

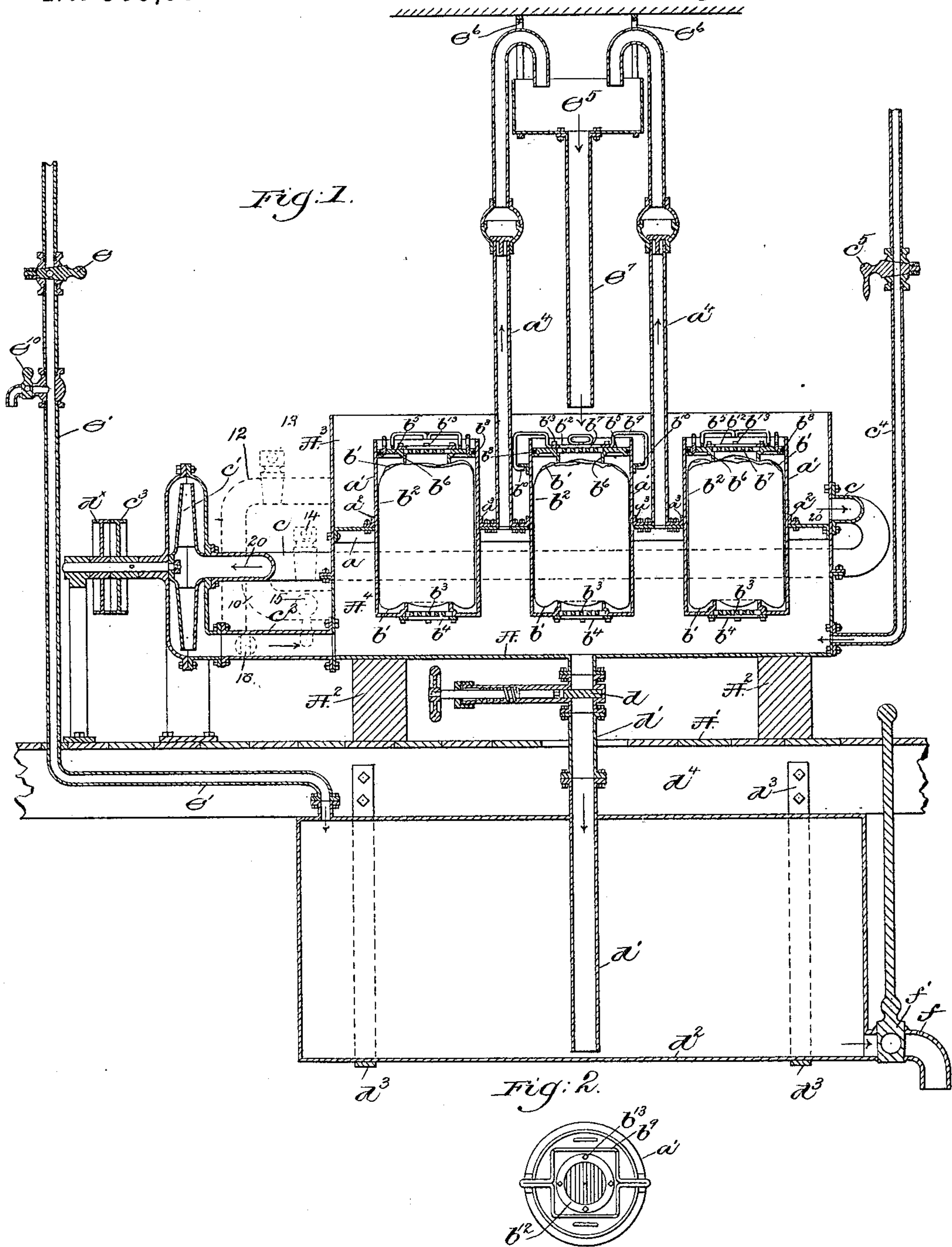
(No Model.)

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APPARATUS FOR DYEING.

No. 369,996.

Patented Sept. 13, 1887.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR DYEING.

