

July 9, 1940.

J. H. HIGGINSON

2,207,682

STOCK DYEING APPARATUS

Filed Jan. 7, 1938

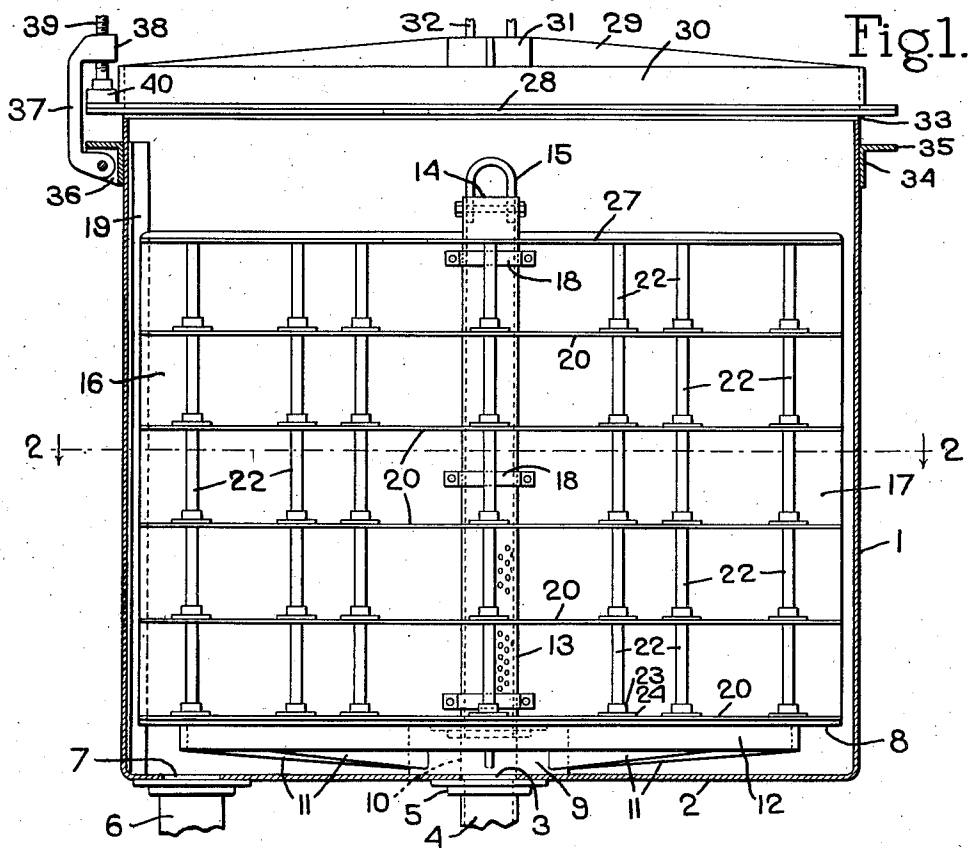


Fig. 2.

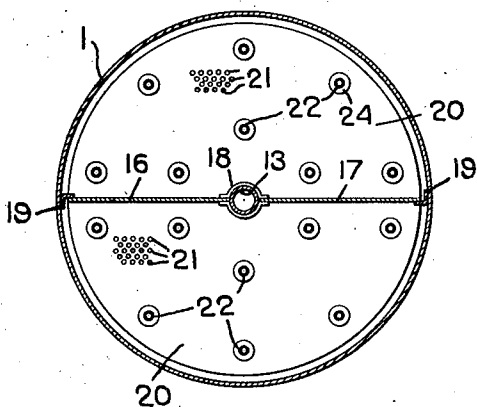


Fig. 3.

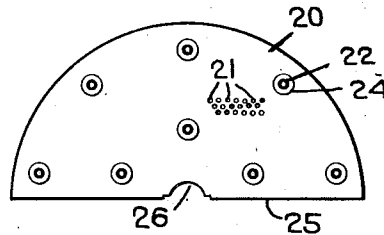


Fig. 4.



Inventor.
Joseph H. Higginson
by *Harold Smith & Tennant.*
Attys.

