

May 30, 1944.

H. H. RAYMOND

2,350,191

DYEING APPARATUS

Filed Jan. 14, 1941

3 Sheets-Sheet 1

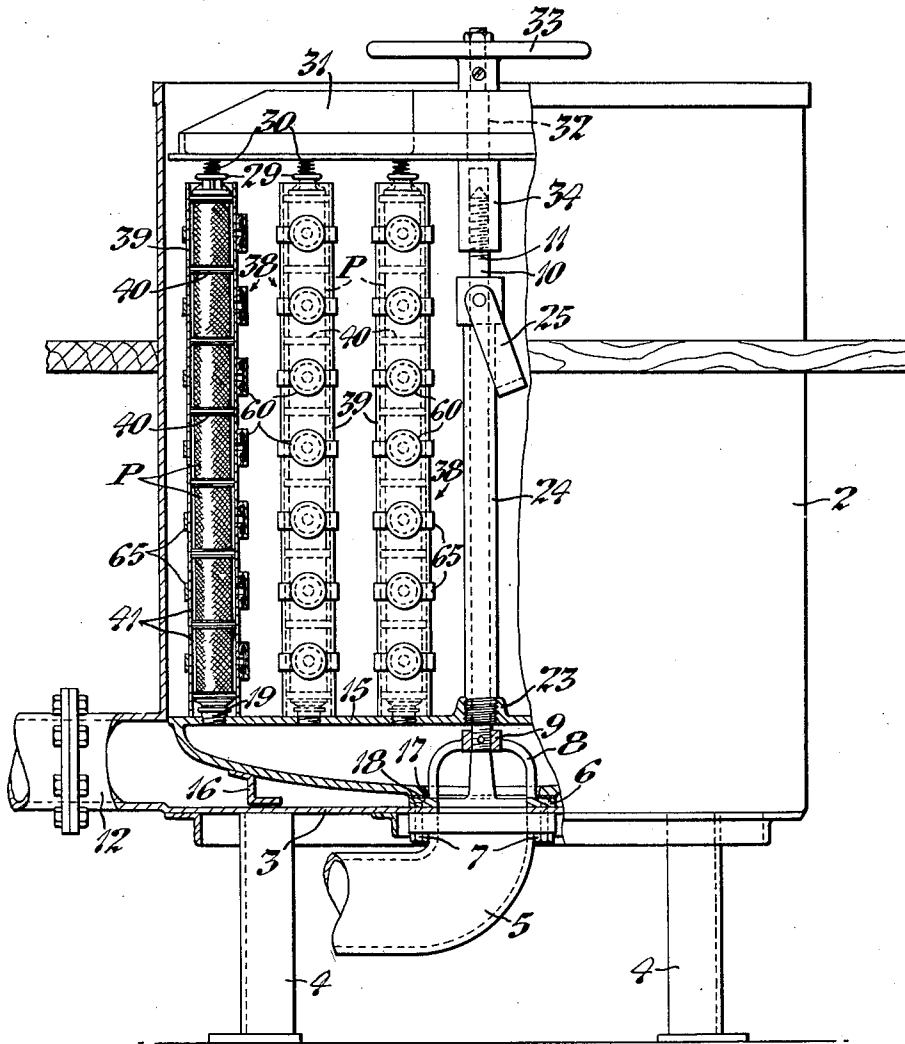


Fig. 1.

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3 Sheets-Sheet 2

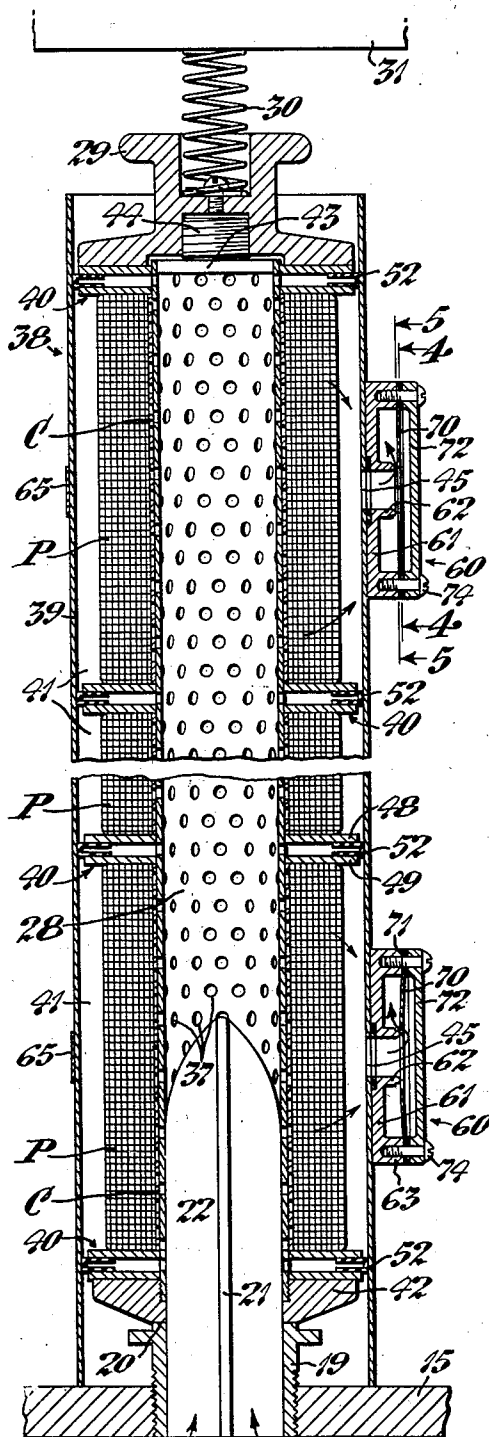


Fig. 2.