SPECIFICATION forming part of Letters Patent No. 369,996, dated September 13, 1887.

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To all whom it may concern:

Be it known that we, THOMAS SAMPSON, of Boston, county of Suffolk, and State of Massachusetts, and FRANCIS H. JEALOUS, of Lawrence, county of Essex, and State of Massachusetts, have invented an Improvement in the Method of and Apparatus for Dyeing, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

Our invention relates to a novel method of and apparatus for dyeing yarn and other fibrous material.

Prior to our invention yarn and other fibrous material to be dyed has been placed in a case or receptacle wherein it is subjected to the action of the dyeing solution, and thereafter the said case or receptacle has been placed in a centrifugal machine or subjected to centrifugal action to expel the water from the yarn. The case or receptacle referred to, with its contents of wet yarn, especially when large quantities of yarn are being dyed, is very heavy and inconvenient to handle. To obviate lifting such heavy case or receptacle, we employ a bag composed of textile material, in which is placed the yarn to be dyed. The employment of a bag to hold the yarn or other fibrous material enables me to use a stationary vessel, which latter is ready to receive a second bag of yarn immediately after the removal therefrom of a bag containing yarn which has been subjected to the action of the dye-liquid.

In accordance with our invention the yarn is placed in a bag and the bag is placed in a vessel or receptacle located in a vat, the said vessel or receptacle being preferably sustained above the bottom of the vat by a partition-plate which divides the said vat into an upper and lower chamber. The coloring-liquid is preferably first received in the upper chamber, and is withdrawn therefrom through pipes by a suitable rotary pump into the lower chamber, from whence it is forced by steam or other pressure up through an opening in the bottom of the vessel or receptacle containing the yarn, the said liquid passing through the material to be dyed and through an opening in the top of the said vessel or receptacle into

the upper chamber of the vat, from which it is again withdrawn by the pump and discharged into the lower chamber of the vat, to be again forced up through the material contained in the vessel or receptacle, as before. The lower chamber of the vat is connected by a pipe to a tank or reservoir, into which the contents of the said chamber may be discharged when the yarn has received the desired color. The coloring-liquid discharged into the tank from the lower chamber referred to may be forced back into the said chamber through the pipe connecting the tank with the said chamber, to be again used in dyeing a new lot of yarn or other material, by steam or other pressure admitted to the said tank. The lower chamber referred to is connected by two stand-pipes with a reservoir, into which coloring-liquid is forced when the pressure within the lower chamber reaches its maximum or safety point, the liquid forced into the said reservoir being discharged therefrom into the upper chamber, the stand-pipes acting as a safety-valve to prevent the pressure within the lower chamber exceeding that which the apparatus can stand with safety.

The particular features of our invention will be pointed out in the claims at the end of this specification.

Figure 1 is a partial section and elevation of our improved apparatus, and Fig. 2 a top view of one of the vessels or receptacles to hold the bag of yarn or other material.

The vat A, of iron or other suitable material, supported above the floor A' by blocks A², is for the best result divided into an upper chamber, A³, and a lower chamber, A⁴, by a flanged plate, a⁵, secured to the sides of the vat. The plate a is provided, as herein shown, with three openings, through which three vessels or receptacles, a', are extended, the said vessels or receptacles being sustained, as shown, by flanges a² a³, riveted to the plate a, the flanges a³ being shown as forming part of stand-pipes a⁴, communicating with the chamber A⁴. The bottom of the vessel or receptacle a' is provided with a central opening around which is a flange, b, projecting into said vessel or receptacle, and upon which rests the bag b' of textile material, which latter con-

tains the yarn or other material, b^2 , to be dyed, the central opening in the bottom of the said vessel or receptacle being partially closed by a grating, b^3 , which, as shown, is held in place by a collar, b^4 , secured to the bottom of the vessel a' .

