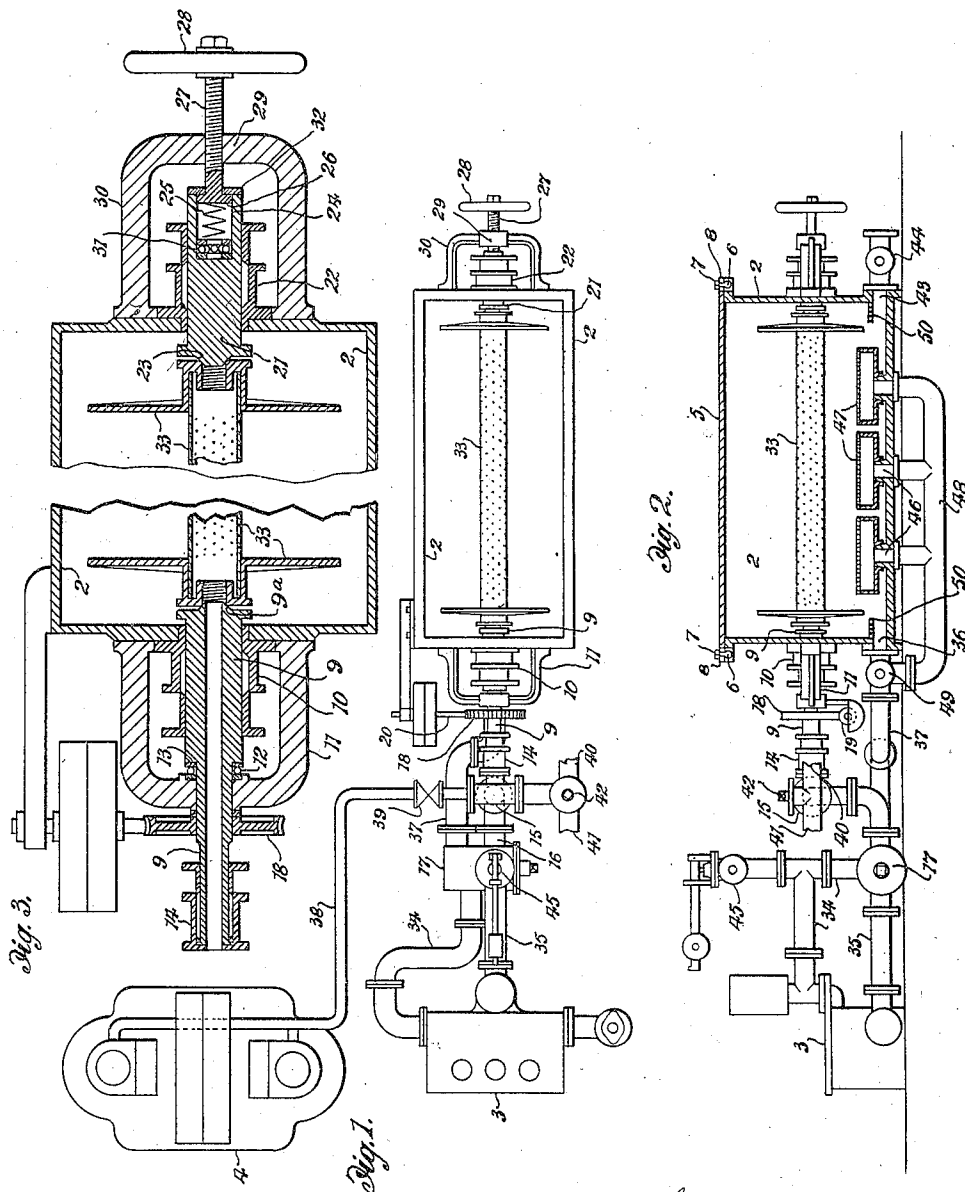


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 ROTARY PERFORATED BEAM APPARATUS FOR DYEING AND OTHERWISE TREATING
 YARN WITH FLUIDS
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UNITED STATES PATENT OFFICE.

