unable to do so owing to the excessive cost.

The doors *f*³ may be opened when necessary to inspect the conditions of the yarns or material upon the reel, or whenever it is necessary to have access to the interior of the vat, without throwing back the cover F.

I claim—

In a dyeing apparatus, a vat to contain the dye-liquor, a steam supply therefor, a removable reel to sustain the articles to be dyed, open bearings for said reel, and means for rotating the reel from the exterior of the vat, combined with a cover for the vat hinged thereto and adapted to be turned back on its hinges for the removal of the reel, and independent doors at and forming a part of the ends of said cover, said doors being adapted to be opened when the cover is down whereby the contents may be inspected without raising the cover, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL C. AYERS.

Witnesses:

S. R. MERRICK,
E. W. BURDETT.