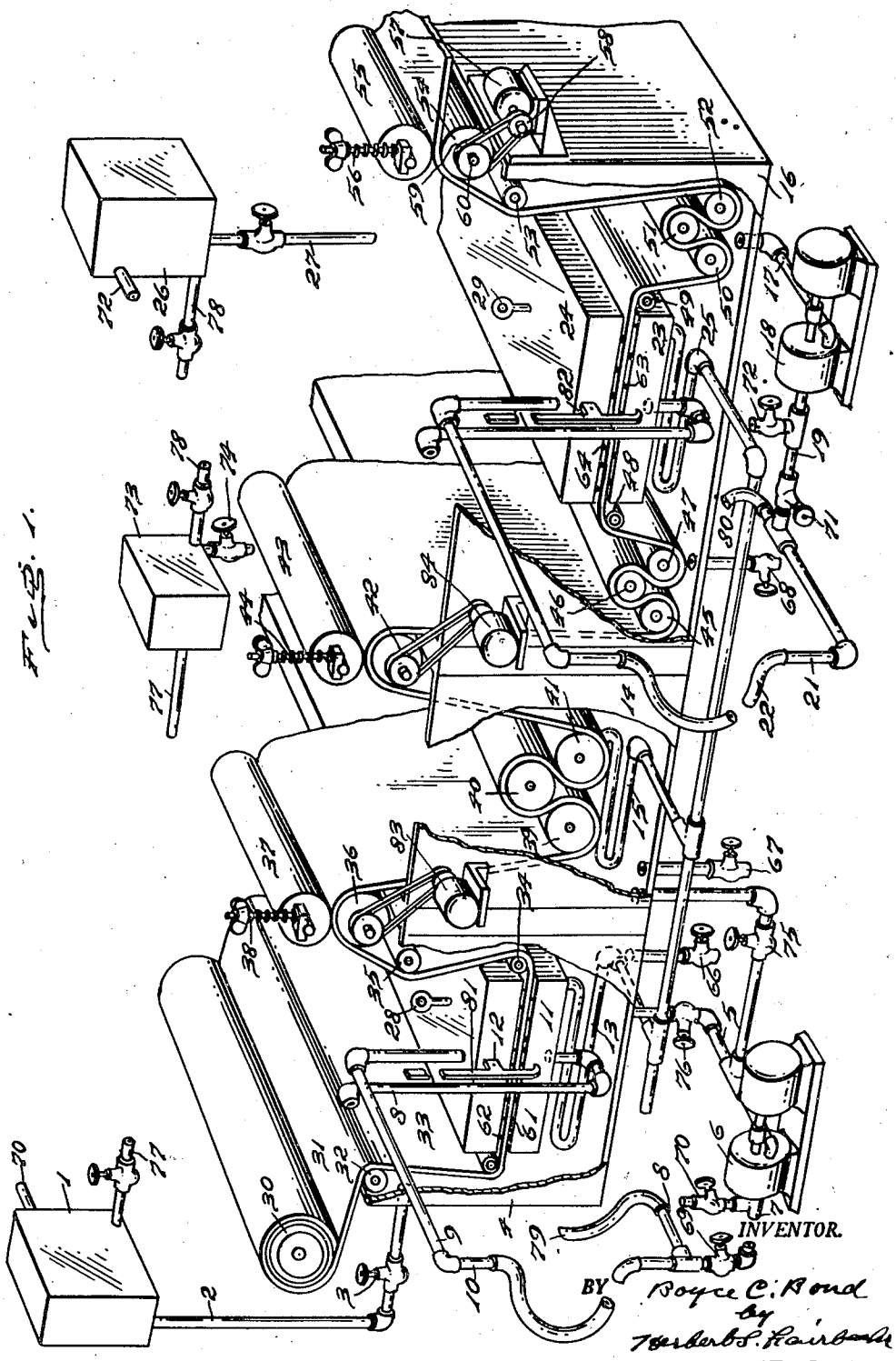
May 11, 1948. B. C. BOND 2,441,308

APPARATUS FOR TREATING FABRICS

Filed Oct. 16, 1945 2 Sheets-Sheet 1



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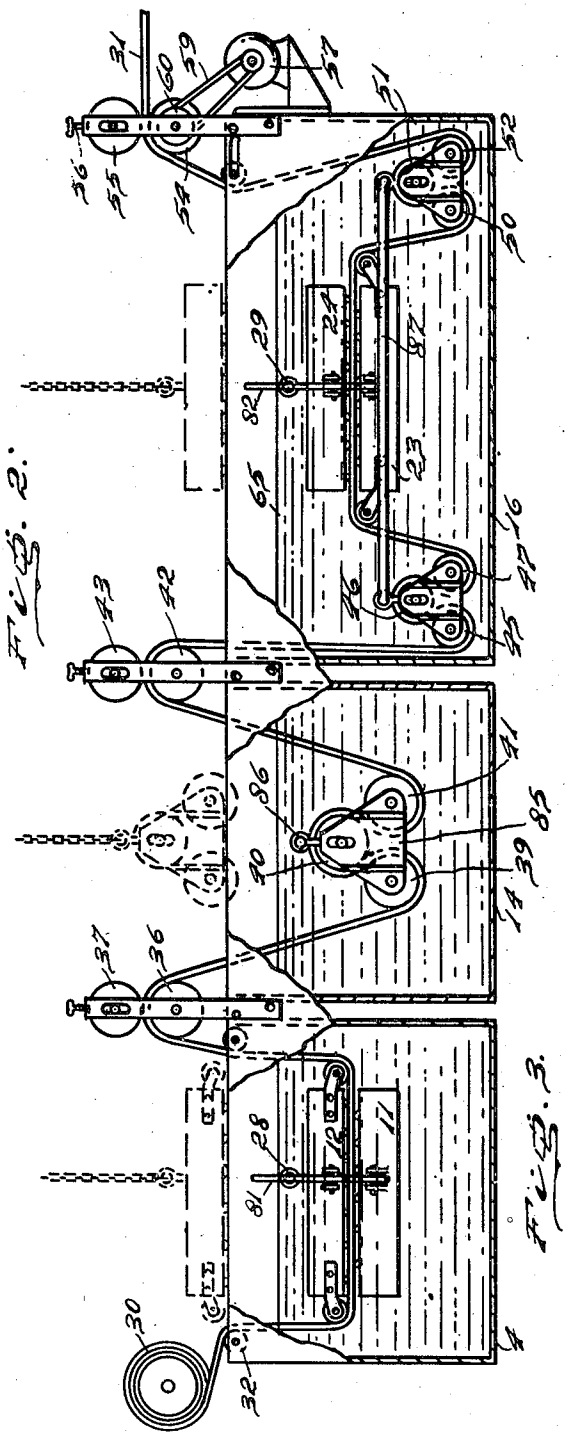


Fig. 2.

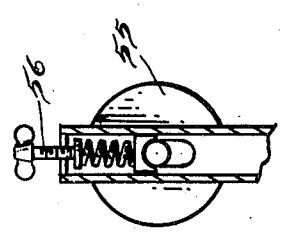


Fig. 5.

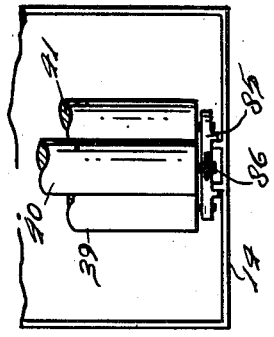


Fig. 4.

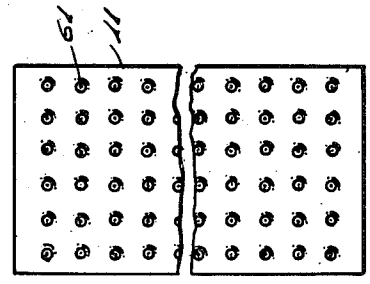


Fig. 3.

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APPARATUS FOR TREATING FABRICS

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Application October 16, 1945, Serial No. 622,531

3 Claims. (Cl. 68—175)

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The object of this invention is to devise a novel apparatus for treating material.

In carrying out the invention in practice, I employ one or more pressure units or sets of units whereby the treating fluid can be forced under hydraulic pressure against one or both sides of the material while the latter is travelling in a submerged position through the treating fluid. Squeeze rolls may be employed to exert a constant squeeze pressure on the material, which latter in many cases would be in strip or sheet form.