The bag of yarn or other material is kept within the vessel a' by a cover, b^5 , provided with a flange, b^6 , which presses upon the top of the bag. The cover b^5 has a central opening similar to the bottom, which is partially closed by a grating, b^7 , secured to the cover by a collar, b^{12} , fastened thereto, as shown, by bolts b^{13} , the said cover being made to fit the vessel a' , as shown, by a ring of packing, b^8 , the said cover being secured in the vessel by a fastening device, b^9 , (shown in Fig. 1,) on the middle vessel as extended over the sides of the said vessel and clamped or sprung beneath flanges b^{10} .

The bag of yarn or other fibrous material having been secured in the vessels a' , as described, the coloring liquid or solution is poured or otherwise discharged preferably into the chamber A^3 , from whence it is drawn through the pipe c , as indicated by arrow 20, by a rotary pump, c' , of any suitable construction, the coloring-liquid being forced by the said pump through the pipe c^2 into the chamber A^4 , the pump c' being rotated by a fast pulley, c^3 , driven by a belt. (Not shown.)

The coloring-liquid in the chamber A^4 is forced by steam or other pressure introduced into said chamber by pipe c^4 , provided with cock c^5 , through the gratings b^3 into the vessels a' through the yarn or other fiber contained in the bag b' , and from the vessels a' through the gratings b^7 into the chamber A^3 , from whence it is again drawn by the pump, and again passed through the yarn or other fibrous material. A continuous circulation of coloring-liquid is thus maintained through the yarn until the said yarn has attained the desired color or tint.

It is desirable to examine the yarn from time to time, so that the desired shade or tint may be obtained, and to do this the cock c^5 is closed to withdraw the pressure from the chamber A^4 , the coloring-liquid discharged from the vessels by opening the valve d in the pipe d' , extended to near the bottom of the tank d^2 , and the cover of a vessel is then removed and a sample taken from the bag. When the desired shade has been imparted to the yarn, the cock c^5 is closed, the belt shipped to the loose pulley d^x , and the valve or cock d in the pipe d' opened to permit the coloring-liquid to run into a reservoir, d^2 , located, as shown, below the floor A' , and suspended by bands d^3 , attached to the girder or beam d^4 . After the vat A has been emptied, the bags of yarn are removed, and may be placed in a centrifugal machine to be dried. A fresh bag of undyed yarn may be placed in the vessels a' , and a cock, e , in a pipe, e' , is then opened to admit steam or other pressure into the reservoir d^2 , to force the coloring-liquid which

has been used once back again through the pipe d' into the chamber A^4 , and up through the vessels a' into the chamber A^3 , from whence it is drawn by the pump, as above described. This is especially advantageous when dyeing with bichromate of potassium or other dyes, which are not exhausted by one batch or quantity of yarn.

The stand-pipes a^4 prevent the pressure in the chamber A^4 from exceeding what the vat will stand, excessive pressure forcing the coloring-liquid from said chamber through said pipes into a vat, e^5 , suspended, as shown, by bands e^6 from the ceiling of the room, the liquid discharged into the reservoir e^5 flowing back into the chamber A^3 through the pipe e^7 .

The flanges b^2 , projecting into the vessel or receptacle a' , press upon the yarn near the center of the bag, spreading or pressing the said yarn out laterally, so that the obstruction offered by the yarn to the passage of the liquid through the vessel will be substantially uniform, thus causing substantially the same amount of liquid to pass up through the center portion of yarn as passes up through the portions near the sides of the vessels, consequently dyeing the yarn uniformly throughout the mass.

When the coloring-liquid has been exhausted, it may be discharged from the tank d^2 through the pipe f , provided with the cock f' , having its stem extended above the floor A' , as shown. When the coloring-liquid from the chamber A^4 is discharged into the tank d^2 , the air contained in the said tank finds an outlet through the pipe e' and faucet e^{10} .

As thus far described, the coloring-liquid passes from the upper chamber through the pump into the lower chamber, from whence it is forced up through the material in the vessels or receptacles.

