

May 3, 1955

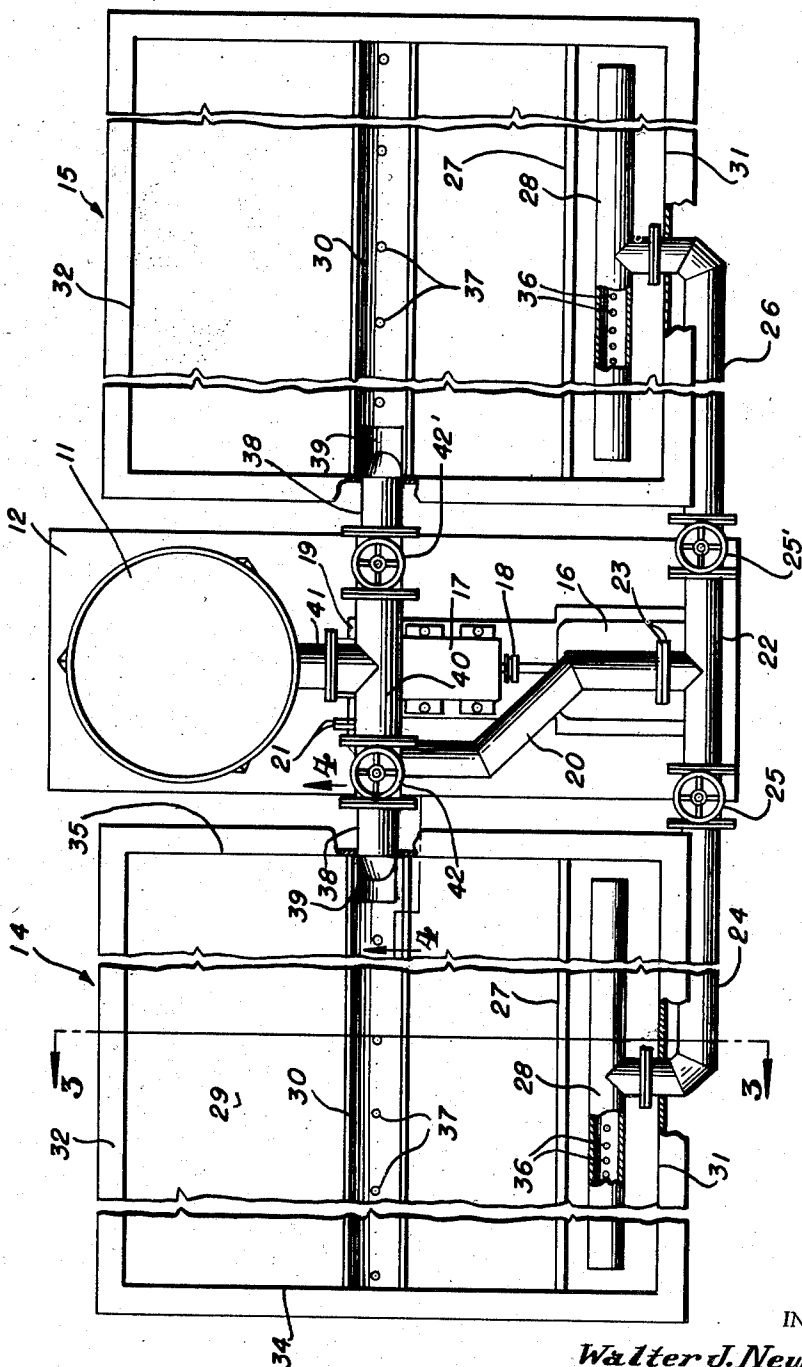
W. J. NEWCOMB
CIRCULATING DYE SYSTEM

2,707,382

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2 Sheets-Sheet 1

FIG. 1.



