(No Model.)

C. L. AUGER.

DYE TUB.

No. 472,327. Patented Apr. 5, 1892.

Fig 1:

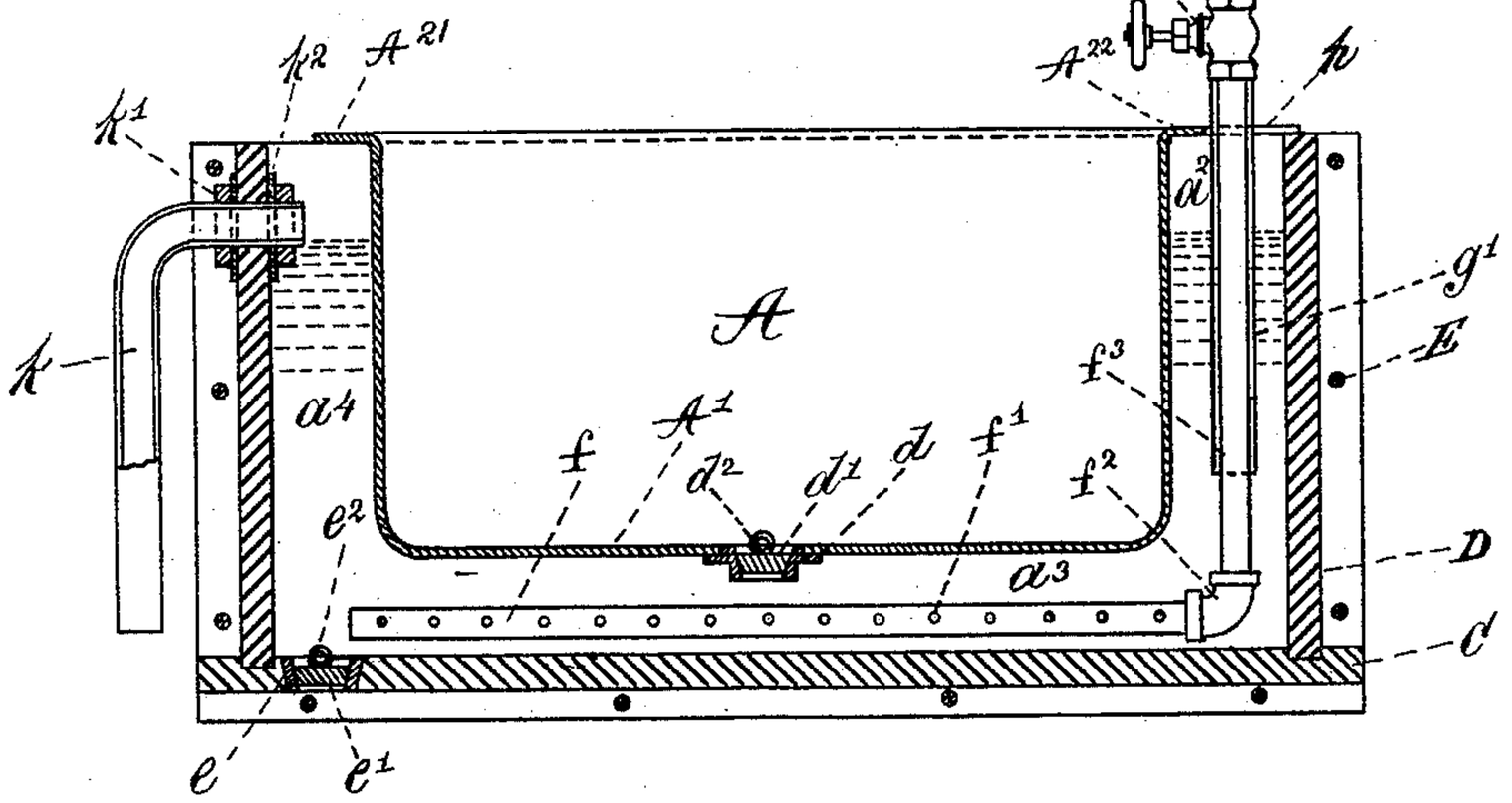


Fig 2:

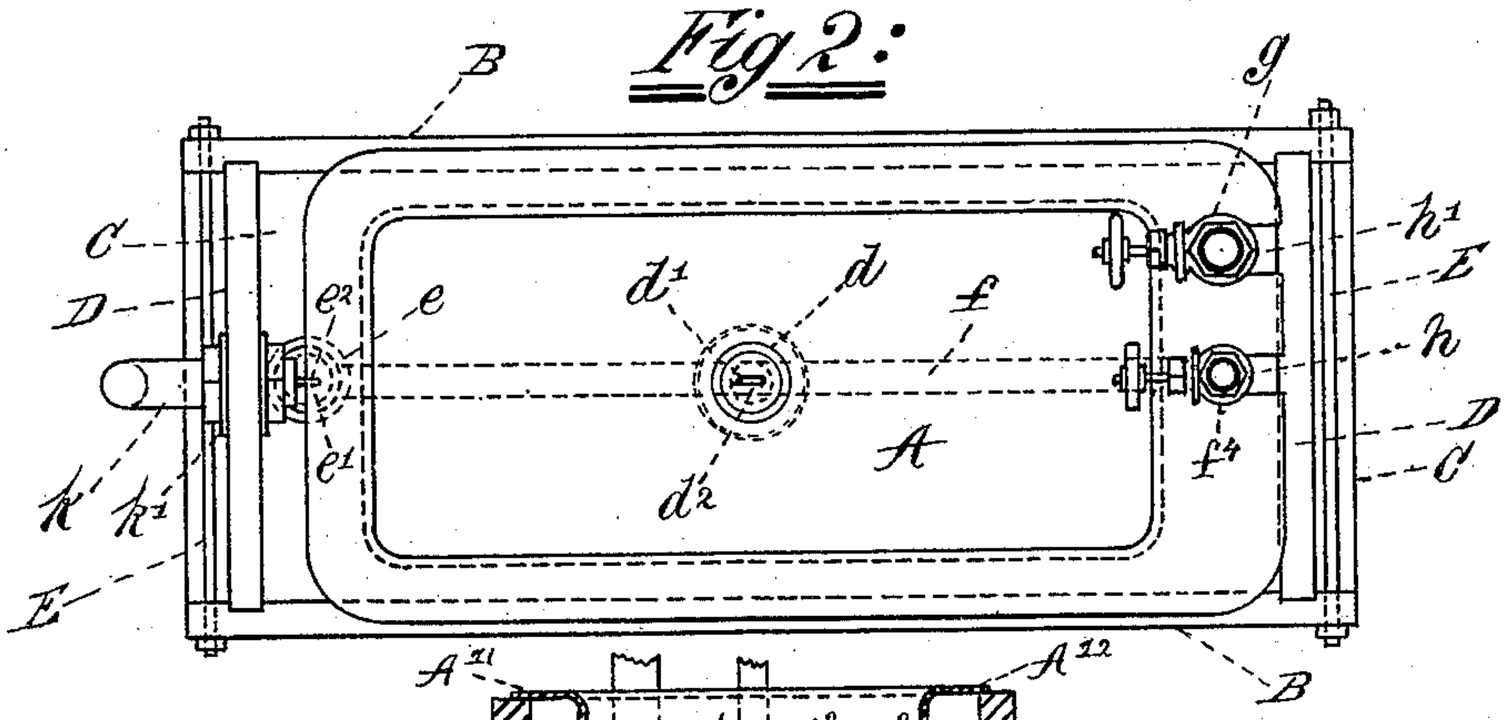
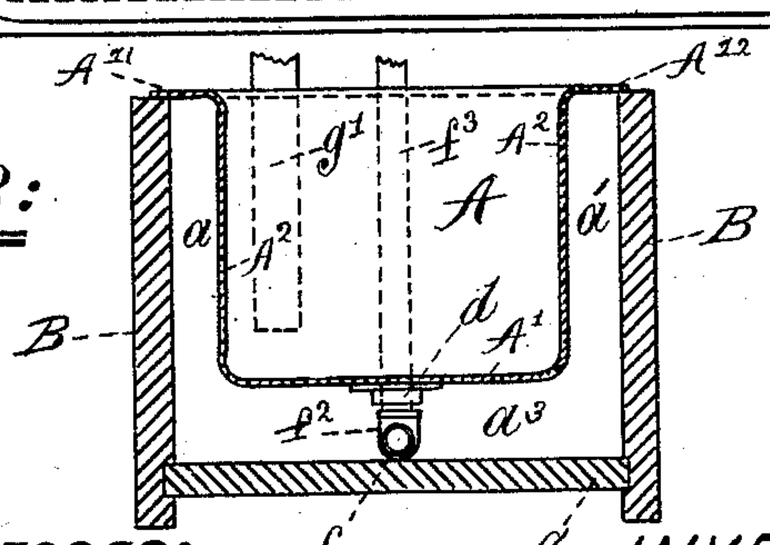


Fig 3:



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DYE-TUB.

SPECIFICATION forming part of Letters Patent No. 472,327, dated April 5, 1892.