We do not desire to limit ourselves to this precise method of circulating the coloring-liquid, as the said liquid may be made to circulate from the lower chamber through the pump and into the upper chamber, from whence it descends through the openings in the top of the vessels or receptacles into the lower chamber, from whence it is again drawn through the pump and discharged into the upper chamber, as above stated. When this latter method is employed, the pipe c , connecting the upper chamber with the pump may be closed by a cock or valve, 14, and the lower chamber may be connected with the pump by the pipe 10, (see dotted lines, Fig. 1,) which is provided with the valve 15, and also by the pipe c^2 , also provided with a cock, 16, the latter pipe communicating with the upper chamber through a pipe, 12, provided with the cock or valve 13. When it is desired to cause the coloring-liquid to pass down through the vessels or receptacles, the cock 14 in the pipe c and the cock 16 in the pipe c^2 are closed, the cock 15 in the pipe 10 and the cock 13 in the pipe 12 being opened. It will thus be seen that the liquid flows through the pipe 10, through the pump,

and thence through the pipe 12 into the upper chamber, from whence it passes down through the material in the vessels *a'* into the lower chamber. When this method of circulation is employed, it has been found necessary to employ a check-valve in each stand-pipe, the said valve being of any ordinary construction, and such as will permit the liquid to pass up through the pipes into the reservoir *e*⁵, but which will close the passage in the pipe when suction or pressure from above is applied to it, so as to prevent air being drawn down into the lower chamber.

It will be noticed that the steam admitted to the lower chamber raises the temperature of the coloring-liquid to boiling-point.

We claim—

1. An apparatus for dyeing yarn and other fibrous material, consisting of a vat divided to form an upper and lower chamber, one or more vessels or receptacles to contain yarn or other fibrous material and communicating with both of said chambers, combined with a pipe communicating with the upper and lower chambers, and with means, substantially as described, to effect a circulation of coloring-liquid through the vessels or receptacles, substantially as described.

2. An apparatus for dyeing yarn and other fibrous material, consisting of a vat divided to form an upper and lower chamber, one or more vessels or receptacles to contain yarn or other fibrous material and communicating with both of said chambers, a pipe communicating with the upper and lower chambers, and with means, substantially as described, to effect a circulation of coloring-liquid through the vessels or receptacles, combined with one or more stand-pipes connected with the lower chamber and with a reservoir connected to the upper chamber, substantially as described.

3. An apparatus for dyeing yarn and other fibrous material, consisting of a vat divided to form an upper and lower chamber, one or more vessels or receptacles to contain yarn or other fibrous material and communicating with both of said chambers, a pipe communicating with

the upper and lower chambers, and with means, substantially as described, to effect a circulation of coloring-liquid through the vessels or receptacles, combined with a reservoir connected to the lower chamber to receive the liquid therefrom, as and for the purpose set forth.

4. An apparatus for dyeing yarn and other fibrous material, consisting of a vat divided to form an upper and lower chamber, and one or more fixed or stationary vessels or receptacles to contain yarn or other fibrous material and communicating with both of said chambers, combined with a pipe communicating with the upper and lower chambers, and means, substantially as described, to effect a circulation of coloring-liquid through the vessels or receptacles, substantially as described.

5. An apparatus for dyeing yarn and other fibrous material, consisting of a vat divided to form chambers *A*³ *A*⁴, one or more fixed or stationary vessels or receptacles, *a'*, having its bottom provided with a flange, *b*, and grating *b*³, and a cover having the inwardly-projecting flange *b*⁶ and grating *b*⁷, combined with the pipes *c* *c*² and pump connected with said pipes to establish a circulation from the chamber *A*³ through the chamber *A*⁴ and vessels or receptacles, substantially as described.

6. An apparatus for dyeing yarns and other fibrous material, consisting of a vat divided to form two chambers, and one or more vessels or receptacles to contain yarn or other fibrous material, connected with both of said chambers, combined with a pipe communicating with the said chambers, and means, substantially as described, to effect the circulation of coloring-liquid through the said vessels or receptacles, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

THOMAS SAMPSON.

FRANCIS H. JEALOUS.

Witnesses:

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