In the treatment of fabrics, I control uniformity and insure thorough penetration of the dyes, chemicals or other treating agents, such as soaps, detergents, wetting agents, fixing agents, coating compounds, waterproofing compounds, finishing compounds, scouring and cleaning compounds, mildewing-proof compounds, softening compounds, permanent type finishing compounds, and the like.

The colors, detergents, chemicals and the like are applied to the material in one or more pressure units, and the material is fed to a further unit or units in order to properly permeate, fix and fasten the dyestuffs, chemicals or compounds to the material or to its fibres.

The invention can be satisfactorily employed in the dyeing of vat, naphthol, sulphur, diazo, direct, acetate, basic or pigment colors or other groups.

For vat colors, the goods are first entered dry into the three units employed containing the vat pigment in suspension which has little or no affinity for the fabric or fibre; then, wet or par dried, and fed into a second unit or units for reduction and development.

The dye or chemical liquor is forced into the innermost part of each individual fibre of the fabric through jets or nozzles, and thereafter the squeeze rolls exert a constant squeeze pressure on the fabric beneath the surface of the dye liquor or chemicals. Any combination of colors may be employed regardless of the exhaust or affinity rating, and well permeated dyeings of most excellent uniformity result.

A similar manner of application is used for naphthol, sulphur, and diazo colors or such group of colors which have to be fixed or developed on to the fibre or fabric.

Where colors such as acetate, direct, basic or pigment colors which do not require further development are used, it is possible to employ only one set of three units in continuous form.

Algosol or indigosol colors (the stabilized solubilized vat colors) can be successfully dyed in one set of the pressure units by a continuous method.

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The dyes or chemicals are dissolved or dispersed and placed in their tanks and fed thereinto as required by fabric consumption, the fabric passing beneath the surface of the dye or chemical liquor through pressure units, then rubber squeeze rolls, and from the apparatus through final, heavy-set squeeze or nip rolls.

The pressure units can be used in scouring, cleaning or preparing fabrics or materials, containing various fibres, such as vegetable, animal or synthetic, mixed by carding, blending, spinning, weaving, knitting and the like, by applying the soaps, detergents or chemicals for conditioning the material before dyeing, printing, bleaching or other treatments.

The pressure units may also be advantageously employed in the application of soaps, detergents or chemicals after dyeing or printing to insure improved effects and at the same time a curtailment of costs and an increase of production by continuous speeds.

Fabrics containing vegetable origin, such as cotton, flax, synthetic (such as cellulose acetate, viscose cuprammonium, nylon, etc.), and fabrics containing animal fibre, such as silk, mohair or wool can be satisfactorily processed in the pressure units.

The units may be used to process fabrics regardless of their constitution even though the fibre may show individual differences in reaction on conventional types of machines.

The invention can be employed to apply coating or finishing compounds of the soluble or dispersed type, waterproofing compounds, mildewproofing compounds and cellulosic finish compounds.

By control of the motors of the pumps, variable or constant pressure can be maintained on the fluid being forced against one or both sides of the material being treated.

With the foregoing and other objects in view as will hereinafter clearly appear, my invention comprehends a novel apparatus for treating material.

For the purpose of illustrating the invention, I have shown in the accompanying drawings a preferred embodiment of it which I have found in practice to give satisfactory and reliable results. It is, however, to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized and the invention is not limited to the exact

arrangement and organization of these instrumentalities as herein set forth.

Figure 1 is a schematic view of an apparatus for treating material, embodying my invention.

Figure 2 is a side elevation of pressure units with the tanks partly broken away to show more particularly the manner in which pressure units and rolls can be raised above the level of the treating fluid.

Figure 3 is a plan view of one of the pressure casings.

Figure 4 is a top plan view, showing the mounting of a set of squeeze rolls.

Figure 5 is a detail of a mounting.

Similar numerals of reference indicate corresponding parts.