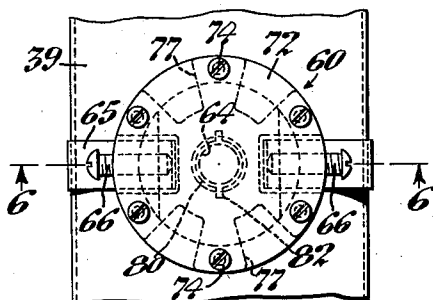


Fig. 3.

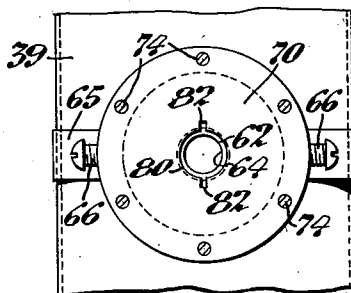


Fig. 4.

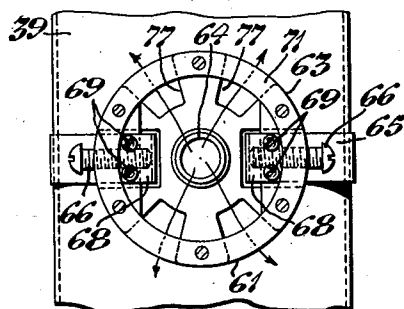


Fig. 5.

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3 Sheets-Sheet 3

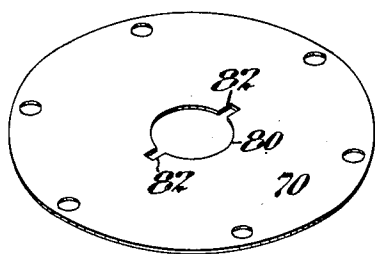


Fig. 8.

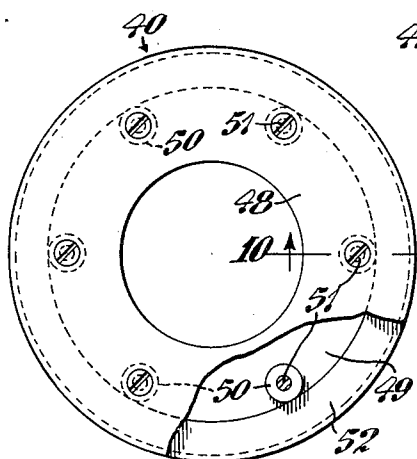


Fig. 9.

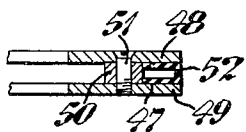


Fig. 10.

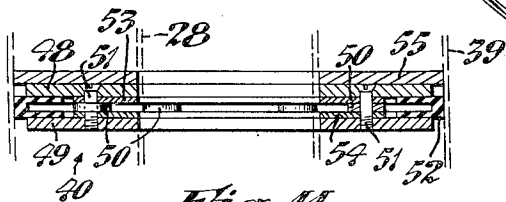


Fig. 11.