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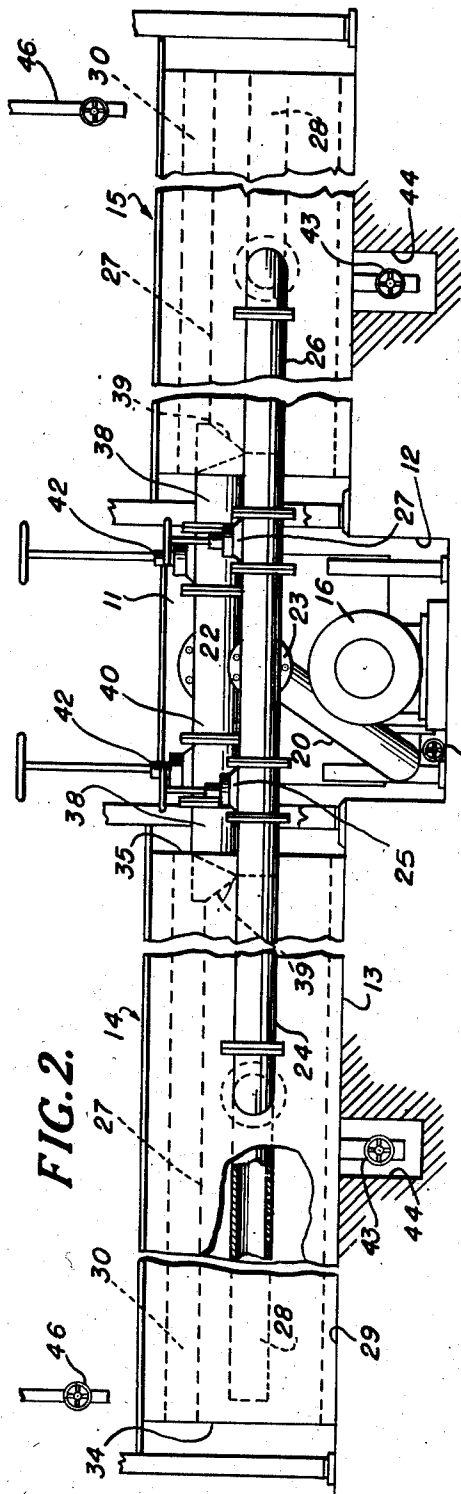
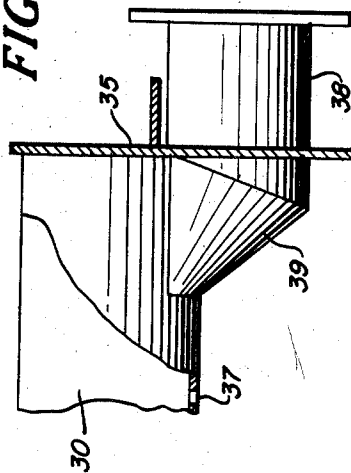
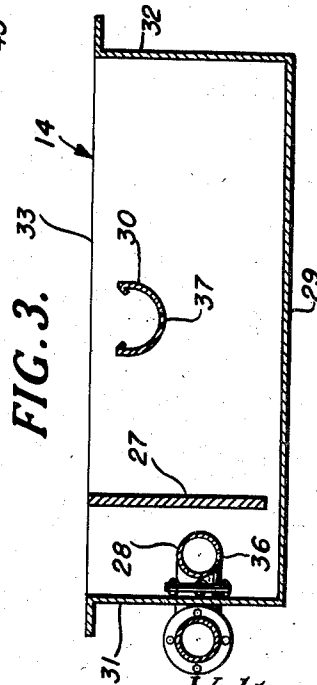


FIG. 4.



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CIRCULATING DYE SYSTEM

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3 Claims. (Cl. 68—184)

This invention relates to apparatus for dyeing piece goods and particularly to an apparatus for dyeing piece goods in a plurality of dye tubs.

Practical considerations place a limitation on the size of dye tubs which can be economically used, so that when a large quantity of piece goods are to be dyed exceeding the capacity of a single tub, it is necessary to utilize a second, and sometimes a plurality of tubs. If a number of articles are to be dyed in a plurality of diverse tubs, it is found to be extremely difficult, and in many cases impossible, to produce goods of precisely the same shade of color in each of the several tubs. In modern industry, the maintenance of an identical shade in a large quantity of material is frequently a matter of the utmost importance, since articles of apparel and other fabrics are mass produced in greater quantities and the various portions of the articles when sewn together must not be distinguishable in shade one from the other.

If a dye tub could be made which would be large enough to handle the largest batch of goods to be dyed, this would still not be satisfactory since job lots are of varying sizes and the tub capacity for dyeing such lots must be adaptable to each separate order. The use of as many dye tubs as are required solves the problem of quantity but introduces the problem of varying shades of dye from tub to tub.

The present apparatus is very flexible and adaptable to a wide range of work. It is economical to operate since any number of articles may be dyed to the same even shade of color without the requirement of expensive equipment, inasmuch as the main units of the apparatus are available for use in conjunction with any number of dye vats which may be added as the need arises.

