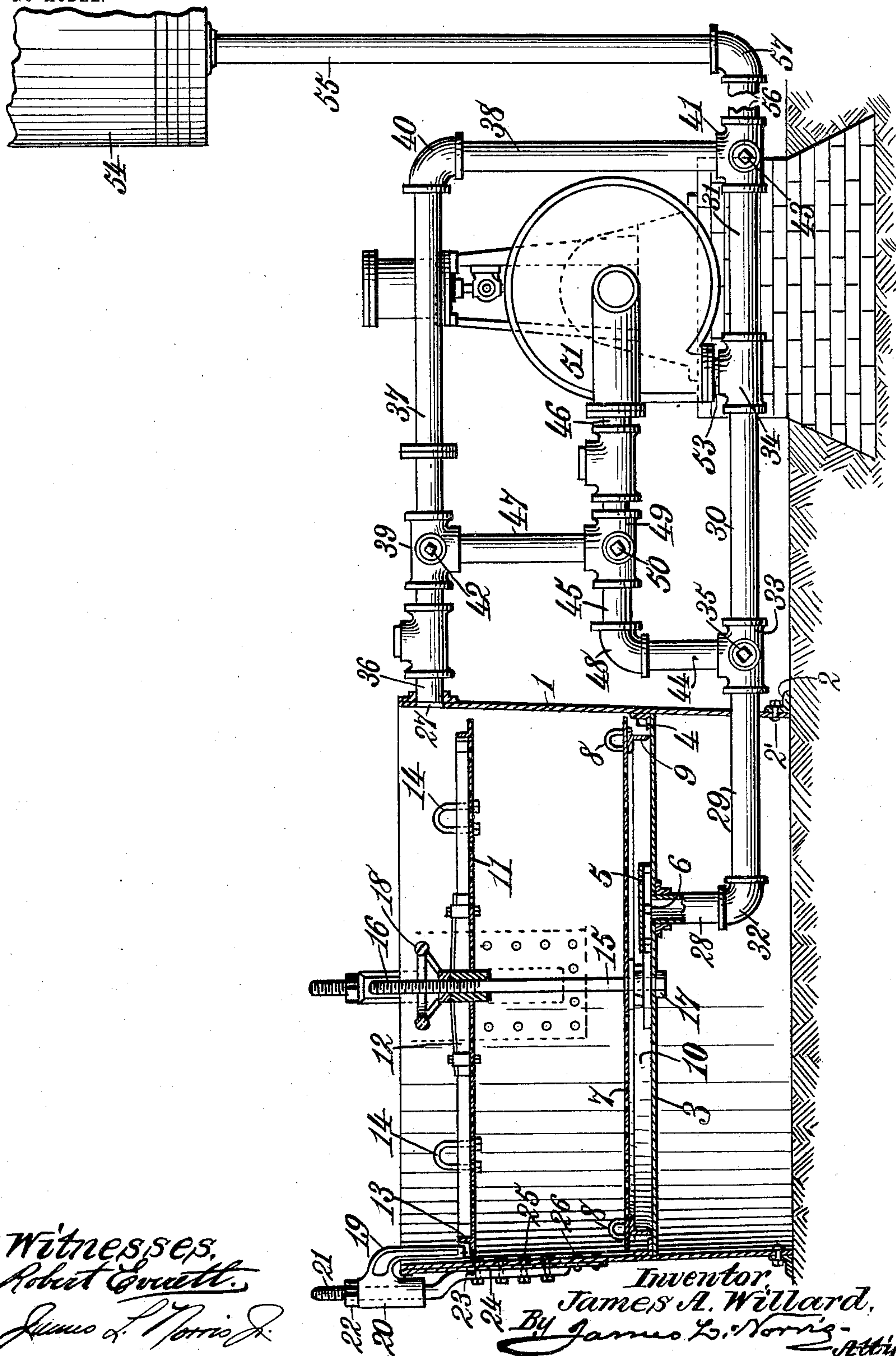


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J. A. WILLARD.
APPARATUS FOR DYEING.
APPLICATION FILED NOV. 4, 1903.

NO MODEL.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR DYEING.