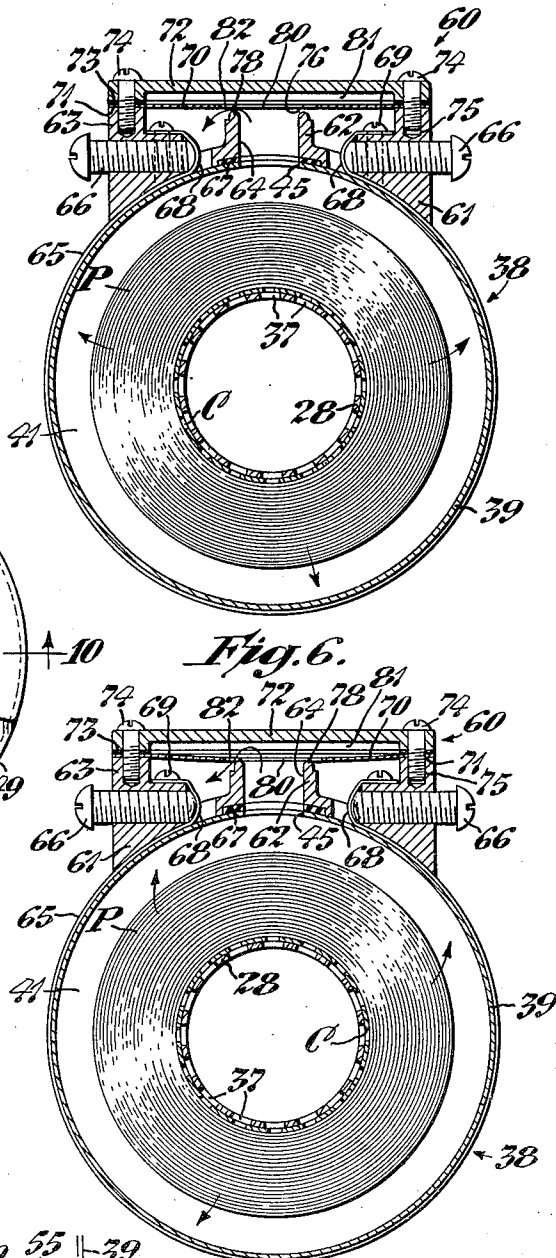


Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE

2,350,191

DYEING APPARATUS

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Application January 14, 1941, Serial No. 374,377

17 Claims. (Cl. 68—189)

The present invention relates to improvements in apparatus for dyeing or otherwise similarly processing materials, such as yarn and thread in package form. By the term "package" as employed in the following specification and claims is meant any wound mass of textile material whatever its character or form and whether or not supported from within or without.

In package-dyeing apparatus commonly used the textile packages are mounted in axial alignment on a perforated tube in a suitable kier or vat and the dye-liquor is supplied under pressure to the interior of the perforated tube to cause it to flow radially outwardly through the packages and discharge into the kier. The dye-liquor may be circulated continuously from the kier through suitable conduits back to the center of the perforated tubes. With such apparatus a maximum amount of dye-liquor will flow through relatively soft packages having the least density and greatest permeability while comparatively little of the dye-liquor may pass through the packages of greater density having less permeability. It has been found that the color shade of the dyed yarn in a package is directly dependent upon the rate of flow of the dye-liquor there-through and the time of treatment so that when a batch of packages is dyed in the manner explained above the packages having the greatest permeability will have a relatively dark color shade while packages having less permeability will have a lighter shade. Consequently, a number of packages of each dyed batch must be rejected and re-dyed because of unsatisfactory shade.

One of the objects of the present invention is to provide an apparatus for dyeing or otherwise similarly processing textile packages in which the rate of flow of the treating fluid through different packages is maintained substantially uniform regardless of variation in their permeability.

Another object of the invention is to provide a package holder or enclosure divided into separate compartments with automatically-operated valve-means in each compartment for maintaining the rate of flow therefrom substantially constant.

Another object of the invention is to provide a package holder of the type indicated having inner and outer tubes with sealing disks there-between to form a separate compartment for each of the textile packages with a control valve for each compartment.

Another object of the invention is to provide

novel valve-means for controlling the exhaust of the treating fluid from each compartment with said means automatically operated by the pressure of the fluid in the compartment to maintain the rate of flow therefrom substantially constant.

Another object of the invention is to provide an expansible sealing disk which is operated by the pressure of the treating fluid to seal the separate compartments one from another.

Still another object of the invention is to provide a dyeing apparatus of the type indicated which is of relatively simple and compact construction and adapted for use over long periods of time without requiring repair or replacement of its parts.

Further objects of the invention are set forth in the following specification which describes a preferred form and arrangement of the parts of the apparatus, by way of example, and two different types of expansible sealing disks for use therewith as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a side elevational view partly in section of a dyeing apparatus incorporating the novel features of the present invention;

Fig. 2 is an enlarged longitudinal sectional view through one of the package holders showing the series of sealing disks between adjacent packages for dividing the holder into separate compartments and the metering valve-means for each compartment for controlling the rate of flow of the treating fluid therefrom;

Fig. 3 is a side view of one of the metering valves disclosed in Fig. 2;

Fig. 4 is a transverse sectional view taken on line 4—4 of Fig. 2 showing the central aperture and radial measuring slots in the flexible diaphragm of the metering valve;

Fig. 5 is a transverse sectional view taken on line 5—5 of Fig. 2 showing the construction of the metering valve-body and the relatively large outlet openings therein;

Fig. 6 is a further enlarged transverse sectional view taken on line 6—6 of Fig. 3 showing the relative position of the flexible diaphragm and the end of the nipple of the valve-body when the pressure of the treating fluid is at minimum to form a relatively large measuring orifice there-between;

Fig. 7 is a view similar to Fig. 6 showing the diaphragm flexed into engagement with the nipple of the valve-body when the pressure of the treating fluid is at maximum to cause the fluid to exhaust through the slots in the diaphragm;

Fig. 8 is a perspective view of the flexible diaphragm of the metering valve;

Fig. 9 is a plan view of a hollow expansible sealing disk;

Fig. 10 is a transverse sectional view taken on line 10-10 of Fig. 9 showing the expansible U-shaped sealing ring positioned between the spaced flanges at the outer periphery of the sealing disk; and

Fig. 11 is a transverse sectional view of a modified form of sealing disk.