Application filed October 31, 1891. Serial No. 410,446. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. AUGER, of the city of Paterson, in the county of Passaic and State of New Jersey, have invented a new and useful Improvement in Dye-Tubs Used in Dyeing Textile Fabrics, whereby a great and important result is obtained in the rapidity with which the process of dyeing fabrics, yarns, &c., is conducted and the more equal shade of color obtained, also in the more economical use of the dye-stuffs and chemicals used; and I attain these results by the mechanism illustrated in the accompanying drawings, of which the following is a specification.

Figure 1 represents a longitudinal section of a dye-tub of my improved construction. Fig. 2 is a plan view of the same. Fig. 3 is a transverse or cross section of the same.

The object of my invention is to increase the output or amount of the material dyed, improve the quality and richness of color, reduce the cost, and effect a saving in the dyes and chemicals used. This will be understood when I state that at present the material to be operated upon is immersed in a bath of dye-liquor and steam admitted by a perforated pipe beneath the material and direct into the liquor, thereby causing a greater heat in the dye adjacent to the pipe, also in the fabric itself, and as the process of heating or boiling advances the condensed steam mingling with the liquor reduces its strength and at the same time adds the impurities carried by the steam, to the great injury of the goods operated upon with respect to shade of color, richness of tints, and the equality of distribution. Again, the process of dyeing having been completed, the tub, with material and its liquor, has to stand to cool, losing time and delaying the use of the dye-liquor for another charge; also, there is a great delay in the removal of the dyed material owing to heat, &c. With my improvement in dye-tubs these disadvantages are obviated. The liquor is placed in the tub of any desired strength, which is maintained throughout the process without agitation or disturbance, thereby gaining a perfect degree of color, shade, or tint, and when completed the dye-liquor and material is gradually cooled off by surface-refrigeration, during which operation the material can be removed, and when all is taken out the tub will be ready for another charge. The liquor or dye, being separated from the steam for heating and water for cooling, consequently remains at the same density or strength at the end of an operation as at the commencement, the only loss being that absorbed by the material operated upon, and whatever loss occurs in bulk is renewed by fresh liquor of the same strength or quality. It will thus be seen that a positive command of the temperature of the tub is gained, as the heat can be varied with the utmost precision and rapidly cooled when desirable without any risk of damage or deterioration to the fabric, yarns, &c., that may be in the tub during the process of dyeing, also without agitating or disturbing the liquor.

I will now describe my newly-invented tub and its construction more fully.

A represents a tub for dyeing purposes, made, preferably, of copper, having projecting flanges A^{21} A^{22} on its upper edges, and surrounding the hollow disk of the pan or tub, which rests loosely upon the upper edges of an outside tub or tank formed to receive it, and which is somewhat larger to allow a space for water to surround the inner tub, as in Fig. 1. The outside tub or tank may be constructed of metal, or formed of the sides B B, ends D D, and bottom C, held together by the bolts E, the material used being wood. At the bottom of the outside tub and near one end, located in the bottom C is a conical valve-seat *e*, formed of brass, and suitably secured, in which is held the conical-seated valve *e'*, having a ring or suitable device for its withdrawal when necessary. At the same end as the outlet-valve *e* and located in the end D near its upper edge is an outlet-tube or overflow-pipe *k*, which is secured to the end D by nuts *k'* and the lead washers k^2. The bent overflow-tube *k* is of a length to reach near to the floor upon which the tub stands, but not to touch, to allow free vent for overflow waste water, Fig. 1. A steam-pipe *f*, having a number of holes *f'* in its sides at frequent intervals, is secured in a suitable manner to the bottom C and occupies a part of the space A^3 between the under side A' of the inner tub A and the bottom C of the outer one. The perforated tube *f* is connected by

the elbow f^2 to the vertical steam-pipe f^3, with its valve f^4, which is connected some distance above the top of the tub to a pipe leading from a suitable and convenient steam-main, Figs. 1 and 2. At the end of the tub in the space A^2, formed between the inner and outer tubs, is a water-supply pipe g', which is of sufficient length to reach within a few inches of the bottom C of the outer tub, and is also provided with a regulating-valve g, Figs. 1, 2, and 3. In the bottom A′ of the inner copper tub A and centrally located is a brass conical valve-seat d, properly secured by flanges to the bottom A′, in which is held a conical valve d', having a suitable ring d^2 or other device for removing it when it is necessary. The flanges A^{21} A^{22}, surrounding the inner tub for the purpose of holding it into position, are cut away at h h' to allow the inner tub to be placed in position without disturbing the steam-pipe f^3 or the water-pipe g', which are permanent fixtures to the outer tub on its inside end D and bottom C, Figs. 1 and 2. The inner corners of the bottom and the upper edges of the inner copper tub A are formed rounded, so as to avoid rough contact with the material to be operated upon and to facilitate the removal of any matter that might collect in a square or angular corner, Fig. 1. The outer tub or tank may be lined with lead or zinc, if made of wood, for the purpose of preservation, and the spaces a a' a^2 a^3 a^4 may be made of varying measurements to accommodate a larger or less amount of water surrounding the inner copper dye-tub, as may be desirable in practice.

