W. H. DAVIS.

DYEING APPARATUS.

APPLICATION FILED JULY 5, 1917.

1,405,299. **Patented Jan. 31, 1922.**

2 SHEETS—SHEET 2.

Fig. 2.

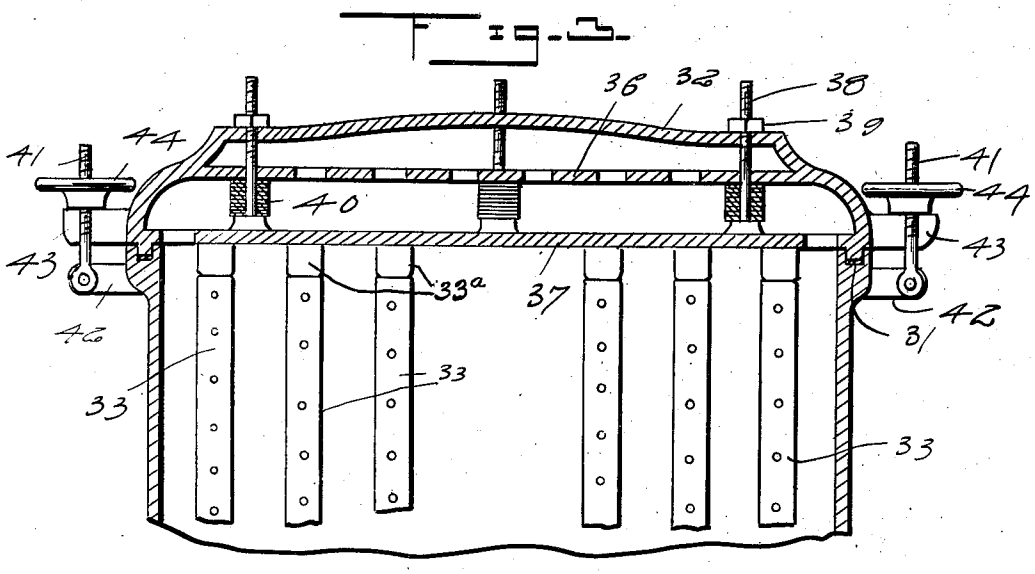
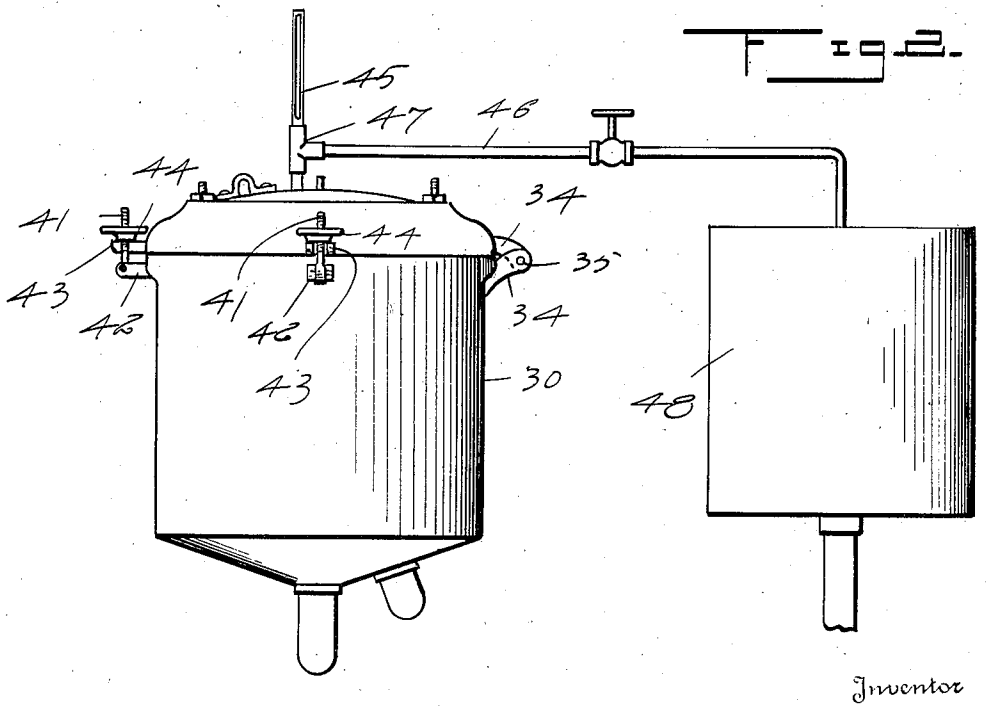


Fig. 3.