Referring to the drawings:

1 designates a supply tank for treating material, having a discharge pipe 2 provided with a valve 3 and discharging into a tank 4 of the first pressure unit. Liquid is withdrawn from the tank 4 by a pipe 5, leading to a motor driven pump 6 having a discharge pipe 7 communicating with branch pipes 8 and 9. The pipe 9 has a flexible portion 10. The pipe 8 leads to a lower pressure casing 11, and the pipe 9 leads to an upper pressure casing 12. A heating coil 13 of any desired type, for example steam or electric, is within the tank 4 for heating the treating material used therein.

Adjoining the tank 4 is a tank 14 having a heating coil 15.

Adjoining the tank 14 is a tank 16 having a pipe 17 leading to a motor driven pump 18 having a discharge pipe 19 with branches 20 and 21, the branch pipe 21 having a flexible portion 22. The pipe 20 leads to a lower pressure casing 23 and the pipe 21 leads to an upper pressure casing 24. The tank 16 has a heating coil 25. A supply tank 26 for the tank 16 has a valve controlled discharge pipe 27. The casing 12 has hooks 28 and the casing 24 has hooks 29 for raising the pressure casings out of their liquid as will hereinafter be explained.

The material to be treated is on a supply roll 30, suitably journalled on the apparatus, and carrying a strip or sheet 31 of the material to be treated. This strip passes over a roll 32 and under rolls 33 and 34, the latter two rolls being mounted on a pressure casing, see Fig. 2, then over a roll 35, and between pressure rolls 36 and 37 having a pressure adjustment 38, around squeeze rolls 39, 40 and 41 in tank 14. The strip passes from the tank 14 between rolls 42 and 43, having a pressure adjustment 44, and then into the tank 16 which has pressure casings and sets of squeeze rolls beneath the surface of the liquor. The strip passes around rolls 45, 46 and 47, over rolls 48 and 49, carried by a pressure casing, and then around a second set of squeeze rolls 50, 51 and 52. The strip next passes over roll 53 and between pressure rolls 54 and 55 having a pressure adjustment 56. The roll 54 is driven by an electric motor 57 having a pulley 58 on its shaft. A belt 59 passes around the pulley 58 and also around a pulley 60 on the shaft of the roll 54 to drive it. Thus, the strip 31 is fed through the apparatus in a continuous operation.

Each set of pressure casings has opposed nozzles between which the strip passes. The casing has nozzles 61 in its upper wall, and the casing 12 has nozzles 62 in its bottom wall. The nozzles are closely spaced and are preferably arranged in staggered relation in the upper and lower casings.

The level of liquid maintained in the tanks 4, 14 and 16 is indicated by line 65. The tanks 4, 14, and 16 have valve controlled drain outlets 66, 67 and 68, respectively.

Provision is made for returning the liquid in a tank to its supply tank. The pipe 7 has a valve 69 to cut off flow to the casings 11 and 12, and a valved controlled pipe 70 leading into the supply tank 1. The pipe 19 from the tank 16 has a valve 71 to cut off flow to casings 23 and 24, and a valve controlled pipe 72 leading to the tank 26.

The tank 14 has a supply tank 73 having a valve controlled pipe 74 discharging into the tank 14. A valve controlled pipe 75 from tank 14 leads to the pipe 5 which has a valve 76 to stop flow from tank 1 when the liquor in tank 14 is to be returned to tank 1 through pipe 70. The tanks for supply 1 and 73 may be connected by valve controlled pipe 77, and the supply tanks 73 and 26 can be connected by a valve control pipe 78.

In order that both casings of a set of pressure casings can be removed at the same time, the pipe 8 has a flexible portion 79, and the pipe 20 has a flexible portion 80; and the casings 11 and 12 have a clamp 81 for locking them together, and the casings 23 and 24 have a similar clamping mechanism 82 for locking them together in spaced relation. A desired number of these clamping mechanism are employed, so that the upper and lower casing of a set can be raised above the liquor when desired.

A single motor can be employed to feed the strip of material to be treated through the machine, and to equalize the tension the roll 36 may be driven by a motor arrangement 83, and the roll 42 by a motor arrangement 84 so that each unit would have an independent drive. These motors as well as the motor 57 would be preferably synchronous motors, and the motor drive connections for the motors 83 and 84 would be similar to that of the motor 57.

