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APPARATUS FOR DYEING OR SIMILARLY TREATING TEXTILES.

APPLICATION FILED JULY 28, 1909.

993,324. Patented May 23, 1911.

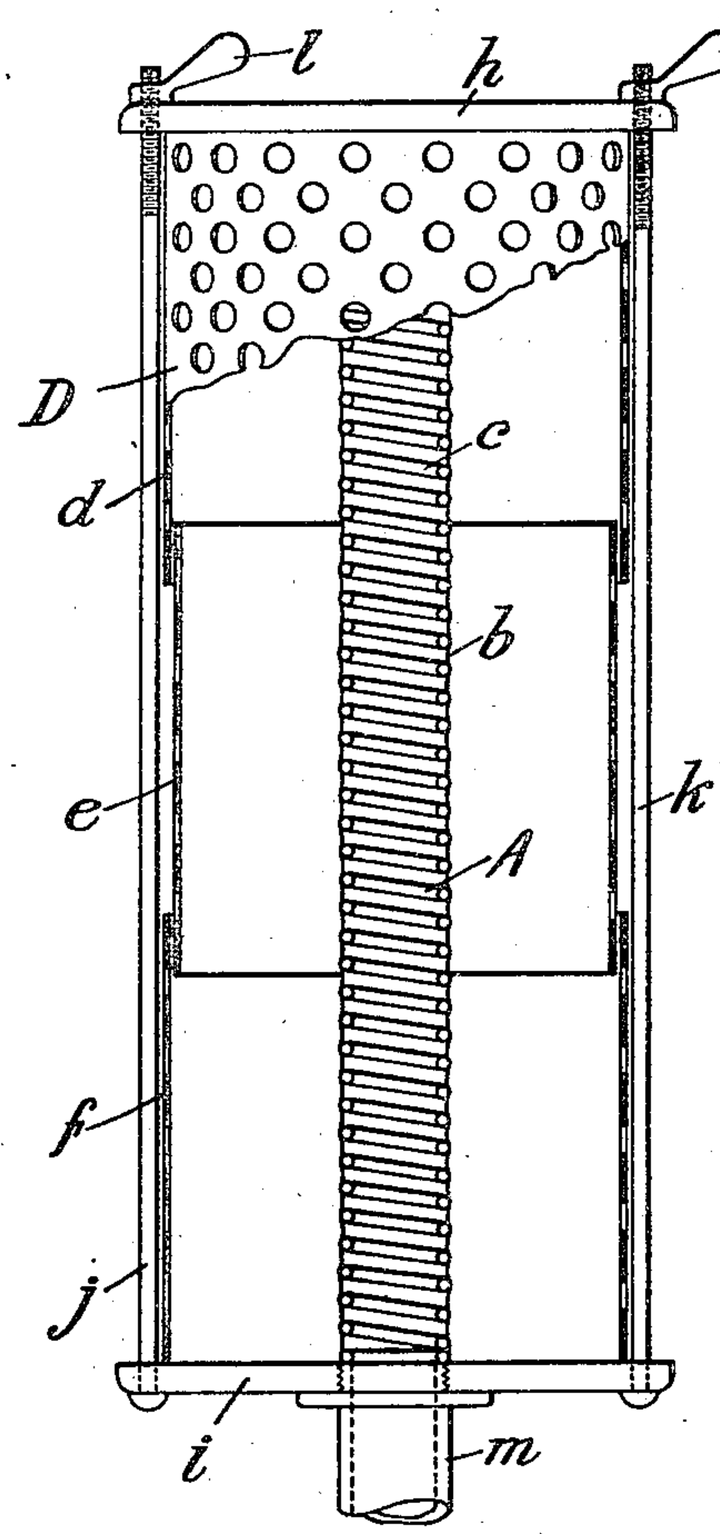

Fig. 1.