Witnesses

C. M. Beale.

Chas. P. Belcher.

Inventor

W. H. Davis.

By A. Andrews & Co.

Attorney

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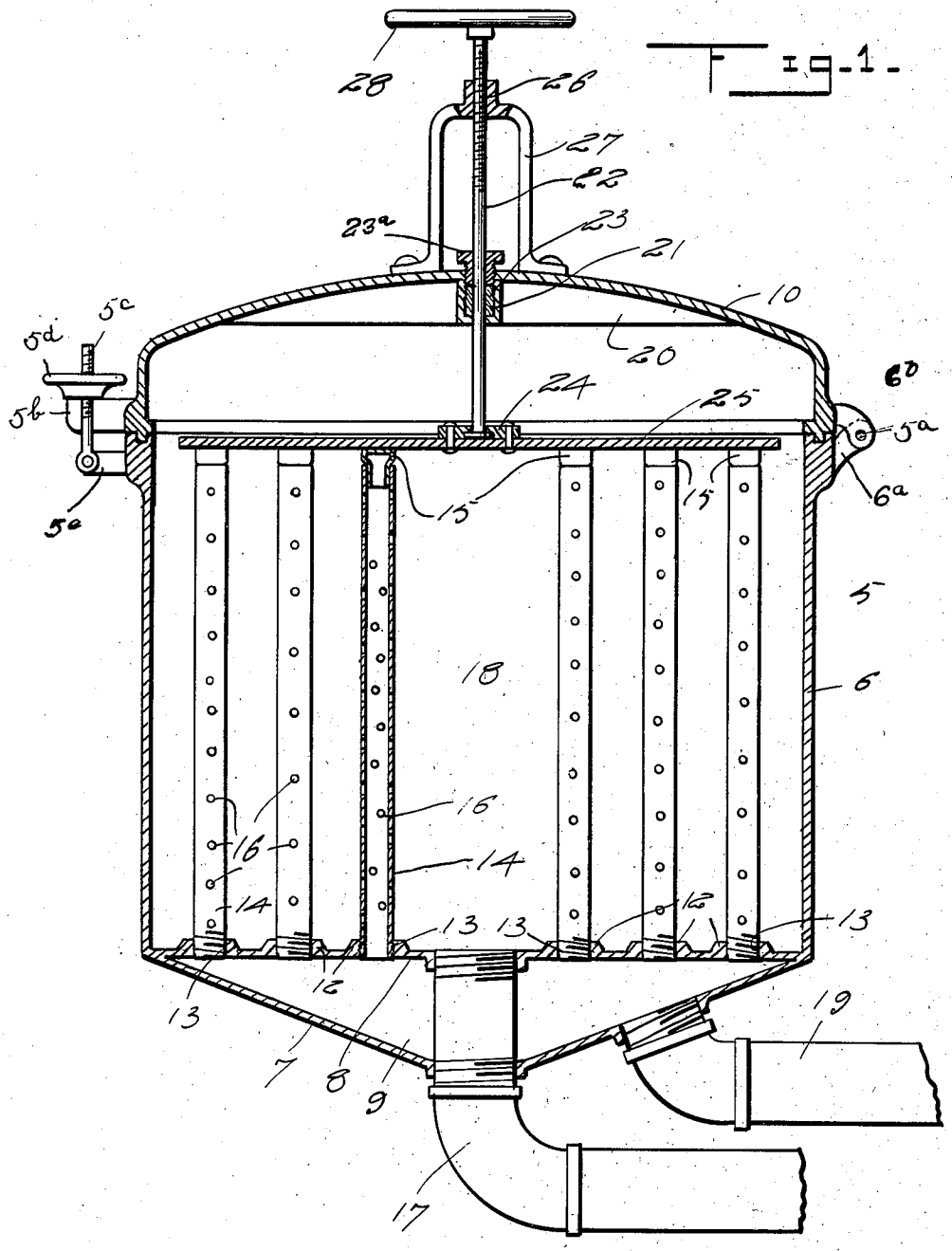
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2 SHEETS—SHEET 1.