SPECIFICATION forming part of Letters Patent No. 755,422, dated March 22, 1904.

Application filed November 4, 1903. Serial No. 179,848. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. WILLARD, a citizen of the United States, residing at Chattanooga, in the county of Hamilton and State of Tennessee, have invented new and useful Improvements in Apparatus for Dyeing, of which the following is a specification.

This invention relates to certain new and useful improvements in apparatus for dyeing raw stock, wool, and similar material.

The object of the invention is to dye, wash, and fix the dyestuffs upon the material being operated on while it is submerged at all times without coming in contact with the air and until the color has been set and made fast or permanent.

The invention further aims to construct an apparatus of the above-referred-to character which is so constructed and arranged that after the material has been operated upon it can be readily removed from the apparatus and transported to any point desired.

The invention further aims to construct an apparatus for dyeing raw stock, wool, and similar material which is so constructed that after the material has been compressed to be operated upon it will be securely held in its compressed condition.

The invention further aims to provide an apparatus adapted for use in dyeing raw cotton, raw wool, and similar materials which shall be extremely simple in its construction, strong, durable, efficient in its operation, readily and easily set up, and comparatively inexpensive to manufacture; and to this end the invention consists of the novel combination and arrangement of parts hereinafter more specifically described, illustrated in the accompanying drawing, and particularly pointed out in the claims hereunto appended.

In describing the invention in detail reference is had to the accompanying drawing, forming a part of this specification and which illustrates a sectional side elevation of the apparatus.

Referring to the drawing by reference characters, 1 denotes an open vat or receptacle mounted upon a suitable support and rein-

forced exteriorly at its lower end by an annular angle-shaped member 2, which is secured to the said vat or receptacle 1 by the bolts 2'. The preferred contour of the vat or receptacle 1 is cylindrical, although any other shape desired may be employed. In the vat or receptacle 1, a suitable distance from the lower end thereof, is arranged a bottom 3, carrying on its upper face an annular angle-shaped member 4, which is adapted to abut against the inner face or side of the vat or receptacle 1. The bottom 3 and angle-shaped member 4 are secured within the vat or receptacle 1 by any suitable means.

The reference character 5 denotes a deflector, which is secured to the upper face of the bottom 3 and is arranged over a combined inlet and exhaust opening 6 for the dye liquor, the opening 6 being formed in the bottom 3 at one side of the center. Arranged within the vat or receptacle 1 is a removable perforated supporting-plate 7, provided with the upwardly-extending yokes 8 and a depending angle-shaped separating and supporting member 9. The yokes 8 are adapted to be engaged by suitable elevating means for lifting the supporting-plate out of the vat or receptacle 1. The member 9 when the plate 7 is in its position within the vat or receptacle 1 is adapted to rest upon the bottom 3, and by such an arrangement the plate 7 is supported and separated a suitable distance from the bottom 3, forming thereby when the plate 7 is in position what may be termed a "receiving and distributing chamber" 10 for the dye liquor before the latter is forced through the material to be dyed.

Within the vat or receptacle 1 is arranged a combined removable perforated cover and compression-plate 11, which is secured to and supported by a spider 12, and the edge of the plate 11 is surrounded by an angle-shaped guide and retaining member 13, which is secured in position by any suitable means. The function of the member 13 will be hereinafter referred to. The plate 11 has suitably secured thereto a plurality of upwardly-extending yokes 14, which are adapted to be engaged

by a suitable lifting means for elevating the plate 11 from the vat or receptacle 1.