It is an object of this invention to provide piece goods dyeing apparatus having a plurality of dye tubs so interconnected that a uniform shade of color is obtained in all of the tubs.

It is another object of this invention to provide dye apparatus which will eliminate the gradation of shading of articles placed within a single tub.

It is a further object of this invention to provide dyeing apparatus in which larger lots of the same color can be made wherein the color from tub to tub will remain the same in shade.

It is a still further object of this invention to provide dyeing apparatus which circulates the dye liquor from tub to tub and also within each separate tub.

Still another object of this invention is to provide dyeing apparatus having a plurality of dye tubs so connected that any tub or tubs can be eliminated from the system and operated as a separate unit.

It is still another object of this invention to provide dyeing apparatus in which a plurality of dye tubs are connected to a common dye tank from which the dye tubs are supplied with dye liquor.

Further objects and advantages of this invention will be apparent during the course of the following description.

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In the accompanying drawings, forming a part of this application, in which like numerals are designated to like parts of the same,

Figure 1 is a plan view of a preferred embodiment of the invention.

Figure 2 is a side elevation of the embodiment of Figure 1.

Figure 3 is a sectional view taken on the line 3—3 of Figure 1, and

Figure 4 is a fragmentary detail of the means for connecting the overflow trough of one of the dye tubs to a dye liquor return main.

The general nature and scope of this invention may be best understood by the description of a preferred embodiment of this apparatus for dyeing a large quantity of piece goods to an even shade of color in a plurality of dye tubs.

An important element of the apparatus consists of a central reservoir or tank containing dye liquor. This tank is placed in a pit or sub-basement so as to have its bottom portion below the level of the floor upon which the dye tubs rest. Suitably surrounding this tank and secured to the floor are a plurality of dye tubs which are individually connected to the tank for recirculating dye liquor from the tank to the tubs and back. Conduit and pumping means are provided for this circulation as will be set forth hereinafter. The dye tubs are also equipped with valve control means whereby each tub may be removed from the circuit, or the single tub may be operated by itself to the exclusion of the remainder of the dye tubs.

Referring now to Figures 1 and 2, this invention comprises a centrally located tank 11 disposed in a pit 12 so that the lower portion of the tank will be below the level of the floor 13. In the illustrative example, tubs 14 and 15 rest on the floor 13 and are placed conveniently close to pit 12 so as to facilitate the connection of these dye tubs to the tank 11.

This pit 12 (Figure 1) is of sufficient size to accommodate an electric motor or other suitable prime mover 16 which is coupled to a gear box 17 by means of a flexible coupling 18. The gear box in turn is connected to a pump 19, the inlet side of which is connected to the lower portion of tank 11 by suitable means. An offset pipe 20 is connected to the output side of the pump 19 by means of collar flanges 21 on one end, and to a T fitting 22 at the other end by means of collar flanges 23. Dye tub 14 is connected to one end of T fitting 22 by means of an elbow pipe 24, and the flow of dye liquor from T fitting 22 into elbow pipe 24 is controlled and regulated by valve 25. Similarly, dye tub 15 is connected to the other end of T fitting 22 by means of elbow pipe 26, and the flow of dye liquor through this elbow pipe is controlled and regulated by means of valve 25'.

Tubular dye liquor distributors 28 are connected intermediate their end portions to the ends of elbow pipes 24 and 26 respectively which project inwardly into vats 14 and 15 respectively.

Dye tubs 14 and 15 are disposed on opposite sides of tank 11 but in all other respects are identical, and accordingly like parts are designated by like numerals.

Referring in particular to dye tub 14 (Figures 1, 2 and 3) distributor tube 28 has perforations or holes 36 spaced longitudinally along its lower portion so that dye liquor entering this tube will be discharged downwardly through these holes toward the bottom 29. An overflow trough 30 is placed intermediate the side portions 31 and 32 (Figures 1 and 3) and is positioned slightly below the top edge 33. This overflow trough is of U-shape cross section, and is integrally secured to the opposite end portions 34 and 35 (Figures 1 and 2). Overflow trough 30, similarly to distributor tube 28, has holes 37 spaced longi-

tudinally along its lower portion. The end of overflow trough 30 secured to end portion 35 of the dye tub is connected to return main 38 which is secured to an opening in the bottom of overflow trough 37 by means of suitable connecting portion 39 (see Figure 4). Return main 38 is in turn secured to a T fitting 40 which is connected to a collar 41. Collar 41 completes the circuit by joining the T portion 40 to tank 11. Intermediate return main 38 and T fitting 40 is a valve 42 so placed to regulate the return flow of dye liquor from vat 14 to tank 11 where it is then recirculated through the piping system above described.