Fig-1-



Inventor

W. H. Davis.

Witnesses

C. M. Beall.

Chas. P. Belcher.

By A. Kaufmann Jr.

Attorney

UNITED STATES PATENT OFFICE.

WADE H. DAVIS, OF ROSEMARY, NORTH CAROLINA.

DYEING APPARATUS.

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To all whom it may concern:

Be it known that I, WADE H. DAVIS, a citizen of the United States, residing at Rosemary, in the county of Halifax and State of North Carolina, have invented certain new and useful Improvements in Dyeing Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention appertains to apparatus for bleaching, dyeing, or otherwise treating with liquid, bundles, parcels, balls or cops of yarn or like fibrous materials.

Its object is to enable the bundles of yarn or like material to be evenly compressed throughout the mass within the treating apparatus whereby an even flow of liquid may be distributed throughout the mass of fibrous material, and to accomplish this result with economy of labor and of time.

The invention comprises an improved apparatus of the type in which bundles of yarn or similar fibrous material are sustained on holders adapted to permit a flow of liquid laterally therefrom or thereto throughout their lengths and enable said liquid to be evenly distributed throughout the fibres in the bundles held on them. The apparatus is so constructed that flow of the liquid treating material may pass laterally through the holders and out through the yarn or reversely through the yarn and out through the holders. The kier or treating container comprised in this apparatus is entirely open at the top, exposing the entire cross section of the container; and it is provided with a cover adapted to be fitted fluid tight, or to be opened to expose completely the top of the kier, and is preferably hinged to outward projecting brackets so that the cover may be turned 90° or more on the hinge, affording full vertical clearance above the kier, and permitting it to approach its seat in closing at a relatively small angle so as to avoid applying material side pressure to the yarn or the like that may extend above the holders.

In the accompanying drawings in which similar reference characters indicate corresponding parts throughout those views that illustrate the same construction:

Figure 1 is a vertical section through one form of the improved apparatus;

Figure 2 is an elevation of another form of the apparatus comprising a kier and an associated expansion tank;

Figure 3 is a vertical section through the upper part of the kier illustrated in Figure 2.

A tank or kier is indicated, generally, in Figure 1 by the numeral 5. This kier has a cylindrical wall 6 and a generally conical bottom 7. Crossing the interior of the tank or kier 5 above the conical bottom at the junction thereof with the cylindrical wall 6 is a septum or partition 8 provided on its upper surface with a number of bosses 12 through which central threaded perforations 13 extend. Threaded into the perforations 13 are an equal number of yarn holders 14 consisting of tubes projecting upward in parallel relation to a level approximating the top of the tank wall 6. The upper ends of these tubes are closed by the plugs 15, which may be screw threaded or permanently secured to the upper ends of the tubes. The walls of the tubes are perforated as shown at 16 with numerous orifices adapting liquid to flow laterally from the tubes in substantially all directions throughout their lengths. The lower ends of said holders or tubes 14 open into the compartment 9 formed between the conical bottom 7 and the partition 8.

A pipe 17 passes through the apex of the tubular bottom, extends through the chamber 9 and opens into the chamber 18 above said perforated partition. A pipe 19 is tapped into the conical bottom 7, said pipe opening into chamber 9 between the bottom 7 and the partition 8.

A hinge bracket 6^a extends outward from adjacent the upper margin of the cylindrical wall 6, as shown in Figure 1, and a similar hinge bracket 6^b projects from a cover 10, the hinge pintle 5^a being passed through said brackets whereby the said cover 10 is hingedly connected to the kier 5. Projecting radially at one or several points around the edge of the cover 10 are pairs of spaced ears 5^b. Hinged to lugs 5^e projecting from the wall 6 of the kier 5 at points beneath the projecting ears 5^b are bolts 5^c adapted to project between the ears 5^b. Threaded on each bolt 5^c is a hand nut 5^d. By means of the bolt 5^c and nut 5^d the cover 10 may be screwed tightly down upon the top of the walls 6 of the kier 5 in order to produce a fluid tight joint. The joint shown is preferably a tongued and grooved joint and

may be provided with a suitable gasket if necessary, the upper portion of the wall being shown as thickened to provide therefor. The under side of the cover 10 may be supplied with suitable strengthening ribs 20. Centrally of said cover a gland 21 is provided containing packing material 23, and a follower 23[a] for confining it. Through said gland extends the rod 22 having a swivel connection, as shown at 24, with a presser plate 25 of sufficient area to extend over the top of all of the holders 14. The upper portion of the rod 22 is threaded, as shown at 26, into a bracket 27, and carries on its extremity a hand wheel 28 by means of which said threaded rod 22 may be rotated in the threaded portion of the bracket 27 and elevate or depress the plate 25.