The present invention may be applied to use with any suitable type of treating vessel, being herein illustrated as used with a cylindrical klier or vat 2 of the type shown and described in United States Letters Patent to Royal Little et al., No. 2,125,937, issued August 9, 1938. The klier 2 shown in Fig. 1 is in the form of a cylindrical vessel having a flat bottom 3 supported on a suitable frame having legs 4. Opening through the center of the bottom 3 of the klier 2 is an intake pipe 5 having its flange attached thereto by bolts 7. Within the klier 2 is an annular seat-rim 6 surrounding the opening of the pipe 5 and clamped to the bottom 3 of the klier by the bolts 7 for the pipe. Projecting inwardly and upwardly from the annular seat 6 are a series of spaced guiding arms 8 joined together at their upper end by a hub 9. Pinned in the hub 9 is a vertically extending rod 10 having a screw-threaded portion 11 at its upper end. On the side of the klier 2 adjacent its bottom is an exhaust pipe 12.

A hollow portable carrier 15 is provided with brackets 16 for supporting it on the bottom wall 3 of the klier 2. The bottom wall of the hollow carrier 15 has a central opening 17 with an annular seat 18 surrounding the opening and adapted for cooperation with the seat 6 on the bottom 3 of the klier 2. The upper wall of the carrier 15 has a series of nozzles 19 mounted in apertures therein for communication with the interior of the carrier. Each nozzle 19 extends upwardly from the hollow carrier 15 and terminates in an annular seat 20 with right-angular guiding flanges or vanes 21 and 22 therein projecting above the annular seat and tapering to a point at their upper ends, see Fig. 2. Mounted in a suitable boss 23 at the center of the upper wall of the carrier 15 is a vertical tube 24 through which the rod 10 of the klier 2 is adapted to extend. The upper end of the tube 24 is provided with a pivoted bail 25 for connection with suitable tackle to lower the carrier 15 into and lift it out of the klier 2.

A perforated standpipe or stringer 28 for supporting a series of packages P in axial alignment thereon is mounted on each of the nozzles 19 on the hollow carrier 15. The packages P as herein illustrated are each in the form of a cylindrical yarn mass wound on a perforated tubular core C. Each standpipe 28 has a cap 29 at its upper end with a compression spring 30 projecting therefrom and the series of standpipes are held against the seats 20 of the nozzles 19 by a pressure plate 31 overlying the springs. A central shaft 32 journaled in the pressure plate 31 has a hand-wheel 33 at one end and an interiorly-threaded sleeve 34 at its opposite end adapted to be screwed down on the threaded end portion 11 of the rod 10. Thus the packages P may be mounted in axial alignment on the standpipes 28 and the latter mounted on the nozzles 19 of the portable carrier 15 at any suitable place outside the klier and the

whole assembly lowered bodily into the klier 2, the arms 8 at the bottom of the klier guiding the carrier to align its annular seat 18 with the annular seat 6 surrounding the intake pipe 5.

The pressure plate 31 is then applied in the klier and the shaft 32 turned by means of the hand-wheel 33 to screw the sleeve 34 onto the threaded portion 11 of the rod 10 to draw the pressure plate against the springs 30 at the upper end of the standpipes 28 to hold the latter seated firmly against the nozzles 19. As thus far described the apparatus is generally similar to that heretofore commonly in use.

In accordance with the present invention each package holder 38 comprises the inner perforated tubular member or standpipe 28, an outer tubular member or cylindrical casing 39 surrounding the packages P mounted on the inner member, and a series of sealing disks 40 positioned between the ends of adjacent packages and extending between the inner and outer tubular members to form a series of separate compartments 41 for the individual packages. The inner tubular member 28 has a series of perforations 37 spaced along its length, an annular flange 42 at its lower end adapted to engage the nozzle seat 20 and a plug 43 in its upper end for sealing the top of the member. The plug 43 in the upper end of the tubular member 28 is provided with a threaded stud 44 on which the cap 29 is screwed to compress the packages P between it and the flange 42 at the lower end of the member.

The outer cylindrical casing 39 is of greater length than the inner tubular member 28 to extend beyond both ends of the latter and is of slightly larger internal diameter than the outside diameter of the packages P to permit it to telescope freely thereover. The outer casing 39 is imperforate except for apertures 45 constituting outlet ports, there being one outlet port for each compartment in the holder located at the longitudinal center thereof.