UNITED STATES PATENT OFFICE

2,207,682

STOCK DYEING APPARATUS

Joseph H. Higginson, Andover, Mass., assignor
to M. T. Stevens & Sons Company, North
Andover, Mass., a corporation of Massachusetts

Application January 7, 1938, Serial No. 183,844

4 Claims. (Cl. 68—199)

This invention relates to improvements in dyeing apparatus and particularly to stock dyeing apparatus in which the stock is supported in a carrier or basket and submerged in the dye liquor contained in a suitable dye kettle and the liquor forcibly circulated by a pump for the purpose of causing the dye to impregnate the fibrous stock contained in the carrier.

In certain usual types of dyeing machines the kettle is of cylindrical form provided with a central inlet through which the dye liquor is introduced by a suitable pump, with an outlet, usually located at or in proximity to the bottom of the kettle, leading to the intake of the pump or to a suitable heating apparatus for the dye liquor which is connected to the pump. The carrier in certain constructions comprises a suitably reinforced base plate having a hollow hub adapted to register with the dye liquor inlet and a vertical tubular perforated conduit having an open end which is fixedly connected to the hub and is provided at its upper end with means adapted to be engaged by a suitable lifting mechanism or hoist for removing the carrier from the kettle. A perforated plate, which is supported by the tubular conduit near its upper end, serves to distribute dye liquor discharged from the upper end of the conduit over the mass of stock to be dyed.

In dyeing stock, particularly rayon, silk, and like materials in apparatus of this type heretofore employed only a limited amount of stock can be successfully uniformly dyed as the matting of the stock by the downwardly circulating dye liquor causes the upper surface zone of the material to act as a filter for the dye liquor and prevents uniform impregnation of the dye in the lower portion of the mass of stock. It has been found by actual experience that it is difficult, if not impossible, properly to dye uniformly two hundred pounds or more of rayon in usual commercial apparatus of this type.

Furthermore, considerable difficulty has been encountered in removing the stock from the carrier after it has been dyed because of the interlacing of the fibres throughout the entire more or less compacted mass.

One of the objects of the present invention is to provide a dyeing apparatus of this general type in which the stock is supported by a carrier having suitably spaced perforated plates forming tills each adapted to contain a desired amount of the stock to be dyed, and which will minimize the matting down and filtering action of the upper zones of the stock to such an extent that

uniform dyeing of the stock may be accomplished in batches of five hundred pounds or more.

A further object of the invention is to provide superposed tills of this character formed in removable sections which will enable each section to be filled with the dye stock before the next section is superposed upon it and upon completion of the dyeing operation will enable the tills to be successively withdrawn so that the dyed stock can be readily removed therefrom.

A further object of the invention is to provide a carrier having tills of the character above described which have no peripheral wall thereby enabling the material, particularly when in the form of spools, cops, or relatively small batches, to be introduced into and removed laterally from the tills without disassembling the tills from the carrier.

Another object of the invention is to provide a dyeing apparatus of the character above described in which the dye kettle and all portions of the carrier for supporting the stock are constructed of metal or presenting surfaces of metal such as stainless steel which is unaffected by the acid or other chemicals contained in the dye liquor.

These and other objects and features of the invention will more fully appear from the following description and the accompanying drawing and will be particularly pointed out in the claims.

A preferred embodiment of the invention is illustrated in the drawing, in which,

Fig. 1 is a diametrical sectional view of a dye kettle showing in elevation a preferred form of carrier for the stock assembled therein;

Fig. 2 is a horizontal sectional view on a reduced scale on lines 2—2 of Fig. 1;

Fig. 3 is a plan view of one of the sections of a carrier or a till illustrated in Fig. 2; and,

Fig. 4 is a side elevation of the till illustrated in Fig. 3.

The dye kettle comprises a cylindrical metal tank 1 having a horizontal bottom 2, preferably formed of stainless steel or presenting an inner surface of stainless steel, or other non-corrosive metal, and provided centrally with a circular aperture 3 communicating with the upper end of an inlet pipe 4 which is provided with a suitable flange or flanges 5 which are welded to the under face of the bottom 2.

An outlet pipe 6, which is welded to the kettle, similarly communicates with an outlet port 7 preferably located in the bottom of the kettle or in the lower portion thereof.