In use the cover 10 will be opened fully, and in the construction shown in Figure 1 it is preferred to use a hoist for lifting said cover. In the usual practice balls or parcels of yarn, wound on cores consisting of coil springs covered with pervious fabric, will be threaded over the holders 14. The lower parcels of this yarn, resting on the bosses 12, will be elevated above any sediment that may collect on the plate 8. The upper parcels of yarn will extend above the tops of the holders 14. After the holders have been loaded with an equal number of parcels on each, or such a number of parcels as will bring the tops of the yarn threaded on the holders 14 to substantially the same level above the tops of said holders 14, the cover 10 will be lowered to position, the plate 25 having meanwhile been withdrawn or raised toward the upper side of the cover by manipulating the hand wheel 28. The hinged bolts 5[c] will then be turned upward so as to pass between the pairs of ears 5[b] and the nut 5[d] will be turned down so as to clamp the cover fluid tight to its seat. Thereafter by turning the hand wheel 28 the presser plate 25 will be forced downward applying even pressure to the masses of yarn held on the holders 14. It is not necessary to apply a heavy pressure on the yarn, the purpose being to get an even pressure throughout the mass so that the bleaching or dyeing liquid will be applied evenly to the entire mass. After the yarn has been compressed as described the bleaching or dyeing liquid may be forced through one or the other of the pipes 17 or 19. Should it be forced first through the pipe 19 the liquid will pass into the chamber 9 and thence up through the holders 14 and be disseminated throughout the bundles of yarn held thereon and will return through the pipe 17 to the source of supply. The flow of liquid may be reversed, as by a four way valve, in the well known manner, and caused to flow in through the pipe 17 to the chamber 18 and through the bundles of yarn from the outside returning through the holders 14 into the chamber 9 and back through the pipe 19. Reversal of the dyeing or bleaching liquid in this manner is known and no further description thereof need be given.

The described form of apparatus illustrated in Figure 1 is particularly adapted for large kiers designed to treat a large mass of yarn at one treatment and wherein it will be difficult to close the cover by hand and apply by the closing of the cover the necessary pressure to the yarn. The presence of the adjustable presser plate 25 manipulated by the screw 22 enables the cover to be closed and screwed down by hand and the necessary pressure afterwards applied.

The form of the invention illustrated in Figures 2 and 3 is adapted for smaller charges of yarn and is intended to be closed by hand and to apply the necessary pressure to the yarn by the cover in the hand closing movement. In Figures 2 and 3 the numeral 30 indicates a kier which is substantially the same in construction as the kier 5 illustrated in Figure 1. The rim or upper portion of the cylindrical wall of the kier 30 is thickened the same as in the apparatus shown in Figure 1 and is provided with a groove in its upper edge in which a packing gasket 31 may be fittted if desired. Holders 33 are provided corresponding to the holders 14 heretofore described. The upper ends of these holders are also permanently closed by plugs designated 33[a] and the holders are perforated tubes similar in all respects to the holders 14. Said holders 33 have their lower ends open and are threaded into a perforated partition as in the other form. In this form of the invention the cover is somewhat different from that previously described. It comprises a top shell 32 having a cross web 36 spaced therefrom beneath it. Through the top shell 32 of the cover and through the web 36 are a number of pairs of perforations, the perforations of each pair registering with each other, through which extend bolts 38 secured at their lower ends to a plate 37. Nuts 39 on the threaded ends of the bolts 38 above the cover plate 32 sustain the plate 37 spaced from the web 36. It is intended that washers, shims, or spacing plates 40 shall be placed over the bolts 38 between the presser plate 37 and the web 36 so as to enable the position of the said plate 37 to be adjusted with respect to the cover. Thus, if a heavier pressure is desired to be placed upon the yarn held upon the holders 33, a larger number of spacing plates 40 will be introduced, and if it is desired to apply a lighter pressure, some of the spacing plates 40 will be removed.