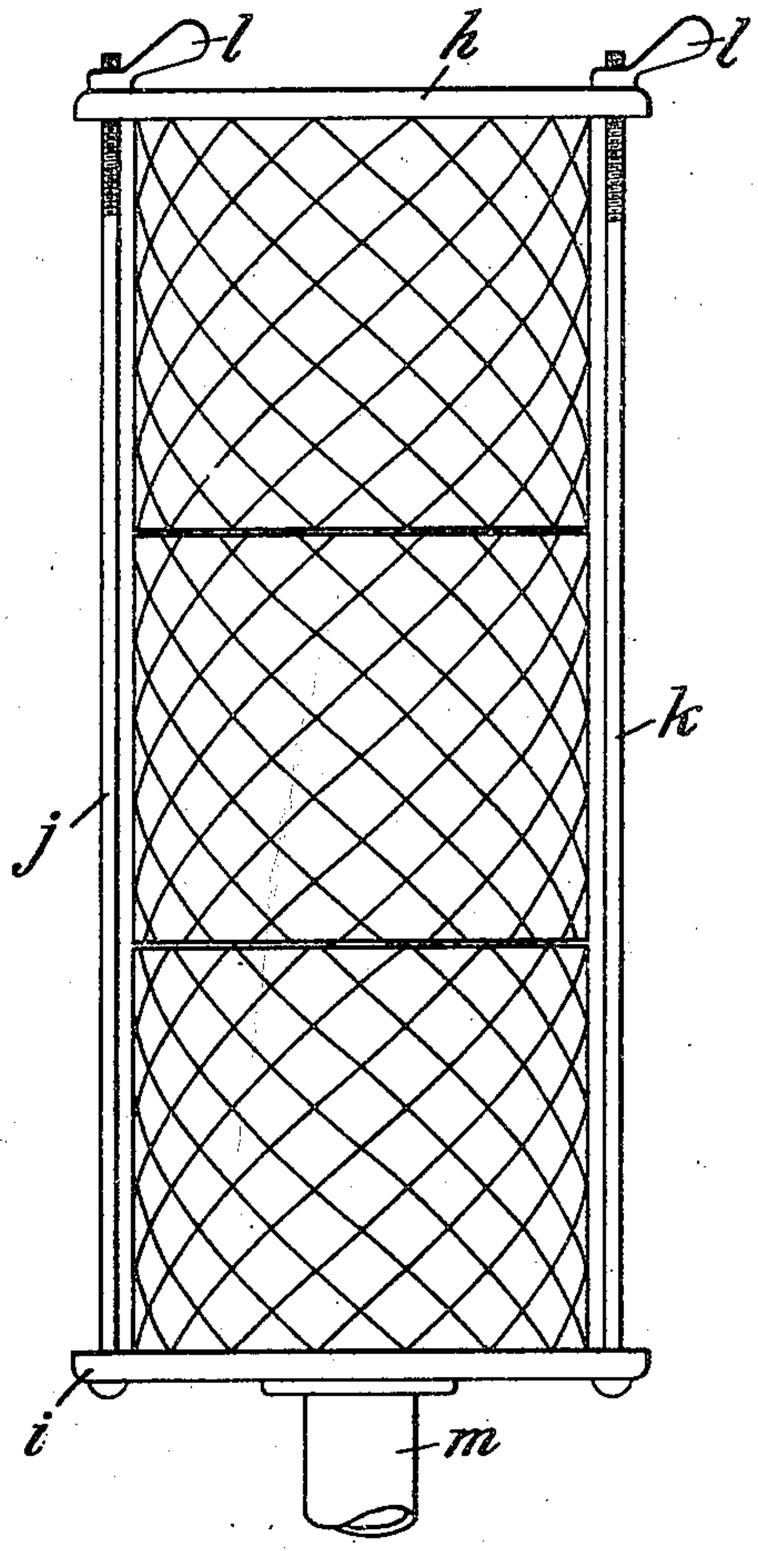

Fig. 2.