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ROTARY PERFORATED-BEAM APPARATUS FOR DYEING AND OTHERWISE TREATING YARN WITH FLUIDS.

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To all whom it may concern:

Be it known that I, ROBERT SMITH HEAP, a subject of the King of Great Britain and Ireland, and a resident of Ightenhill, Burnley, in the county of Lancaster, England, have invented certain new and useful Improvements in or Relating to Rotary Perforated-Beam Apparatus for Dyeing and Otherwise Treating Yarn with Fluids, of which the following is a specification.

This invention has reference to rotary perforated-beam apparatus for treating yarn, wound on the beams, with fluids by passing the latter through the yarn, in washing, steaming, bleaching, dyeing and drying.

In known apparatus of the kind referred to, the perforated beams with the yarn wound thereon are arranged horizontally above a vat or vats into which the washing, dyeing, bleaching or other liquor or liquors drains or drain after being admitted into the interior of the beam or beams and passing through the yarn wound thereon. With such apparatus it is sometimes an objection that the liquor or liquors is or are exposed to the oxidizing action of the atmosphere during the treatment of the yarn, and the object of this invention is to overcome this objection.

According to this invention, the perforated beam or beams carrying the yarn is or are mounted to rotate in a closed vat or chamber or vats or chambers provided with a fluid-tight cover or covers whereby the beam or beams is or are inserted and removed and with means for supporting the beam or beams horizontally and with suitable passages or conduits for the inlet and outlet of the fluid or fluids with which the yarn is to be treated.

In carrying the invention into effect, I may employ any desired number of vats or chambers, and I may adapt each vat or chamber to receive only a single beam or to receive two or more beams.

The accompanying drawings illustrate one arrangement of a single-beam apparatus embodying the invention, Fig. 1 being a plan of the apparatus, Fig. 2 an elevation thereof with the vat in longitudinal section, and Fig. 3 a sectional plan to a larger scale showing the means for connecting the fluid conduit to the beam and rotatably mounting the latter in the vat.

Referring to the drawings, the apparatus illustrated comprises a vat 2, a liquid pump 3 and an air compressor 4.

The vat 2 is provided with a removable cover 5 adapted to be clamped in fluid-tight connection by means of swing bolts 6 pivoted on the walls of the vat and fitted with clamping nuts 7 to co-operate with lugs 8 on the cover.

One side or end wall of the vat is provided with a rotatable fluid nozzle 9 which passes through a stuffing box 10 and a bearing bracket 11 secured to the wall of the vat, a ball thrust-bearing 12 being arranged between an annular shoulder 13 on the nozzle and the bearing bracket. The outer end of the nozzle 9 is connected by a stuffing box 14 with a junction piece 15 which is connected by a conduit 16 to a reversing and stop valve 17. The inner end of the nozzle 9 is formed with a spherical spigot part 9^a. The nozzle 9 is adapted to be rotated by means of a worm wheel 18 mounted on it and a worm 19 on a suitably driven and supported shaft 20 in the known way.

The other side or end wall of the vat is provided with a rotatable clamping member 21 which passes through a stuffing box 22 and has its inner end formed with a spherical spigot part 23. The outer end of the member 21 is formed with a recess 24 wherein is located a spring 25 and the enlarged head 26 of a screw 27 provided with an operating handwheel 28 and mounted in and co-acting with a nut 29 carried by a bracket 30 mounted on the wall of the vat. A ball thrust-bearing 31 is arranged between the spring 25 and the end of the recess 24, and a cover plate 32 fixed to the outer end of the member 21 retains the head 26 of the screw 27 in the recess.

The perforated beam 33 containing the yarn to be treated is mounted between the inner ends of the nozzle 9 and clamping member 21 and clamped in rotatable and fluid-tight connection therewith by the tightening up of the clamping screw 27.

