

March 16, 1948.

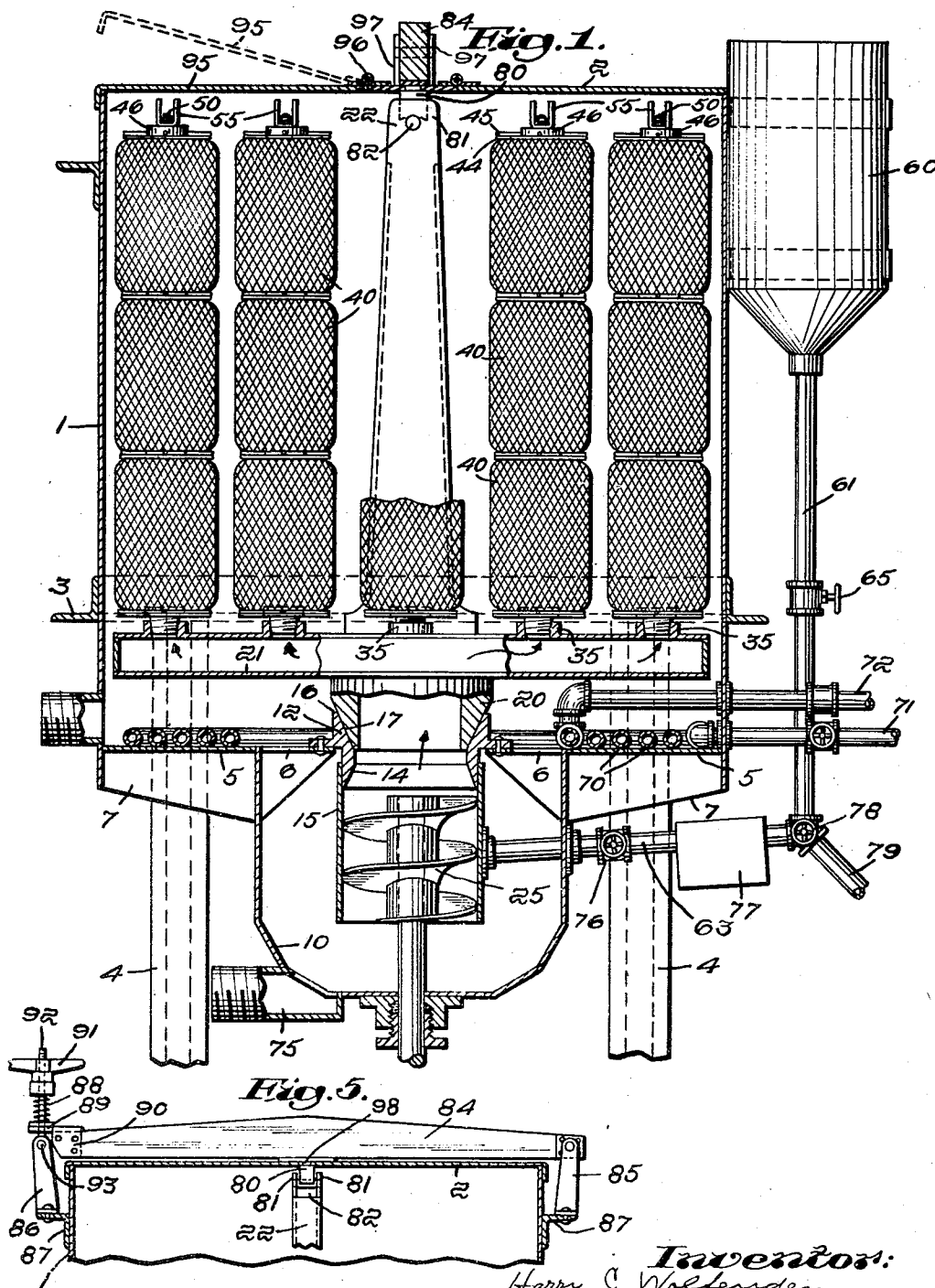
H. C. WOLFENDEN

2,437,987

SPACER AND PROTECTOR FOR YARN HOLDING DEVICES

Filed April 24, 1945

2 Sheets-Sheet 1



Inventor:
Harry C. Wolfenden

by James R. Hodder
Attorney

March 16, 1948.