The reference character 15 denotes a vertically-extending rod having its upper portion screw-threaded, as at 16, and its lower portion secured centrally to the bottom 3, as at 17. The rod 15 extends centrally through the spider 12 and carries on its screw-threaded end an adjusting-wheel 18, the function of which is, as the wheel screws down the rod 15 when the material is mounted upon the plate 7, the wheel 18 will carry the plate 11 therewith, consequently compressing the material to be treated between the plates 7 and 11. The plate 11 is retained in its adjusted position—that is, the position which it has been brought to through the medium of the wheel 18—by means of a plurality of retaining-arms 19, which are adapted to engage the lower section of the member 13—that is to say, the horizontally-extending portion of the member 13—while the vertically-extending portion of the member 13 is adapted to retain and guide the arms 19 to and in securing position. The arms 19 are curvilinear in contour and are adapted to extend over the top edge of the vat or receptacle 1 and depend downwardly within the same. The upper end of each of the arms 19 is formed integral with a sleeve 20, loosely mounted upon an upwardly-extending screw-threaded rod 21, and the arms 19 are retained in their securing position through the medium of the nut 22, carried by the rod 21. It will be evident that when the nut 22 is lowered and engages with the sleeve 20 the latter will be prevented from any vertical movement, but that when the nut 22 is elevated, owing to the fact that the sleeves 20 are loosely mounted on the rod 21, the sleeves can be vertically moved, so that the arms 19 can be swung out from the vat or receptacle 1, so that the plates 7 and 11 can be removed therefrom. The lower end of the rod 21 is connected to or terminates in a stay-plate 23, which is secured to the outer face of a reinforcing-plate 24 by means of the bolts 25, these latter extending through stay-piece 23, plate 24, and side of the vat or receptacle. The plate 24 is also secured to the vat or receptacle 1 by means of the bolts 26.

The vat or receptacle 1 besides being provided with the combined inlet and exhaust opening 6 in the bottom 3 thereof is also provided in its side, near its top, with a combined inlet and exhaust opening 27. Communicating with the opening 6 is a primary combined supply and suction pipe formed of the pipe-sections 28, 29, 30, and 31. The sections 28 and 29 are connected together by the elbow-shaped coupling 32, the sections 29 and 30 by the T-shaped coupling 33, and the sections 30 and 31 by the T-shaped coupling 34. The T-shaped coupling 33 is provided with a three-way valve 35. Communicating with the opening 27 is a secondary combined supply and exhaust pipe for the dye liquor, and it com-

prises the pipe-sections 36, 37, 38, and 31. The sections 36 and 37 are connected together by the T-shaped coupling 39, the sections 37 and 38 by the elbow-shaped coupling 40, and the sections 38 and 31 by the T-shaped coupling 41. The T-shaped coupling 39 is provided with a three-way valve 42 and the T-shaped coupling 41 with a three-way valve 43. Communicating with the primary and secondary combined supply and exhaust pipes for the dye liquor is an auxiliary feed-pipe consisting of the pipe-sections 44, 45, 46, and 47. The sections 44 and 45 are connected together by the elbow-shaped coupling 48. The section 44 is connected to the T-shaped coupling 33. The sections 45 and 46 are connected together by the T-shaped coupling 49. The section 47 is connected at one end to the T-shaped coupling 39 and at its other end to the T-shaped coupling 49, the latter being provided with a three-way valve 50. The section 46 communicates with a pump 51, driven by a prime mover, and the pump 51 also communicates with, by the pipe-section 53, the T-shaped coupling 34.

The reference character 54 denotes a dye liquor reservoir, which communicates with the pump through the medium of a dye-liquor feed-pipe formed of the pipe-sections 55, 56, which are connected together by the elbow-shaped couplings 57. The section 55 communicates with the reservoir 54 and the section 56 communicates with the T-shaped coupling 43.

The operation of the apparatus is as follows: The plate 11 is removed, and the material—say about five hundred pounds—is taken from the bale without any previous opening or handling and placed upon the plate 7. The plate 11 is then replaced and the whole mass compressed by means of the operation of the wheel 18. The lifting-arms 19 are then brought to their retaining position in engagement with the member 13. The vat or receptacle 1 is then supplied with dye liquor in such quantity that it will completely submerge the material, as well as the plate 11, the quantity of dye liquor being such that when it is drawn on and forced through the material to dye it there will always be a sufficient quantity of the dye liquor in the vat or receptacle 1 to prevent the material being treated from coming into contact with the air. After the dye liquor has been supplied to the vat or receptacle the pump 51 is operated, and it pulls or draws the dye liquor from the upper part of the vat or receptacle 1 through the pipe-sections 36, 47, and 46 into the pump, as the valves 39 and 50 have been set for this purpose. The pump then forces the dye liquor through the sections 53, 30, 29, and 28 into the chamber 10, or rather into the deflector 5, which causes the material to be distributed throughout the chamber 10, and then through the action of the pump the dye liquor is forced up through the perforations in the plate 7 through the