The sealing disks 40 may be of any suitable form and, as illustrated in Figs. 2, 9 and 10, each disk comprises a pair of annular plates 48 and 49 held in spaced relationship by washers 50. Screws 51 extending through one of the plates 48 and the spacing washers 50 are screwed into the opposite plate 49 to hold the parts assembled. The washers 50 are located midway between the inner and outer peripheries of the plates 48 and 49 to define an annular space 47 between the plates at the outer periphery of the disk 40. The diameter of the opening in the plates 48 and 49 of each disk 40 is such as to adapt the disk to fit closely around the inner tubular member 28 while the outer diameter of the plates is slightly less than the inside diameter of the outer casing 39. Mounted in the annular space 47 between the plates 48 and 49 of each disk 40 is a ring 52 of resilient material such as rubber or the like. The rings 52 are preferably of U-shape in cross-section with their spaced sides extending radially inwardly adjacent the inner faces of the plates 48 and 49 and their outer peripheries extending between the plates either flush with or slightly within the outer peripheries of the latter when the ring is contracted. When a treating fluid, such as dye-liquor, is supplied under pressure to the interior of the inner perforated tubular member 28 part of the fluid is directed radially outwardly through its perforations 37 and between the plates 48 and 49 of each of the seal-

ing disks 40. The pressure of the treating fluid will thus act on the interior of the ring 52 in each disk 40 to expand it into sealing engagement with the inside wall of the outer casing 39 and simultaneously fixedly engage its spaced sides with the inside faces of the plates 48 and 49. It will be noted by reference to Fig. 2 that one of the sealing disks 40 is positioned between the flange 42 at the lower end of the inner tubular member 28 and the bottom of the lowermost package P and another disk 40 is positioned between the cap 29 and the end of the uppermost package P, whereby each individual package is positioned in a separate compartment 41 between the inner tubular member and the outer casing 39.

In Fig. 11 a sealing disk 40 of modified construction is illustrated having the same spaced plates 48 and 49, spacer washers 50 and screws 51. In this modified form of construction, however, thin annular plates 53 and 54 are provided intervening between the washers 50 and plates 48 and 49. The annular plates 53 and 54 are of a thickness corresponding to the thickness of the sides of the U-shaped expansible rings 52 and their outside diameters correspond to the inside diameter of the rings. Consequently, the outer peripheries of the thin annular plates 53 and 54 align with the inner peripheries of the spaced sides of the ring 52 to direct the treating fluid between the sides thereof whereby to prevent the fluid from escaping between the sides of the ring and the faces of the spaced plates 48 and 49 of the sealing disk 40.

In the modified form of construction illustrated in Fig. 11 a centering plate 55 of annular form is shown for maintaining the casing 39 concentric with the inner tubular member 28 so that the expansion of the resilient rings 52 will be uniform around the entire peripheries of the sealing disks 40. Preferably, one of the centering plates 55 is provided at the top and bottom of each package holder 38.

A metering valve 60 is provided for each outlet port 45 in the outer casing 39, the valve being designed to operate automatically to regulate the flow of the treating fluid from its compartment to discharge a substantially constant amount of the fluid therefrom. In other words, the valves 60 for all of the several compartments 41 will discharge substantially the same amount of treating fluid whereby the same amount of dye-liquor will pass through each package P in a given period of time so that all the packages are subjected to the same condition of treatment regardless of variations in their permeability. Each valve 60 comprises a body-member 61 having a base curved to the contour of the surface of the casing 39 with a projecting nipple 62 positioned centrally thereof and an outer annular wall 63 concentric therewith.

The valve-body 61 is mounted on the casing 39 by means of a strap or band 65 encircling the casing with its end portions extending through apertures in the valve-body and turned back on themselves to provide loops 68; the terminal portions of the strap being attached to the valve-body by means of screws 69, see Figs. 5 and 6. The band 65 is tightened by means of set-screws 66 extending through the outer annular wall 63 of the valve-body 61 at opposite sides thereof and engaging the loops 68 at the terminal portions of the band. Thus, when the set-screws 66 are screwed into the valve-body 61 the encircling band 65 is drawn tightly around the outer sur-

face of the casing 39 to fasten the valve-body rigidly thereto.

The projecting nipple 62 on the valve-body 61 has a central orifice 64 of a diameter corresponding to that of the outlet ports 45 in the casing 39 and in alignment therewith when the valve-body is fastened in place. A gasket 67 is preferably provided between the valve-body 61 and the casing 39 surrounding the aligned port 45 and the orifice 64 to seal the joint.

A flexible diaphragm 70, see Fig. 8, is mounted on a flat annular seat 71 at the outer end of the annular wall 63 of the valve-body 61, being clamped thereto by means of a cover plate 72 having an annular flange 73 which overlies the seat 71. A suitable sealing gasket is provided between the diaphragm 70 and flange 73 of the cover plate 72. The cover plate 72 is attached to the valve-body member 61 by means of screws 74 extending through the plate and the diaphragm and screwed into holes 75 in the annular wall 63. The outer edge of the nipple 62 is formed with a rounded lip 78 which lies in a plane parallel to the plane of the concentric annular seat 71. Thus the flexible diaphragm 70 normally extends across the lip 78 of the nipple 62 of the valve-body 61 to provide a space therebetween forming an annular measuring orifice 76, see Fig. 6. The outer annular wall 63 of the valve-body 61 is also provided with a series of relatively large radially-disposed openings 77, see Fig. 5, for discharging the treating fluid which escapes through the annular measuring orifice 76.