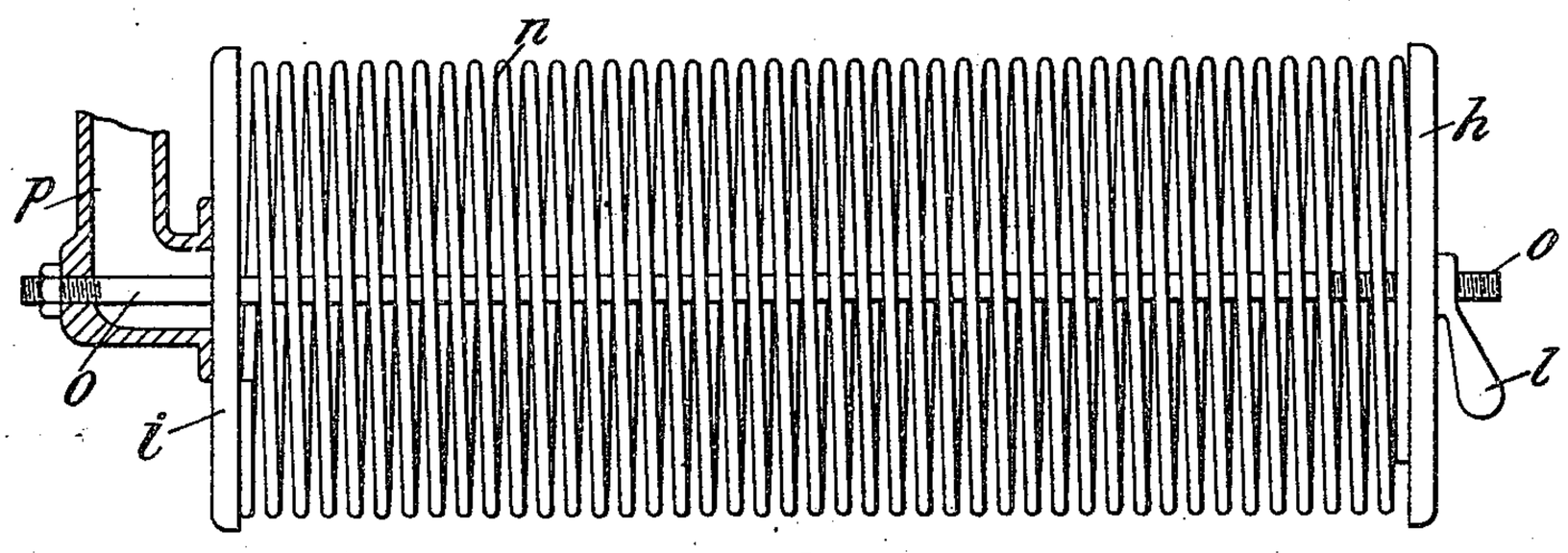

Fig. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR DYEING OR SIMILARLY TREATING TEXTILES.

993,324. Specification of Letters Patent. Patented May 23, 1911.

Application filed July 28, 1909. Serial No. 510,071.

To all whom it may concern:

Be it known that we, JOHN C. HEBDEN and FREDERICK H. DANIELL, citizens of the United States, residing at Providence, in the county of Providence and State of Rhode Island, and Franklin, in the county of Merrimack and State of New Hampshire, respectively, have invented certain new and useful Improvements in Apparatus for Dyeing or Similarly Treating Textiles, of which the following is a specification.

Our invention relates to the art of dyeing or similarly treating textiles and consists of an improved apparatus for supporting and confining the material so that pressure may be applied to compress the whole mass to secure a uniform density throughout all portions.

Our invention relates particularly to the treatment of slubbing, sliver, roving, lap or tops, in dyeing, mordanting, bleaching, steaming, scouring, washing and dyeing.

The invention is fully set forth in the following specification, illustrated by the accompanying drawings, in which:

Figure 1 is a part sectional view showing one form of our invention; Fig. 2, a view showing another form of the device; Fig. 3, a still further modification of the apparatus.