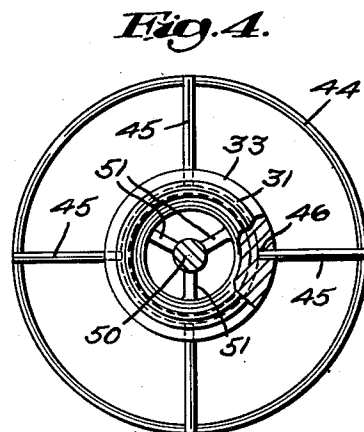
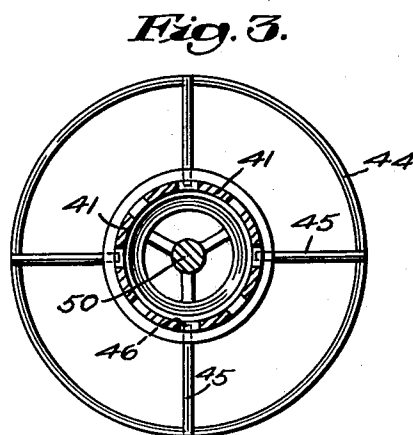
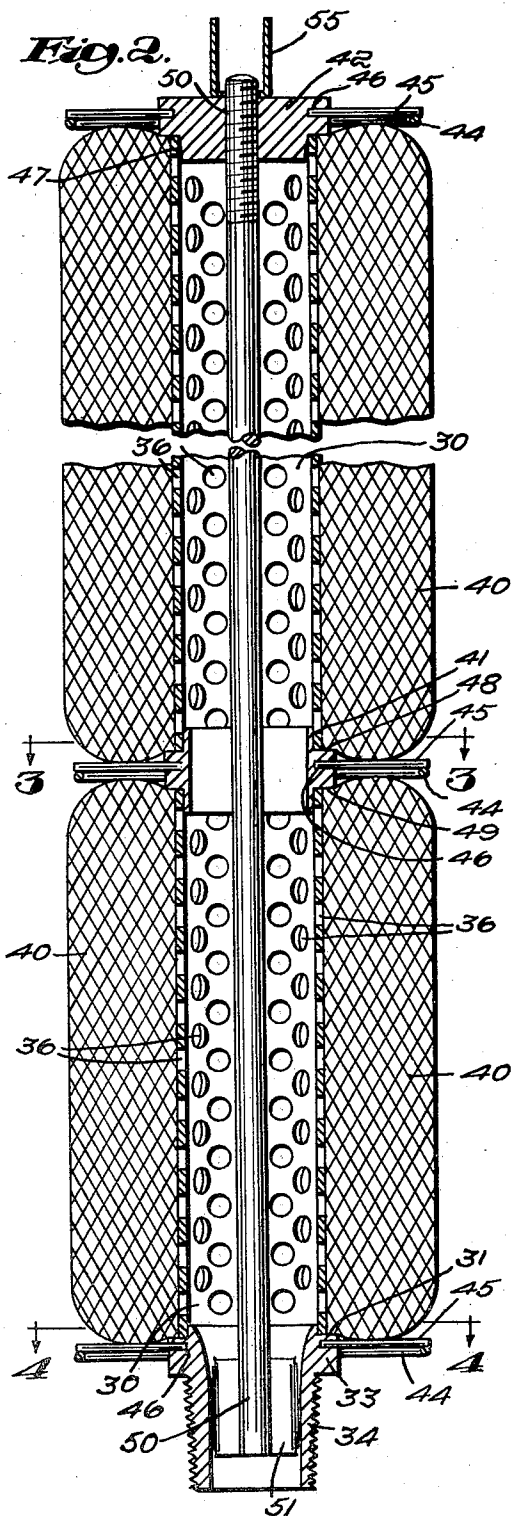
H. C. WOLFENDEN

2,437,987

SPACER AND PROTECTOR FOR YARN HOLDING DEVICES

Filed April 24, 1945

2 Sheets-Sheet 2



Inventor:
Harry C. Wolfenden
by *James R. Hodder*
Attorney

UNITED STATES PATENT OFFICE

2,437,987

SPACER AND PROTECTOR FOR YARN-HOLDING DEVICES

Harry C. Wolfenden, Attleboro, Mass.

Application April 24, 1945, Serial No. 590,070

1 Claim. (Cl. 68—198)

1

My present invention is directed to improve and perfect dyeing apparatus wherein a plurality of packages, spools, cheeses, or the like, of yarn or other material are contained in a tank; and more particularly the invention is directed to the holding and spacing devices for such articles to be dyed.

Heretofore it has been customary to assemble a plurality of packages on a spindle to be treated in a tank wherein dyeing liquid is circulated, but the means for holding the packages, as well as for spacing adjacent packages from each other, has caused a great deal of difficulty, interfering with the free circulation of the dyeing liquid and thus preventing a free flow and complete dyeing action of the material in contact with the holding and spacing devices. Such prior spacing devices are shown, for example, in my prior and copending application Ser. No. 533,847, filed May 3, 1944 (now abandoned).