The reversing and stop valve 17 is also connected to the delivery and suction of the pump 3 by conduits 34, 35, respectively, and is also connected to a draw-off outlet 36 in the wall of the vat below the nozzle 9 by means of a conduit 37. The air compressor 4 is connected to the junction piece 14 by

means of a conduit 38 and a non-return or other suitable valve 39. Water and steam conduits 40, 41 connect through a valve 42 with the junction piece 15. A drain-off outlet 43 fitted with a cock 44 is provided in the wall of the vat below the clamping member 21, and a relief valve 45 is provided in the conduit 34.

When the beam 33 is mounted between the nozzle 9 and clamping member 21, and the cover 5 is secured, the dyeing, bleaching or like liquor with which the yarn is to be treated is circulated by the pump, the liquor passing from the pump delivery by the conduit 34 to the reversing and stop valve 17 and thence by way of the conduit 16, junction piece 15 and nozzle 9 to the interior of the barrel of the beam, and through the perforations therein and the yarn wound thereon. From the vat the liquor passes back to the pump by way of the outlet 36, conduit 37, reversing the stop valve 17 and conduit 35. By corresponding operation of the reversing and stop valve 17 the circulation of the liquor may be reversed, the liquor in such case entering the vat at 36 and being drawn off from the interior of the barrel of the beam 33 by the nozzle 9.

Water introduced into the junction piece 15 by the conduit 40 and valve 42 may be circulated in similar manner to the dyeing, bleaching or like liquor. On the closing of the valve 17, steam admitted by the conduit 41 and valve 42 to the junction piece 15, or compressed air from the compressor 4 admitted to the junction piece 15 by the conduit 38 and valve 39, may be led by the nozzle 9 to the interior of the barrel of the beam 33 and after passing through the yarn such steam or compressed air may escape from the vat through the drain outlet 43 and valve 44.

The bottom of the vat 2 may be provided with nozzles 46 adapted to be fitted with and to support removable hollow perforated boxes 47 on which can be placed cops, cheeses or hanks of yarn so that the apparatus may also be employed for treating yarn in the cop, cheese or hank. The nozzles 46 are connected by a branch conduit 48 with the conduit 37, a valve 49 being provided

to render the nozzles 46 inoperative and operative as required. Alternatively, the vat 2 may be provided with a perforated false bottom or partition, as indicated at 50, Fig. 2, arranged above the level of the opening 36 for the support of cops, cheeses or hanks of yarn, in which case the nozzles 46, trays or boxes 47, branch conduit 48 and valve 49 may be dispensed with.

What I claim as my invention, and desire to secure by Letters Patent is:—

1. In apparatus for treating yarn with fluids, a vat, a plurality of nozzles opening into the vat, a perforated hollow box for each nozzle through which the liquid passes and which are adapted to support yarn in the cop, cheese or hank, and a common conduit for supplying a fluid to all of said nozzles.

2. In apparatus for treating yarn with fluids, a vat, a plurality of nozzles opening into the vat, a perforated hollow box for each nozzle through which the liquid passes and which are adapted to support yarn in the cop, cheese or hank, a common conduit for supplying a fluid to all of said nozzles, a second conduit leading to the interior of said vat, a third conduit, and a valve for controlling communication selectively between the third conduit and either of the other conduits.

3. In apparatus for treating yarn with fluids, a vat, a plurality of nozzles opening into the vat, a perforated hollow box for each nozzle through which the liquid passes and which are adapted to support yarn in the cop, cheese or hank, a common conduit for supplying a fluid to all of said nozzles, a second conduit leading to the interior of said vat, a third conduit, a valve for controlling communication selectively between the third conduit and either of the other conduits, a fourth conduit connecting to said vat at a higher level, a pump, and a second valve for controlling the circulation of a liquid by the pump and conduits through the vat in either direction.

In witness whereof I have hereunto set my hand.

ROBERT SMITH HEAP.