material which is to be dyed into the space formed at the top of the vat or receptacle 1, and this operation continues until it is desired to change the circulation of the dye liquor than that as stated. During the foregoing operation the valve 35 is set to obtain the circulation, as set forth. When it is desired to reverse the circulation of the dye liquor, valves 35, 50, 39, and 43 are set so that the action of the pump will cause the dye liquor to pass downwardly through the vat or receptacle 1 through the sections 28, 29, 44, 45, and 46 into the pump, and thence from the pump through the sections 53, 31, 38, 37 and 36 into the vat or receptacle 1 and thence through the material. This operation is continued as long as it is necessary.

From the first operation set forth it is evident that the dye liquor has traveled from the bottom to the top and by the second operation set forth from the top to the bottom.

If it be necessary to force the dye liquor in one direction to completely dye the material, this is continued the necessary time. The material is then washed. If it be necessary to circulate the dye liquor in alternate directions to completely dye the material, this operation is continued the necessary time, and the material is then washed; but in either case it is necessary that the material be washed. The circulation of the washing medium is done in the same manner as the dye liquor. After the dyeing and washing are completed the plate 11 is removed by the engagement of a suitable moistening device with the yokes 14, and then plate 7 is lifted out of the vat or receptacle with the material thereon and transported to any suitable point desired.

It is thought the many advantages of my new and improved apparatus for dyeing raw stock, wool, and similar material can be readily understood from the foregoing description, taken in connection with the accompanying drawing, and it will furthermore be evident that changes, variations, and modifications can be resorted to without departing from the spirit of the invention or sacrificing any of its advantages, and I therefore do not wish to restrict myself to the details of construction hereinbefore described and as shown in the accompanying drawing, but reserve the right to make such changes, variations, and modifications as come properly within the scope of the protection prayed.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a dyeing apparatus, an open vat having an imperforate bottom and adapted to contain a body of dye liquor, a removable perforated plate arranged above the bottom thereof, said plate of a diameter substantially equal to that of the inner diameter of said vat at the bottom thereof, a compression-plate operating within said vat at the bottom thereof

and of a diameter substantially equal to the inner diameter of said vat at the lower end thereof, means for retaining the compression-plate in its adjusted position, a pump, means communicating with said pump for suitably circulating dye liquor through the said vat, and means carried by the said plates and adapted to be engaged by a suitable hoisting device for removing said plates from said vat.

2. A dyeing apparatus comprising an open vat having an imperforate bottom and adapted to contain a body of dye liquor, a removable perforated plate supported upon the bottom of said vat and of a diameter substantially equal to the inner diameter of said vat at the bottom thereof, said plate provided with a plurality of yokes, a removable and an adjustable compression-plate supported within said vat and provided with a plurality of yokes, said removable and adjustable compression-plate of a diameter substantially equal to that of the inner diameter of said vat at the bottom thereof, said yokes of each of the said plates adapted to be engaged by an elevating device for removing said plates from said vat, adjustable means carried by said vat and adapted to engage said compression-plate for retaining it in its adjusted position, and means communicating with said vat for circulating a dye liquor therethrough.

3. A dyeing apparatus comprising a vat provided with an imperforate bottom suitably removed from its lower end and adapted to contain a body of dye liquor, a removable perforated plate arranged in said vat and provided with a supporting member adapted to rest upon said bottom, said plate further provided with means adapted to be engaged by a hoisting device to permit of the removal of the plate from the vat and said plate of a diameter substantially equal to that of the inner diameter of said vat at the bottom thereof, a removable and adjustable compression-plate arranged in and supported by said vat and carrying a guiding and retaining member and further provided with means adapted to be engaged by a hoisting device to permit of removing said adjustable plate from said vat, said adjustable plate of a diameter substantially equal to that of the inner diameter of said vat, means arranged in the said vat at the bottom thereof for adjusting the said compression-plate, means carried by the vat and adapted to engage said guide and member for retaining the compression-plate in its adjusted position, and means for circulating a dye liquor through the vat.