The carrier comprises a perforated bottom

plate 8 which is mounted upon a spider having a hub 9 having a vertical cylindrical aperture 10 complementary to and registering with the inlet aperture 3 and provided with radial arms 11 connected at their outer ends to or formed integral with a vertical ring 12 which is located in proximity to the periphery of the bottom plate 12. The hub is internally screw threaded and a vertical perforated cylindrical conduit 13 having at its lower end complementary screw threads is fixedly screwed into the hub. The conduit 13 is provided with an open upper end 14 and means, such as a shackle 15, is secured to the upper end of the conduit to provide means by which a suitable lifting apparatus or hoist may be attached to raise the carrier bodily from the kettle.

The present invention comprises the provision of suitably spaced successively superposed perforated plates removably mounted upon the base plate and upon each other providing tills for the material to be dyed, the term "tills" being used herein to define separate supporting means or trays for supporting respectively desired portions of the entire mass of material to be dyed in such manner as to minimize the matting down of the stock by the dye liquor passing downwardly therethrough thereby insuring uniform dyeing of the stock.

In the preferred embodiment of the invention illustrated herein vertical partition plates 16 and 17, which are fixedly secured to the base plate 8 and to the vertical conduit 13 by suitable straps 18, extend radially from the vertical conduit in diametrically opposite directions. Vertical guides 19, preferably in the form of angle bars welded to diametrically opposite portions of the wall have radially extending flanges entering complementary recesses in the base plate 8 and engaging the ends of the radial partitions 16 and 17, insure proper positioning of the carrier within the kettle and registry of the passage in the hub with the inlet 3 of the dye kettle.

The tills for supporting the stock desirably are of the same form and a description of one will serve for the description of all. Each till in the preferred embodiment of the invention illustrated comprises a semi-circular flat plate 20, preferably of stainless steel, of suitable thickness and provided throughout its entire area with a multitude of small apertures 21. Spacing members, preferably in the form of vertical tubes 22 of stainless steel, are seated in sockets 23 also of stainless steel having flanges 24 which are welded to the upper surface of the plate 20 in substantially equally widely spaced relation throughout the entire area of the plate 20. The spacing members 22 are of equal length and are adapted to support the perforated plate of the next till which is superposed upon it. The spacing members are so positioned as to be in axial alinement when the tills are assembled in superimposed relation thereby preventing distortion of the plates of the tills by the weight of the material carried thereby. Each of the semi-circular perforated plates 20 is provided with a diametrical straight edge 25 adapted to abut the partition plates 16 and 17 and is provided with a central arcuate cut-away portion 26 adapted to fit upon the central tubular member 13. The carrier is provided with a perforated top plate 27 formed in semi-circular sections.

The dye kettle is provided with a suitable cover 28 of somewhat larger diameter than the upper end of the dye kettle and which is mounted upon a suitable spider 29 having a peripheral ring 30

and a central hub 31 provided with a shackle 32 adapted to be engaged by the hoisting apparatus. The cover has secured to it a gasket 33 adapted to engage the upper end of the kettle and thereby provide a suitable seal.

Suitable means are provided for releasably securing the cover to the kettle. As illustrated herein an annular angle bar 34 is welded to the outer wall of the kettle and presents a horizontal flange 35. Suitably spaced brackets 36 are welded to the angle bar 34 and the lower arms of C-clamps 37 pivotally secured to the brackets. The upper arms 38 of the C-clamps are provided with screws 39 having suitable heads (not shown) by means of which they may be rotated and with swiveled connections to heads 40 adapted to clamp upon the projecting edge of the cover 28.

One of the important features of the invention consists in constructing all parts with which the dye liquor may come in contact of non-corrosive metal such as stainless steel or if other metal parts are employed providing the same with continuous surfaces of non-corrosive metal such as stainless steel.

In the operation of the device all of the tills but the lowermost are removed; the lowermost till may then be readily filled from above with the stock to be dyed. The next till is then superposed upon the spacing members 22 of the first till and similarly loaded. This operation is repeated until all of the sectional tills have been filled. The cover plate sections 27 are then superimposed upon the spacing members of the uppermost till and secured to the central conduit in any suitable manner. The cover 28 is then clamped upon the kettle and the dye liquor forced into the kettle through the conduit 13 until the stock is completely submerged. Continuous operation of the pump maintains a circulation of the dye liquor upwardly through the conduit 13 and over the top thereof as well as radially from the perforations in the conduit 13 while the dye liquor is continuously drawn off through the outlet 6. By reason of the fact that the stock is supported by the tills in relatively thin layers as compared with the entire mass of stock, the circulation of the dye liquor through the perforations in the tills causes a uniform impregnation of the stock without substantial matting thereof which, as above stated, would cause non-uniformity of dyeing.