In my present invention of an improved holding and spacing element for such dyeing apparatus, I have devised an extremely simple and efficient holding and spacing element which will eliminate the difficulties heretofore experienced in this work and insure the full and complete flow of dyeing liquid thru the entire end portions and area of each package because the holders and spacers are constructed and arranged so as to avoid any interruption in the flow of dyeing liquid around the ends of the packages, spools, and the like; and, on the contrary, will facilitate the flow of dyeing liquid directly into and thru the entire area and portions of each end of the articles being treated.

As heretofore shown, I prefer to embody the improved holding and spacing devices in a unit dyeing apparatus of the general type of my prior and copending application Ser. No. 513,239, filed December 7, 1943, wherein a circular tank of considerable area is adapted to receive a removable holder comprising a manifold and a plurality of rods, which rods extend thru and hold a plurality of hollow tubes, spools, or the like, each tube or spool carrying the material to be dyed. Such material to be dyed is in the form of packages, and these are held and positioned on each tube by my improved spacer and holder, which spacer gives a free-flowing action around, into, and thru the end portions of each package, as distinguished from the perforators, separators, and supporting elements of my said prior application Ser. No. 533,847 (now abandoned).

In such dyeing apparatus, it is important and necessary to have the tank and the spool, tube,

2

or article-holding elements of a material which will not be either discolored by the liquid nor discolor the articles being held therein and dyed. I prefer, therefore, to utilize either special acid-resistant synthetic plastics or stainless steel, either of which materials I find will stand up as linings for the tank and holding elements for the material being treated.

My improved separator is formed as a light wire cage, having a diameter sufficient to protect and hold the outer edges of the packages carried thereby, and a plurality of similar light radial members united to a hub.

Such a light wire cage may be either a separating element between adjacent series of spools, spindles, or the like, and on the same dye-supporting spindle, or may constitute the top and bottom holding portion of either one or a plurality of such packages on a holding spindle.

Referring to the drawings illustrating a preferred embodiment of my invention shown in assembly with the unit dyeing apparatus such as illustrated in my said prior application Ser. No. 513,239:

Fig. 1 is a vertical plan view partly in cross-section of a circular dyeing tank in a unit dyeing apparatus.

Fig. 2 is an enlarged cross-sectional lengthwise view of a spindle extending thru hollow perforated tubes on which yarn or the like material is wound, with my novel form of holding and spacing element;

Fig. 3 is a cross-sectional view on the line 3—3 of Fig. 2, and

Fig. 4 is a cross-sectional view on the line 4—4 of Fig. 2, and

Fig. 5 is a fragmentary side view illustrating the braces and holding construction for the removable top.

Referring to the drawings, a circular tank 1 is provided with or without a removable top 2, said tank having an encircling flange 3 to be engaged by a set of vertical supports 4—4, the bottom 5 of the tank having a series of central openings 6—6 admitting a flow of liquid within the tank thru said openings 6 into a centrally positioned sump 10.

A series of radial braces 7 support the floor 5 and extend inwardly beyond the openings 6 to carry a flanged collar 12, having a depending portion 14, to which a circular sleeve 15 is welded or otherwise secured, and an upstanding flange 16 formed with its interior surface bevelled, as shown at 17, to fit the correspondingly outer bevelled surface of a hollow hub 20, to which hub

3

is secured a hollow circular manifold 21 and adapted to be lifted out of the tank 1 by a lifting bail 22 separating the bevelled surface on the hub 20 and flange 16 by this mere lifting action and, similarly, connecting them by the lowering of the apparatus into the tank 1.

Adapted to rotate in the sleeve 15 is a propeller pump 25 rotatably actuated by a reversible motor (not shown) and normally forcing dyeing liquid contained within the sump 10 upwardly in the direction of the arrow, Fig. 1, thru the interior of the manifold 21 and, hence, therefrom thru a plurality of openings arranged around the manifold and adapted to receive the threaded ends of hubs, on which hollow tubes carrying the packages to be dyed are fitted and held.

As best shown in Fig. 2, each of these hollow and perforated tubes 30 is adapted to fit into a circular groove 31 in the upper part of a hub 33, said hub having its lower portion threaded as indicated at 34 to fit within the correspondingly threaded openings 35 formed in the top of the manifold 21, as shown in Fig. 1.