4. An apparatus of the character described comprising an open vat having an imperforate bottom and adapted to contain a body of dye liquor, a removable perforated plate arranged therein, supported upon the bottom of said vat, provided with means for attaching it to a hoisting device and of a diameter substantially equal to that of the inner diameter of the vat at the bottom thereof, a removable and adjustable

perforated compression-plate arranged in said vat and provided with means for attaching it to a hoisting device and of a diameter substantially equal to that of the inner diameter of said vat at the bottom thereof, adjustable means carried by said vat and adapted to engage said compression-plate for retaining it in its adjusted position, a deflector interposed between the bottom of said vat and said removable perforated plate, and means communicating with said vat for circulating a dye liquor there-through.

5. A dyeing apparatus comprising an open vat having an imperforate bottom and adapted to contain a body of dye liquor, a removable perforated plate supported by the bottom of said vat and provided with means adapted to be connected to a hoisting device so as to permit of the removal of said plate, said plate of a diameter substantially equal to that of the inner diameter of said vat at the bottom thereof, a removable and adjustable compression-plate arranged in said vat and provided with means for attaching it to a hoisting device to permit of its removal from said vat, said compression-plate of a diameter substantially equal to that of the inner diameter to said vat at the bottom thereof, means carried by said vat and adapted to engage said compression-plate for retaining it in its adjusted position, a primary dye-liquor supply and exhaust pipe communicating with said vat, a secondary dye-liquor supply and exhaust pipe communicating with said vat, means for establishing communication between the said pipes, a dye-liquor feed-pipe communicating with said pipes, a pump communicating with said dye-liquor feed-pipe and said other pipes, and operating means for said pump.

6. An apparatus of the character described comprising an open vat having an imperforate bottom and adapted to contain a body of dye liquor, a removable perforated plate arranged in said vat and provided with a supporting member adapted to rest upon the bottom of said vat for retaining said plate a suitable distance above said bottom, said plate of a diameter substantially equal to that of the inner diameter of said vat at the bottom thereof, an adjustable compression-plate operating in said vat and provided with a guide and retaining member and of a diameter substantially equal to that of the inner diameter of said vat at the bottom thereof, means carried by the said plates to permit of attaching them to a hoisting device so as to remove said plates from said

vat, means for adjusting said compression-plate, means carried by the said vat and adapted to engage the said guide and retaining member for securing said compression-plate in its adjusted position, and means communicating with said vat for circulating a dye liquor therethrough.

7. An apparatus of the character described comprising a vat having an imperforate bottom and adapted to contain a body of dye liquor, a removable perforated plate arranged in said vat and provided with a supporting member adapted to rest upon the bottom of said vat, an adjustable compression-plate operating in said vat and provided with a guide and retaining member, means carried by the said plates to permit of attaching them to a hoisting device, means for adjusting said compression-plate, means carried by the vat and adapted to engage the said guide and retaining member for securing said compression-plate in its adjusted position, and means communicating with said vat for circulating a liquid there-through.

8. An apparatus of the character described comprising an open vat having an imperforate bottom and adapted to contain a body of dye liquor, a perforated plate arranged therein and having a supporting member adapted to rest upon the bottom of the vat for suitably spacing the said plate from said bottom forming thereby a receiving-chamber, said plate of a diameter substantially equal to that of the inner diameter of said vat at the bottom thereof, a deflector arranged in said receiving-chamber, a compression-plate operating in said vat and provided with a guide and retaining member and of a diameter approximately equal to that of the inner diameter of said vat at the bottom thereof, means for adjusting the said compression-plate, means carried by the vat and adapted to engage said guide and retaining means for securing the said compression-plate in its adjusted position, means communicating with said vat for circulating a liquid therethrough, and means carried by the said plate and adapted to be connected to a hoisting device so that the said plates can be removed from said vat.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses

JAMES A. WILLARD.

Witnesses:

P. O. TATUM,
CHAS. S. HALL.