Heretofore it has been found extremely difficult to dye or similarly treat textile materials of the class above specified. This variety of material is of such a nature that it becomes easily disintegrated in handling and is too delicate in structure to resist the force of hydraulic pressure generally made use of in circulating dyeing processes. Unless the material is confined under pressure the fibers will be blown apart and separated to such an extent as to destroy the continuity of its structure. Further, even a slight disarrangement or disturbance of the fibers will detract from the ultimate value of the yarn or thread for which the slubbing or roving is intended. Materials of this class are sometices wound into soft balls, or cylindrical packages and bundles; or sometimes they are simply coiled into cylindrical cans called roving cans.

Our improved apparatus provides for dyeing the material either in the form of bundles or when loosely coiled upon itself in an irregular mass. The device is shown in the form of a cylindrical container in which the mass of material is compacted about a central pervious and longitudinally contractible support to provide for compressing the mass longitudinally to bring the material to a uniform density throughout all portions while, at the same time, providing for a central channel through the mass for the passage of the liquid or gas.

The essential feature of our invention is the longitudinally compressible casing or container which, while preventing radial expansion of the mass of material, is adapted to contract longitudinally when pressure is applied to the ends of the mass.

In Fig. 1 we have shown a central tube A of the form shown and described in the application of Frederick H. Daniell, Serial No. 417,419, filed February 24th, 1908. This tube consists of a flexible sleeve *b* of fabric or other suitable reticulated material supported and distended in tubular form by a helical coil of wire *c*. The wire is coiled openly so that the liquor or gas is free to pass between the coils and escape through the pores or openings in the fabric surrounding the coil. The open spacing of the coils also allows them to close up to permit contraction of the tube along its axis. Surrounding the tube is a perforated cylinder D which we have shown constructed in three sections *d*, *e* and *f*. The central section *e* is of slightly less diameter externally than the internal diameter of the two end sections *d* and *f*, and is adapted to slide within the two latter sections in a manner similar to that in which the sections of a telescope slide, one within another. The material to be treated is either wound around the tube A in the form of a cylindrical bundle having a diameter adapted to the interior of the cylinder D; or the material may be packed around the tube A by coiling it within the cylinder D. At the ends of the cylinder are two flanges or plates *h* and *i* adapted to close the ends of the cylinder. Extending through suitable holes in the rims of the flanges are rods *j* and *k* having their ends headed over on the face of the flange *i* with their opposite ends threaded to receive the hand-nuts

l, *l*, which are used to draw the flanges together. Screwed into the flange *i* is a pipe *m* adapted to form an opening to provide for the flow of the liquor or gas into the tube A. When the apparatus is used for dyeing material packed into the container D it is preferable to have the tube A secured at one end to the flange *i*, but if cylindrical bundles are to be used in the device the tube is preferably removable from the rest of the apparatus, so that it may be applied to the winding spindle to provide for winding the material upon it.

In Fig. 2 we have shown a cylinder constructed of wire cloth or netting to take the place of the telescopic cylinder D shown in Fig. 1. This might be made in one piece but we have shown it as preferably formed in three sections which will provide for greater convenience in packing the material within the cylinder. For sake of clearness in the drawing, the wire screen is shown with a comparatively large mesh, but in practice a finer mesh would be preferable to prevent the material from bulging through the openings. In this construction the wires are braided or netted together so that when the flanges *h* and *i* are brought together to compress the material the wires will slip on each other and allow the cylinder to contract. It will be evident that the contraction of this form of cylinder longitudinally must necessarily cause a slight diametrical expansion, and therefore this form of the device is not quite so satisfactory as the other forms shown.

In Fig. 3 the cylindrical container is formed of a helically coiled band or wire *n*. The spaces between the coils are sufficiently large so that when the whole coil is contracted longitudinally there will still be sufficient openings between the coils to provide for a free flow of the liquor. In this modification, instead of using two or more rods around the rims of the flanges *h* and *i* we have shown the device with a single rod *o* secured at one end in the pipe *p* and extending through the center of the two flanges. In some respects this arrangement of the rod is preferable as it may be made to serve as a support or positioning means to locate the tube centrally in the cylinder when the material is packed around it.