A baffle plate 27 is vertically disposed intermediate distributor tube 28 and overflow trough 30, and is integrally secured at each end to adjacent end portions 34 and 35. The top edge of this plate is flush with the top edges of the dye tub and the bottom edge is spaced apart from the bottom 29 of the tub.

When a dyeing operation has been completed, and the apparatus is to be drained, each tub may be emptied by means of draining valve 43 (Figure 2) placed in the lowermost portion of vat 14 and projecting downwardly into a pit 44 placed below the floor level. In order to drain the liquid from the piping system, a valve 45 (Figure 2) is suitably placed in the lowest portion of the system as at the portion of pipe 20 immediately adjacent to the output portion of pump 19.

In operation, the tank 11 is filled with a dye liquor and the tubs may be filled with water from any suitable means such as water supply valve 46 (Figure 2). Depending on the quantity of material to be dyed, the number of dye tubs to be used is first determined and certain of the tubs are either included or excluded from the operation of the system by means of valves 25, 25', 42 and 42'. If both dye tubs 14 and 15 are to be used, all valves are opened and motor 16 is started. This motor drives pump 19 which in turn forces dye liquor through pipe 20 up into T fitting 22 where the dye liquor is divided and is directed through pipes 24 and 26 into dye tubs 14 and 15. When the dye liquor enters the distributor tube 28, it is forced through holes 36 downwardly to the bottom 29 of the dye tub and thence along the bottom until it passes underneath baffle plate 27 and enters the main portion of the dye tub. At this point the dye liquor forms substantially two streams, one stream flowing upwardly toward the left top edge of overflow trough 30 as shown in Figure 3 and the other stream flowing over the bottom 29 of the dye tub until it is turned upwardly by side portion 32 and thence toward the right-hand top edge of overflow trough 30. When the level of the tub is higher than that of the top edges of the overflow trough 30 this dye liquor spills over into the trough and is returned to tank 11 for recirculation by means of connecting portion 39, return main 38, connecting T 40 and collar 41.

If for some reason, the level of liquor in the dye tub should fall beneath the top edges of overflow trough 30, a constant supply of dye liquor to the pump 19 is assured since a small quantity of the dye liquor will still enter the trough 30 through holes 37 and be returned to the tank 11 and pump 19 as above described.

Thus, it may be seen that this apparatus provides

means for circulating the same dye liquor throughout a series of separate tubs whereby the piece goods being treated in the separate tubs will receive the same shade of dye regardless of which tub they may be in. It may also be appreciated that this described apparatus is quite flexible in that a single dye tub may be utilized with this equipment or as many other dye tubs may be added to the system as are required to dye a given quantity of piece goods to the same shade of color. While only two tubs are illustrated, it will be apparent that any greater number may be employed. In addition to recirculation of the common dye liquor throughout all the tubs in use, complete circulation within each individual dye tub is assured by means of the novel structure disclosed and used in each separate tub. The location and structure of the distributor pipe used in combination with the baffle plate and overflow trough assures the complete distribution and continuous movement of dye liquor within the tub so that no unevenness of shading of piece goods in any tub will occur.

It is to be understood that the form of this invention, herewith shown and described, is to be taken as a preferred assembly of the same, in that various changes in the shape, size and arrangement of the parts may be resorted to, without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A dye tub comprising a dye liquor distributor tube in said tub adjacent one side thereof and extending longitudinally substantially the length of said tub, supply means connected to the central portion of said distributor tube, a dye liquor overflow trough centrally disposed intermediate the sides of said tub, below the top edges thereof and extending horizontally between the ends of said tub, a baffle plate vertically disposed between said distributor tube and said overflow trough, said baffle plate being spaced from the bottom of said tub at its lower edge and flush with the top of said tub at its upper edge and extending longitudinally between the ends of said tub, and return means connected to said overflow trough.

2. Apparatus as defined in claim 1, wherein said distributor tube is horizontally disposed and perforated along its bottom, whereby dye liquor is directed downwardly into said tub for passing under the lower edge of said baffle plate.

3. Apparatus as defined in claim 2, wherein said overflow trough is perforated along its bottom portion to permit dye liquor to enter said trough from the underside thereof when the dye liquor level in said tub falls below the top edge of said trough, whereby a constant supply of dye liquor is maintained to said return means.

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