In this form of the invention brackets 34 extend laterally from the walls of the kier and from the cover and through these brack-

ets a pintle 35 extends whereby the cover is hinged to the kier as in the other form of apparatus described. Similarly, pairs of projecting ears 43 are arranged on the cover and projecting brackets 42 on the upper portion of the kier. To the brackets 42 are pivoted threaded bolts 41 carrying nuts 44 whereby the cover may be clamped tightly down to its seat and the yarn appropriately pressed.

In Figure 2 there is shown a thermometer 45 communicating with the interior of the tank or kier through the cover whereby information may be had with respect to the temperature of the interior of the kier. The thermometer as shown is attached to the top of a T-connection 47 into which is tapped a pipe 46 having a hand valve therein, the pipe beyond the hand valve extending to the expansion tank 48, into the open end of which it dips.

The form of apparatus shown in Figures 2 and 3 is, as stated, designed to be used with smaller charges of yarn. It is loaded in the same manner as the apparatus shown in Figure 1, the cover having been lifted and turned back to an angle of 90° or more so as to leave the top fully open. The yarn parcels are then quickly placed over the holders 33, the top parcels being allowed to project above the tops of the holders a sufficient distance so that when the cover is closed an even pressure may be put upon all of the yarn upon the holders whereby to provide for an even distribution of the liquid throughout the yarn. An appropriate adjustment of the presser plate 37 may be made by means of the screws 38 and the spacers 40. This cover may be closed by hand sufficiently to enable the bolts 41 carrying the nuts 44 to be turned upward so that the nuts engage over the pairs of ears 43. The nuts may be then screwed down and the cover clamped tightly to its seat applying adequate pressure to the charge or yarn.

In practice the simple apparatus herein described effects an enormous saving of time and labor over apparatus known to me where similar dyeing or bleaching methods are used. An important utility of the apparatus lies in the rapidity with which the kier may be charged and discharged. The top being held wide open the yarn may be loaded onto the holders with great rapidity to a subtantially even level and may then be rapidly compressed to the extent necessary by closing down the cover. In the form shown in Figures 2 and 3 all that is necessary to apply the compression is to close the cover. In the form shown in Figure 1 (adapted to large charges) the presser plate will be drawn slightly backward and then the cover closed; after that a few turns of the screw will apply the necessary pressure.

Having described my invention in the form now best known to me, what I claim and desire to secure by Letters Patent is as follows:

1. An apparatus for treating yarns and the like comprising a container having an open top, a plurality of substantially parallel holders fixed within the container and extending toward the top, said holders being constructed to permit circulation of fluid laterally therefrom into the container or in the reverse direction; a cover for the container adapted to cover or uncover said open top, means for securing said cover fluid tight in closed position, and a presser plate adjustably secured to the cover said presser plate being adapted and arranged to compress the yarn on said holders when the cover is closed.

2. An apparatus for treating yarns and the like comprising a container having an open top, a plurality of substantially parallel holders fixed within said container and extending toward the top, said holders being constructed to permit circulation of fluid laterally therefrom into the container or in the reverse direction; a cover pivoted to the container adapted to cover or uncover said open top, means for holding said cover fluid tight in closed position, and a presser plate adjustably secured to the cover said presser plate being adapted and arranged to compress the yarn on said holders when the cover is closed.

3. In an apparatus for treating yarns or the like with liquid, the combination of a container having an open top, a plurality of substantially parallel holders projecting upward toward the top, a cover adapted to be secured fluid tight to said container, said cover having a presser plate of an area sufficient to extend over the tops of all of said holders, threaded bolts connected to said presser plate and extending through said cover and having nuts threaded thereon outside of the cover, and a plurality of spacer plates between the presser plate and said cover whereby to adjust the position of said presser plate with respect to the cover, and means for clamping the cover, fluid tight, upon the container.

In testimony whereof I affix my signature in presence of two witnesses.

WADE H. DAVIS.

Witnesses:
J. E. Buck,
C. W. White.