To provide for automatic operation of the valve 60 to vary the size of the measuring orifice 76 in accordance with the pressure of the treating fluid in the compartment 41 the diaphragm 70 is provided with a central opening 80 through which a portion of the treating fluid discharges into a chamber 81 between the cover plate 72 and the diaphragm. The diaphragm 70 is thus subjected to the pressure of the treating fluid on its area in the upper chamber 81 and the diaphragm is so constructed as to flex toward the lip of the nipple in direct proportion to the pressure. To provide for escape of the treating fluid from the compartment 41 when the diaphragm 70 is flexed into engagement with the lip 78 at the outer end of the nipple 62 under maximum pressure conditions, as indicated in Fig. 7, the diaphragm is provided with diametrically opposed slots 82 extending radially from the central opening 80. The slots 82 are of such dimensions that at a maximum pressure of the treating fluid a predetermined constant amount of the treating fluid will pass through the slots and discharge through the exhaust openings 77 in the sides of the valve-body 61. A preferred embodiment of the invention having now been described in detail, the mode of operation of the apparatus is explained as follows.

The apparatus is prepared for a dyeing or similar processing treatment by first assembling the packages P on the standpipes or stringers 28. To this end a sealing disk 40 is slid over the perforated tubular member 28 until it seats against the flange 42 at the bottom thereof. A package P is then slid onto the member 28 until its end seats on the sealing disk 40. The sealing disks 40 and packages P are then successively mounted on the member 28 in alternate arrangement until it is entirely filled, as illustrated in Fig. 2, with a sealing disk overlying the end of the uppermost package. The cap 29 is then screwed onto the threaded stud 44 of the plug 43 in the upper end of the member 28 to compress the packages be-

tween the sealing disks 40 separating their ends. The casing 39 is next telescoped over the packages P mounted on the member 28 to form a self-contained package unit 38. The package holder units 38 are severally mounted on the nozzles 19 of the portable carrier 15, being guided into position by the tapered upper ends of the vanes 21 and 22 projecting from the nozzles to position the annular flanges 42 of the holders on the seats 20 of the nozzles. It will be understood that the portable carrier 15 may be located outside of the kier 2 and the application of package units 38 to the carrier be continued until each nozzle 19 has a package holder unit mounted thereon. It will also be understood that other methods may be used for assembling the packages P on their holders to form package units and for mounting the package units on the carriers. The loaded carrier 15 is then lifted bodily by suitable tackle and lowered into the kier 2 with the rod 10 at the center of the kier alined with the tube 24 on the carrier. As the portable carrier 15 is lowered into position the arms 8 projecting upwardly from the bottom of the kier 2 act to center the carrier to position its annular seat 18 concentric with the annular seat 6 in the kier. The pressure plate 31 is then applied to the kier and the shaft 32 rotated by the hand-wheel 33 to screw the sleeve 34 onto the screw-threaded end 11 of the rod 10 to apply pressure against the springs 30 projecting above the caps 29 of the package holders 38 whereby to yieldingly press the holders against the seats 20 on the nozzles 19. The apparatus is then ready for operation.

The treating fluid, such as dye-liquor or the like, is supplied under pressure from a suitable pump, not herein shown, through the inlet conduit 5 to the hollow carrier 15 and forced upwardly through the inner perforated standpipes 28 of the holders 38. Some of the treating fluid will flow radially through the perforations 37 in the inner tubular members 28 into the hollow sealing disks 40 to thereby expand the rings 52 into sealing engagement with the inside wall of the outer casing 39 to form a series of closed compartments 41, one for each package P.

The treating fluid also will flow outwardly through the perforations 37 in the standpipes 28 and through the masses of yarn in the packages P to discharge from the individual compartments 41 through the metering valves 60. As stated above, the rate of flow of the treating fluid from each compartment is regulated by its metering valve 60 to maintain the rate of flow substantially constant in all the various compartments. Thus each package P of a batch is subjected to the same amount of treating fluid passing there-through regardless of its density and permeability. To this end the treating fluid is caused to pass through the measuring orifice 76 between the end of the nipple 62 and the diaphragm 70. With a minimum pressure of the treating fluid in a compartment 41 the diaphragm 70 will assume the position illustrated in Fig. 6 and the measuring orifice 76 is of such dimension as to pass a predetermined quantity of the treating fluid. During operation of the apparatus the treating fluid passes through the opening 80 in the diaphragm 70 into the chamber 81 and flexes the diaphragm in accordance with the pressure of the fluid to decrease the size of the measuring orifice 76 in proportion to the pressure whereby to maintain a substantially constant rate of flow of the treating fluid from the compartment. Under maxi-