In the present construction, I have illustrated the manifold 21 adjacent the bottom of the tank 1 but this manifold may be otherwise positioned, as for example, in the intermediate vertical height of the tank 1 with hollow tubes attached above and below the same, as shown in my said prior application 513,239.

Dyeing liquid supplied in the tank or sump 10 is forced by the propeller pump 25 upwardly thru the sleeve 15, hub 20, manifold 21, and each hollow tube 30 flowing outwardly thru the series of perforations 36 in each tube into and thru the encircling cheeses 40 or thru the spools and packages assembled therein.

In order to hold and space these packages 40 appropriately and insure a full free-flowing of the dyeing liquid around the ends, preventing under-dyeing at the end portions, I have devised my novel supporting, spacing, and protecting cage construction which can be utilized either for the lowermost and, hence, supporting member 33 or for an intermediate spacing and supporting element, as indicated at 41, or for a top-holding element as shown at 42.

In either case, the protecting and spacing element comprises a circular wire 44 of substantially equal diameter to that of the package 40 being held or applied on the tube, with a series of similar supporting radial wire-like member 45, four being herein illustrated, which extend from the hubs 33, 41, or 42 to each encircling wire 44 and are welded to the latter. The hubs may be tapered on the outside to give a wedging effect, as indicated at 47, for firmer interlocking with the adjacent end of the hollow tubes.

The radial members 45 can be and, preferably, are fitted in recesses 46, bored or otherwise formed in each of the hub members to which these wire cage elements are attached.

As shown in Fig. 3, the intermediate spacing hub 41 is formed with a circular flange or shoulder as indicated at 48 and 49 to receive the end portions of the adjacent hollow tubes 30 when the tubes are being assembled with the cheeses 40 thereon. The wire cage-supporting and spacing members 44 and 45 extend outwardly from the hub 41 sufficiently to be substantially equal in diameter to that of the adjacent packages 40 and to space the top of one from the bottom of the next superimposed cheese, and thus hold them apart to permit the liquid dye flowing thru the perforations 36 in each of the hollow tubes 30

4

thru the package 40 at the top and bottom, as well as laterally, thus producing a full, even, and uniform dyeing action. The thin wire cage-like members 44 and 45 are preferably round and relatively so thin as to afford no interruption nor prevention of the full free-flowing of liquid dye thru the packages at the ends. The hub 41 is sufficiently thin and streamlined to permit full capacity of liquid flow therethru.

Fig. 4 illustrates in plan view the hub 33 and its radial member 45 each fitted in recesses 46 and extending to and supporting, by welding or otherwise, the outer circular rim 44.

In order to hold the assembled hollow tubes 30 in position, I provide a clamping rod 50 secured to a plurality of three or more webs 51 in the bottom portion of the hub 33, preferably extending substantially throughout the length of the threaded member 34, thus supporting the central rod 50 on which the series or plurality of hollow tubes 30 and the packages carried thereby are assembled.

The top spacer and holder 42 is fitted with a wing nut 55 and is threaded onto the rod or spindle 50; thus, tightening of the wing nut will hold the assembled packages in position. The spindles are then threaded into the corresponding openings 35 around the manifold 21 and then the entire apparatus is lowered into the tank 1, after which the cover 2 may be applied and dyeing liquid circulated thru the tubes and outwardly thru the cheeses, and this operation reversed as above noted, as often as may be desired.

In order to supply dyeing liquid into the tank 1 and sump 10, or to supply an additional charge of liquid therein, I may utilize a mixing tank 60 to which is attached a conduit 61 extending to and thru a three-way valve 78 and by a lateral conduit 63 directly into the sleeve 15 and, hence, directly into the propeller pump 25, thus insuring admixture and turbulence of the new charge of liquid as it is forced thru the manifold and the articles within the tank 1.

I find it desirable to provide this apparatus with means to pump a supply of liquid from the sump 10 up into the mixing tank 60 and, thereupon, to complete the mixing charge, which will include the new dye and a part of the charge thus supplied from the sump. For this purpose, I provide a pump designated diagrammatically at 77 in the conduit line from the sump to the tank 60, which will be operated reversibly as by a reversible motor (not shown); and for this purpose, also, I provide a shut-off valve 76 between the pump 77 and the sump 10. When the valve 76 is open and the valve 65 also open, the pump 77 is actuated to pump a supply of dyeing liquid up from the sump 10 into the tank 60; whereupon the pump 77 is stopped, the charge in the tank 60 completed, and the pump 77 reversed to force the charge in the tank 60 directly into the propeller 25, as above explained.