I have shown three pressure units 4, 14 and 16 connected in line, but many other arrangements are used depending upon the work which is to be done, for example, two sets of units can be connected in line, namely, 4, 14, 16—4, 14 and 16. A dryer may be connected between the two sets.

Tank 4 and its adjuncts can be used alone, and the same holds true of units 14 and 16.

The continuous line may be the following arrangements, 4 and 14; 4, 14, 16, 16; 14, 16; 4, 16, 4, 16; 4, 16, dryer, 4, 16; 14, 16, 16; 4, 14, 16-dryer-16, and many other combinations as will be apparent.

The squeeze rolls 39, 40 and 41 are journalled on carriers 85 having hooks 86, the journals of rolls 39 and 41 being fixed and the shaft of roll 40 floating in a slot so that the pull of the fabric will cause the floating roll 40 to be pressed against the other two. The journals for the set of rolls 45, 46 and 47 and the set of rolls 50, 51 and 52 are mounted on a carrier 87 connected with the casing 23.

The operation of the apparatus will now be clear to those skilled in this art and is as follows:

Assuming that the desired treating solution has been placed in the supply tanks and that the strip of material to be treated has been threaded into position as shown in Figure 1, the motors are started to effect the feed of the material and the operation of the pumps. As the strip passes between the pressure casings of unit 1 in close proximity to their nozzles, the treating

material withdrawn from the tank 4 is injected into the strip under hydraulic pressure substantially throughout the area of the strip between the casings and permeates and penetrates the material of the strip. The strip now passes between the rolls 36 and 37 which remove excess treating material and into the unit 14 where the strip is subjected to a squeezing action by the rolls 39, 40 and 41. If the treatment is to be continued, the strip passes from the rolls 42 and 43 into the unit 16 where it is subjected to two squeezing actions, prior to and subsequently to the injection of the treating material against one or both sides of the strip.

If the strip should break the pressure casings and squeezing rolls can be raised above the hot liquor and the strip threaded into position between the casings of a set and between the different rolls.

It will be apparent from the foregoing disclosure that the nozzles in one pressure casing are in alignment with imperforate baffle portions in the opposed pressure casing. The result of this is that the ejection of the treating solution into the space between the casings creates an equilibrium of pressure of the treating solution within and throughout the area of such space. This pressure maintains the strip of fabric being fed between the casings in equi-distant relation with the nozzles in the opposed faces.

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

1. In an apparatus for treating fabric, a tank to receive the treating solution, pressure casings submerged in the solution, with juxtaposed faces in alignment and in spaced relation, each of said faces having closely spaced nozzles with imperforate baffle portions between the nozzles, means to feed a treating solution under pressure into said casings, the nozzles in each of said juxtaposed faces being in alignment with baffle portions of the other juxtaposed face whereby the ejection of treating solution into the space between the casings creates an equilibrium of pressure of the treating solution within and throughout the area of said space, and means to feed a fabric through said space, the pressure of the treating solution maintaining the fabric during such feed in equi-distant relation with the nozzles in said juxtaposed faces.

2. In an apparatus for treating fabric, a tank to receive the treating solution, pressure casings submerged in the solution with juxtaposed faces in spaced relation and having closely spaced nozzles with imperforate baffle portions between the nozzles, means to feed a treating solution under pressure into said casings, the nozzles in each of said juxtaposed faces being in alignment with baffle portions of the other juxtaposed face whereby the ejection of treating solution into the space between said casings creates an equilibrium of pressure of the treating solution within and throughout the area of said space, and means to feed a fabric through said space, the nozzles being located on their faces entirely within the area of fabric being fed between the casings.

3. In an apparatus for treating fabric, a tank to receive the treating solution, pressure casings submerged in the solution with juxtaposed faces in spaced relation, each of said faces having closely spaced nozzles with imperforate baffle portions between the nozzles, the nozzles in one face being opposite to the baffle portions of the other face, clamping means to retain the pressure casings in fixed relation with each other, and means to feed a fabric through the space between the casings, said fabric during its feed through said space being maintained in equidistant relation with the nozzles in juxtaposed faces by the treating solution ejected from the nozzles against opposite sides of the fabric.

BOYCE C. BOND.

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