mum pressure conditions the diaphragm 70 is flexed into engagement with the lip 78 at the end of the nipple 62 to entirely close the measuring orifice 76, at which time the treating fluid is caused to escape through the measuring slots 82 which are so proportioned as to discharge a predetermined quantity of treating fluid at maximum pressure. For example, the treating fluid may be supplied to the interior of the package holder 28 at a pressure of twenty pounds per square inch. The valve 60 for each compartment 41 may be designed to exhaust two and one-half gallons of the treating fluid per minute with a pressure of the treating fluid in the compartment ranging from substantially zero to twenty pounds per square inch. When the treating fluid in a compartment 41 has no appreciable pressure, but with the package therein passing two and one-half gallons per minute the diaphragm 70 will be in the position illustrated in Fig. 6 to maintain a maximum opening of the measuring orifice 76. In these conditions the size of the measuring orifice is such as to exhaust the two and one-half gallons per minute. With a maximum pressure of the treating fluid in the compartment 41 of twenty pounds per square inch the diaphragm 70 will be flexed to the position illustrated in Fig. 7 and the measuring slots 82 will still exhaust only two and one-half gallons of the treating fluid per minute. At any intermediate pressure of the treating fluid between substantially zero and twenty pounds per square inch the diaphragm 70 will be flexed to maintain an opening of the measuring orifice 76 corresponding to the pressure of the treating fluid which will discharge two and one-half gallons of the fluid per minute. Thus the same amount of treating fluid is passed through each of the packages P and as all the packages are subjected to the same treatment by the fluid for a given period of time they will all have the same condition of treatment and therefore have a uniform shade of color when treated with a dye-liquor.

It will be observed from the foregoing specification that the present invention provides a novel form of apparatus for dyeing or otherwise treating textile materials in package form to insure the same treatment of all the packages in a batch regardless of their varying permeability. It will be observed further that the present invention provides a novel form of package holder for enclosing each package in a separate compartment and controlling the rate of flow of the treating fluid from each compartment to maintain it substantially uniform in all the different compartments. It will be observed still further that the present invention provides an apparatus of relatively simple construction to adapt it for economical manufacture and use.

While a preferred form of apparatus incorporating the novel features of the present invention is herein illustrated and described, it is to be understood that modifications may be made in the construction and arrangement of its parts without departing from the spirit or scope of the invention. For example, the package holders of the present invention may be made integral with the hollow carrier or may be either fixedly or detachably applied to kiers of other constructions without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. An apparatus of the type indicated comprising a compartment for enclosing a textile package,

means for supplying a treating fluid under pressure to the compartment to cause it to flow through the package, and means responsive to the pressure of the fluid in the compartment for maintaining a constant rate of flow of the fluid from the compartment irrespective of the permeability of the package.

2. An apparatus of the type indicated comprising a compartment for enclosing a textile package, means for supplying a treating fluid under pressure to the compartment to cause it to flow through the package, and means operated automatically by the pressure of the fluid in the compartment to maintain a substantially constant rate of flow of the treating fluid from the compartment at any pressure of the fluid therein.

3. An apparatus of the type indicated comprising a compartment for enclosing a textile package, means for supplying a treating fluid under pressure to the compartment to cause it to flow through the package, an outlet port in the compartment for exhausting the treating fluid therefrom, and valve-means cooperating with the outlet port to control the exhaust of treating fluid from the compartment, said valve-means being operated by the pressure of the treating fluid in the compartment for maintaining a constant rate of flow of the fluid therefrom.

4. An apparatus of the type indicated comprising a compartment for enclosing a textile package, means for supplying a treating fluid under pressure to the compartment to cause it to flow through the package, an outlet port in the compartment for exhausting the treating fluid therefrom, and valve-means cooperating with the outlet port in the compartment for maintaining a constant rate of flow of the fluid therefrom whereby the same amount of treating fluid passes through the package during a predetermined period of time regardless of its permeability.

5. An apparatus of the type indicated comprising a series of compartments each adapted to enclose a textile package, means for supplying a treating fluid under pressure to the compartments from a single source of recirculatory fluid to cause it to flow through the packages, and valve-means in each compartment for controlling the flow of the fluid therefrom, all of said valve-means having the same flow characteristics to maintain the same rate of flow from all of the compartments.

6. An apparatus of the type indicated comprising a plurality of compartments for separately containing textile packages, means for supplying a treating fluid under pressure to the compartments from a single source of recirculatory fluid to cause it to flow through the packages therein, and valve-means in each compartment for maintaining a substantially constant rate of flow of the treating fluid therefrom, said valve-means in the plurality of compartments having the same flow characteristics whereby substantially the same amount of treating fluid will pass through all the packages regardless of variations in their permeability.

7. An apparatus of the type indicated comprising a series of separate compartments each adapted to enclose a textile package, means for supplying a treating fluid under pressure from a single source of recirculatory fluid to cause it to flow through the packages in the compartments, and valve-means in each compartment operated by the pressure of the treating fluid therein to maintain a substantially constant rate of flow of the treating fluid from the compartment, said valve-

means in the several compartments having the same flow characteristics whereby all the packages in the several compartments are subjected to the same amount of treating fluid.

8. An apparatus of the type indicated comprising a holder for mounting a group of hollow packages, a casing surrounding the packages mounted on the holder, sealing means between adjacent packages forming a separate compartment for each package, means for supplying a treating fluid under pressure to the interior of the packages, and valve-means in the casing for controlling the rate of flow of the treating fluid from each compartment.