After the dyeing operation has been completed a suitable hoist is connected to the shackle 15 on the upper end of the conduit 13 and the carrier raised vertically from the dye kettle and supported in raised position over the kettle until the greater portion of the dye liquor is drained from the stock. The carrier or basket may then be swung to a convenient place for unloading, the top perforated plates 27 removed, thereby permitting ready access to the stock in the first till which can be removed upwardly notwithstanding the vertical spacing members, or alternatively the upper till can be withdrawn from the carrier and the stock removed from it in the manner above described. After the uppermost till has been unloaded the remaining tills may be similarly unloaded. After the unloading operation has been completed the tills may be successively replaced and loaded in reverse order. In view of the fact that the basket has no vertical peripheral wall or walls surrounding the material in the respective tills some or all of the material in any till may be introduced or withdrawn laterally without the necessity of disassembling the su-

perimposed tills thereby facilitating the filling or emptying of the basket.

While in the dyeing apparatus illustrated and described herein the tills are in two sections of semi-circular form, it will be readily understood that the invention in its broader aspects is not restricted to the number of sector-shaped tills provided with suitable spacing members adapting them to be superposed in the manner above described.

It will therefore be obvious that the particular embodiment of the invention disclosed herein is of an illustrative character and not restrictive and that various changes in form, construction and arrangement of parts may be made within the spirit and scope of the following claims.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is:

1. Dyeing apparatus comprising a stock dye kettle, a carrier having a perforated base mounted in but bodily removable from said kettle comprising a vertical series of tills each having a perforated bottom plate and spacing members of equal height rigidly secured to the bottom plate and adapted when the tills are assembled to be positioned in vertical axial alinement, and a central tubular supporting member secured to the bottom of said carrier and extending vertically through said tills and provided at its upper end with means to be engaged by mechanism for lifting the carrier from the kettle, and means for circulating the dye liquor through the material carried by said tills.

2. Dyeing apparatus comprising a cylindrical stock dye kettle, a circular carrier having a perforated base, mounted in but removable from said kettle comprising a vertical series of complementary semi-circular removable tills each having a perforated bottom plate and spacing members of equal height rigidly secured to the bottom plate and adapted when the tills are assembled to be positioned in vertical axial alinement, and a central tubular supporting member secured to the bottom of said carrier and extending vertically

through said tills and provided at its upper end with means to be engaged by mechanism for lifting the carrier from the kettle, and means for circulating the dye liquor through the material carried by said tills.

3. Dyeing apparatus comprising a cylindrical stock dye kettle having a base provided with a central inlet for the dye liquor, a bodily removable carrier within said kettle having a horizontal circular base of somewhat less area than the bottom of said kettle, a perforated central tubular conduit positioned to register with the inlet to said kettle, vertical partition plates secured to the base of said carrier and to said tubular conduit and extending radially from the latter in diametrically opposite directions, a plurality of like superimposed removable tills each having a semi-circular perforated bottom plate with rigid vertical spacing members of equal length secured thereto in widely spaced relation and positioned in vertical alinement when the tills are in assembled position, and means upon the upper end of said tubular conduit adapted to be engaged by a lifting mechanism for removing the carrier from the kettle.

4. Dyeing apparatus comprising a stock dye kettle having a base provided with a central inlet for the dye liquor, a bodily removable carrier within said kettle comprising a horizontal perforated base plate having a hub provided with an aperture adapted to register with the inlet for the dye liquor, a vertical perforated cylindrical conduit having its lower end communicating with said inlet, means for discharging the dye liquor from the lower portion of said kettle, a vertical series of superimposed tills each having a perforated bottom plate and spacing members of equal height rigidly secured to the bottom plate in equally widely spaced relation throughout the area thereof and adapted when the tills are assembled to be positioned in vertical axial alinement, and means on said carrier adapted to be engaged by a lifting mechanism for removing the carrier from the kettle.

JOSEPH H. HIGGINSON.