Thereupon the valve 76 is closed. I also find it desirable to arrange to provide a drain or outlet from the tank 60 and conduit 61, and for this purpose I provide a three-way valve 78 in the conduit line substantially as shown in the right, Fig. 1, with the outlet 79. Thus, the valve 78 would normally permit the free-flowing of the liquid in either direction thru the conduit 61 while closing the outlet 79; while the valve 78 may be closed to shut off the conduit to the pump 77 and thus open the line from the conduit 61 and thru the outlet 79.

I prefer to form the top 2 with a central, downwardly extending lug 80 to interlock with the

5

top of the central lifting bail 22 so as to steady the entire apparatus within the tank 1 and hold it against displacement as well as to aid and assist in maintaining the bevelled faces 16 and 17 tight.

For this purpose, any suitable interlocking arrangement can be effected, but as herein shown I provide spaced extensions 81 at each side of the bail with the cross-pin 82 between which spaced portions and above which cross-pin the lug 80 rests, see Fig. 5.

I may also desire to strengthen the top 2, particularly for carrying the lug 80 in tight contact with the central bail to steady the apparatus within the tank. For this purpose I provide a crossbar 84 secured to pivotal links 85 and 85 in diametrically opposite position, which links are attached to flanges 87 on the side of the tank 1. A coiled spring 88 bears upon a forked portion 89 of a fixture 90 on one end of the crossbar 84 and under tension of the thumb screw 91 threaded onto a rod 92, having its other end attached at 93 to the link 86, so as to permit a quick attachment and detachment of the crossbar 84 as well as the exerting of yielding tension adjusted by manipulating the thumb nut 91 to hold the lug 80 in contact with the lifting bail 22.

In order to permit inspection of the tank 1 during the operation and without stopping the mechanism, I may provide the cover 2 in the form of a pair of leaves, the same being indicated at 95, with a pivot 96 and permitting such leaves to be lifted for inspection without disturbing the crossbar 84 and its holding contact on the apparatus within the tank. This permits convenient inspection and the entire top can be readily removed or applied when desired.

When these hinged covers 95 are desired, they may be pivotally secured parallel with the crossbar 84 and by flanged portions 97 attached to the crossbar 84, in which case the lug 80 is secured directly to the underneath part of the crossbar. Where the cover 2 is continuous without the hinge-leaf construction, I then either attach the lug directly to the bottom of the top or thru a plate 98 to the crossbar, or may use said plate 98 as a bearing member between the crossbar 84 and the lug 80, thereby imparting the pressure of the spring 88 for holding engagement on the bail 22.

With the manifold 21 and attached hub 20 outside the tank 1, the several hollow tubes 30 with their attached material to be dyed are assembled, the spacers fitted, and the top spacer and holder 42 applied to clamp each series to-

6

gether, which are then fitted in the correspondingly threaded recesses in the manifold; whereupon the entire apparatus is lowered into the tank 1 and automatically connected for circulation by contact of the bevelled faces 16 and as above described and as shown in Fig. 1. Thereupon the top 2 is applied and the crossbar 84 swung into position on its pivot connecting it with the link 85, and the forked plate 89 fitted to straddle the rod 92, and thumb nut 91 to hold the plate under tension as above explained.

Dyeing liquid being supplied and steam thru the heating pipes 70, the propeller 25 initiates and maintains a flow of dyeing liquid thru the hollow tubes and outwardly thru the packages, cheeses, or the like, assembled thereon within the tank 1, flowing back into the sump 10 for recirculation. At any time the dyeing liquid within the tank can receive an additional charge from the mixing chamber 60, as above noted, and the dyeing liquid may be drained off thru the outlet 75, the propeller 25 reversed, and air drawn thru the packages, and outwardly thru the tubes and, thus, effect a partial moisture extraction; whereupon the operation can be repeated, as will be readily understood.

I claim:

An openwork spacer and protector for yarn-holding tubes comprising a hollow hub, having an interior diameter corresponding to that of the tubes to be held and spaced, said hub having flanges to interlock with adjacent tubes adapted to abut on the hub, said hub having radially extending rods attached at their outer periphery to an encircling rod, said encircling rod being of a diameter to protect the yarn carried by said tubes and to permit free flowing of liquid or air thru the center of the tube and into the end portions of the yarn adjacent said radial rods.

HARRY C. WOLFENDEN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,871,246	Thus	Aug. 9, 1932
1,928,252	Gollong	Sept. 26, 1933
1,933,980	Hornbuckle	Nov. 7, 1933
2,194,877	Stieger	Mar. 26, 1940
2,196,559	Jackson	Apr. 9, 1940
2,226,394	Steinen	Dec. 24, 1940

55