9. An apparatus of the type indicated comprising a perforated tube for mounting a group of hollow packages, a casing surrounding the packages mounted on the tube, sealing means between adjacent packages forming a separate compartment for each package, means for supplying a treating fluid under pressure to the interior of the perforated tube, and valve-means in the casing communicating with each compartment and operated by the pressure of the treating fluid therein to maintain a substantially constant rate of flow from each compartment regardless of the permeability of the package therein.

10. An apparatus of the type indicated comprising a holder for mounting a group of hollow packages, a casing surrounding the packages mounted on the holder, disks between adjacent packages, radial expansion means on the disks operated by the pressure of the treating fluid to seal the disks to the casing to form a separate compartment for each package, means for supplying a treating fluid under pressure to the interior of the packages to cause it to flow radially therethrough, and valve-means in the casing communicating with each compartment and operated by the pressure of the treating fluid therein to maintain a substantially constant rate of flow from each compartment regardless of the permeability of the package therein.

11. In an apparatus for dyeing or otherwise treating textile packages, the combination of a kier having a bottom chamber, standpipes mounted in the kier and adapted to support groups of packages thereon, said standpipe communicating with the bottom chamber of the kier, a casing surrounding the packages on each standpipe and divided axially into separate compartments with each compartment adapted to enclose a package, means for supplying a treating fluid under pressure to the bottom chamber of the kier and the standpipes communicating therewith to cause it to flow through the packages, and valve-means for each compartment for controlling the rate of flow of the treating fluid therefrom.

12. In an apparatus for dyeing or otherwise treating textile packages, the combination of a kier having a bottom chamber with a plurality of nozzles communicating therewith, package holders detachably mounted on the nozzles for communication with the hollow bottom of the kier, each of said holders comprising an inner perforated tube on which the packages are mounted and an outer casing surrounding the packages with sealing disks between adjacent packages extending between the inner perforated tube and the outer casing to provide a separate compartment for each package, means for supplying a treating fluid under pressure to the holders to cause it to flow through the inner perforated tube and the packages in the com-

partments, and valve-means in the outer casing for controlling the flow of the treating fluid from each compartment to maintain the rate of flow constant.

13. A package holder comprising a compartment for enclosing a textile package, said compartment being adapted to permit treating fluid to be supplied thereto under pressure, an outlet aperture in the compartment for exhausting the treating fluid therefrom, and a flexible diaphragm cooperating with the outlet aperture to provide a measuring orifice to control the rate of flow of the treating fluid from the compartment, said flexible diaphragm being subjected to the pressure of the treating fluid in the compartment to reduce the capacity of the measuring orifice in proportion to the pressure of the fluid to maintain a substantially constant rate of flow therethrough.

14. A package holder comprising a compartment for enclosing a textile package, means for supplying treating fluid to the compartment under pressure, a valve-body communicating with the compartment and having a measuring orifice for exhausting the treating fluid therefrom, a flexible diaphragm cooperating with the measuring orifice to control the rate of flow of the treating fluid from the compartment, said diaphragm having an opening overlying the orifice with measuring slots at the sides of the opening, and a pressure chamber at the side of the diaphragm opposite the valve-body whereby the diaphragm is subjected to the pressure of the treating fluid in said chamber to control its position with respect to the orifice.

15. An apparatus of the type indicated comprising a stringer for mounting a series of hollow packages thereon, a casing surrounding the packages mounted on the stringer, and sealing means between the ends of adjacent packages forming a separate compartment for each package, said sealing means comprising an annulus having a continuous peripheral opening communicating with the central opening in the annulus, and a ring of resilient material located in said

opening at the periphery of the annulus whereby pressure applied at the center of said annulus is transmitted through the opening to expand the ring beyond the periphery of the annulus.

16. An apparatus of the type indicated comprising a perforated tube for mounting a series of hollow packages to adapt a treating fluid to be supplied thereto under pressure to cause it to flow through the packages, a casing surrounding the packages mounted on the tube, and sealing means between the ends of adjacent packages forming a separate compartment for each package, said sealing means consisting in an annular member comprising overlying plates with an opening therebetween, and a continuous expansible ring of U-shape in cross-section positioned between said plates at the periphery of the member whereby the pressure of the treating fluid applied through the perforated tube at the center of the member is transmitted through the opening to expand the ring beyond the periphery of the member and also laterally to seal its sides against the plates.

17. An apparatus of the type indicated comprising a perforated tube for mounting a group of hollow packages to adapt a treating fluid to be supplied thereto under pressure to cause it to flow through the packages, a casing surrounding the packages mounted on the tube, and sealing means between the ends of adjacent packages forming a separate compartment for each package, said sealing means comprising an annular member having spaced flanges at its outer periphery forming an annular opening communicating with its central opening, and a ring of resilient material positioned in the peripheral opening of the annular member, said ring being of U-shape in cross-section whereby the pressure of the treating fluid applied through the perforated tube at the center of the member is transmitted through the annular opening in the member to expand the ring beyond the periphery of the member and also laterally whereof to seal its sides against the spaced flanges.

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