I will now describe the operation and use of my improved dye-tub. The inner copper tub A being inserted within the outer wooden tub and the outer plugs or conical valves d' e' being secured in their seats d and e, the inner tub is filled with liquor or dye-stuff of the requisite strength and color to a sufficient height. Water is then admitted by the valve g through the pipe g' until the spaces a, a', a^2, a^3, and a^4 are filled up to the level of the overflow-pipe K, Fig. 1. When the water escapes by the pipe K, the valve g is closed and the steam-valve f^4 is opened to admit steam through the pipe f^3, elbow f^2, and perforated pipe f by means of the holes f' to the water. The water becomes heated by the admission of steam to any degree of temperature necessary, and transmits its heat to the bottom, sides, and ends of the copper inside tub at their outer surfaces, and consequently imparts the same degree of heat to the liquor or dye-stuff contained in the inner tub A. When the dye is thoroughly incorporated and the density of color, &c., is perfect, the material is treated in the usual manner practiced by the dyer. The degree of heat necessary is regulated by the proper manipulation of the steam-valve f^4 and the cold-water valve g. The water admitted for lowering the temperature and the expansion due to the heat and condensation of the steam flows away by means of the overflow-pipe K. When the fabric, yarn, or material is sufficiently treated, the steam being shut off, the water-vave g is fully opened, and the heated water contained in the spaces a a' a^2 a^3 a^4 between the inner and outer tubs is forced out through the overflow-pipe K, which is of sufficient area to remove it freely, the hotter water rising by gravity first is thrown out, and the temperature is gradually lowered. In certain cases the cooling process having to be more rapid the plug e' in the outlet e in the bottom C′ of the outer tank is withdrawn and the hot water allowed to escape. The plug e' is then replaced and the spaces a a' a^2 a^3 a^4 charged with cold water, which operation, being renewed frequently, rapidly cools the liquor and the material in the inner tub A. The dyed material is then removed for further treatment and the tub is ready for another charge of material to be dyed. When the liquor has spent its strength, it is added to by fresh dye, also to replace that absorbed by weighting or loading the materials operated upon. This is done without the admixture of any foreign substance, as would be the case were steam used directly to boil the liquor. When it becomes necessary to alter the color or dye used and replace it by another and different one, the liquor is removed from the tub A by dipping it out or by siphon; but if the dye that remains be of slight value the plug d' may be withdrawn by its ring d^2 from its seat d in the bottom A′ of the inner tub A and the liquor allowed to run from the tub A into the space A^3 formed in the bottom between the inner and outer tubs, and from thence, by removal of the plug or valve e', through the valve e, to flow to a convenient drain and escape.

With this description of my invention, what I claim is—

1. In a dye-tub, an inner copper tank provided with projecting flanges on its upper edges, a conical valve suitably secured in a brass conical valve-seat centrally located and properly secured in the bottom of the inner copper tank, in combination with an outer tub or tank of any suitable material, which is larger than the inner tank, the inner tank resting inside of the outer tank and being supported by means of the projecting flanges on its upper edges, which rest loosely upon the upper edges of the outside tank, so that the inner tank may be removed or replaced at pleasure, the outer tub being provided in the bottom, at one end thereof, with a conical valve-seat and valve, the latter having a ring or other suitable device for its withdrawal and being provided, also, with an outlet-tube or overflow-pipe located in the end near its upper edge, both of said tubs in combination with the perforated steam-pipe f, elbow f^2, and vertical steam-pipe f^3, valve f^4, and water-supply pipe g', with its regulating-valve g, all located and constructed substantially as shown and described, and for the purposes specified.

2. The combination of the outer tub, inner tub A, outlet-pipe *k*, perforated steam-pipe *f*, elbow f^2, vertical steam-pipe f^3, and its valve f^4, the water-supply pipe *g'*, with its valve *g*, the inner tub provided with a conical valve-seat *d* and conical valve *d'*, centrally located in the bottom thereof and provided with a suitable ring d^2 or other device for removing it when necessary, the bottom and corners of the inner tub as well as the upper edges being rounded and the outer tub being provided in the bottom, at one end thereof, with a conical valve-seat *e* and valve *e'*, having a ring or suitable device for its withdrawal when necessary, all constructed and operating substantially as and for the purposes described.

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