The operation of the device is as follows: When the material is to be treated in bundle form the bundles or packages are wound on to the contractible tube A in the same manner as they are usually wound on a spool-barrel or other holder. The cylinder D is then applied to the outside of the bundle with the sections arranged as shown in Fig. 1. The flanges *h* and *i* are next applied to the ends of the cylinder with the rods passing through the holes in the rims of the flanges. By screwing the hand-nuts *l*, *l* down on the rods *j*, *k* the flanges *h* and *i* are brought toward each other. The pressure of the flanges *h* and *i* on the ends of the bundle compresses the mass of material held in the container D and the container prevents radial expansion of the mass so that it can be compacted sufficiently to secure a uniform density throughout all its portions. This uniform density of the material is absolutely necessary to provide for an even permeation of the fluid in dyeing. It will be understood that the sections of the cylinder D telescope as the flanges *h* and *i* are brought together, the section *e* sliding within the sections *d* and *f*, so that there is practically no resistance to the compression of the material except that which is inherent in the material itself. After the material has been compressed to a sufficient extent to bring all of its portions to a uniform density the liquid is forced through the pipe *m* into the tube A. The opposite end of the tube A being closed by the flange *h*, the liquid cannot escape at this end and is therefore forced radially outward through the foraminous walls of the tube A into the material surrounding the tube and escapes through the perforations in the cylinder D. If it is desired, a still further saturation of the material may be secured by using the reverse of this operation; that is, the liquid may be forced through the material from the outside by using the tube A as a suction pipe or exhaust.

The method of using the apparatus for dyeing material not wound into packages is practically the same except for the first step. Instead of winding the material around the tube A it is simply coiled as closely as possible about the tube and within the container D. After it has been packed in as compactly as possible the whole mass is compressed and the dye-liquor or other fluid applied as before described. The other forms of apparatus shown in Figs. 2 and 3 are used in the same manner.

We are aware that it is old in the art to pack material into cylindrical containers for dyeing purposes. We are also aware of the use of a contractible central tube serving as a channel passing through a mass of material compressed within a cylindrical container, as set forth in our application for patent Serial No. 473,438, filed January 21st, 1909. Therefore, we do not claim in this application broadly the use of a contractible central tube in connection with an outside retainer, nor do we claim the broad construction of a container in which yarn may be compressed, but

What we do claim is:

1. In an apparatus for treating textile materials with fluids, the combination with a longitudinally compressible, porous tube of a container for the material arranged

around the tube, said container adapted to contract longitudinally when pressure is applied to compress the material.

2. An improved apparatus for treating textile materials with fluids, the same comprising a cylindrical container adapted to contract longitudinally when pressure is applied to its ends.

3. An improved apparatus for treating textile materials with fluids, the same comprising a pervious container adapted to contract longitudinally when pressure is applied to its ends.

4. An improved apparatus for treating textile materials with fluids, the same comprising a cylindrical container formed of a plurality of sections and adapted to contract longitudinally under pressure.

5. In an apparatus for treating textile materials with fluids, the combination of a pervious container for the material adapted to be longitudinally contracted and flanges arranged to close the ends of the container.

6. In an apparatus for treating textile materials with fluids, the combination of a longitudinally contractible, pervious container, flanges adapted to close the ends of the container and means to draw the flanges together to apply pressure to compress the material.

7. In an apparatus for treating textile materials with fluids, the combination of a longitudinally contractible, pervious container, flanges adapted to close the ends of the container, a pipe leading through one of the flanges, and means to force the flanges together to compress the material.

8. In an apparatus for treating textile materials with fluids, the combination of a longitudinally contractible, pervious tube, a longitudinally contractible, pervious container arranged concentric with the tube, flanges to close the ends of the container, means to admit the liquid to the tube and means to force the flanges together to compress the material within the container.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN C. HEBDEN.
FREDERICK H. DANIELL.

Witnesses:
MARY A. O'KEEFFE,
ALEX YOUNG DAVISON.