March 5, 1963 L. L. JOHNSTON ET AL 3,079,782

FABRIC FLUID TREATING APPARATUS

Filed Oct. 24, 1961 2 Sheets-Sheet 1

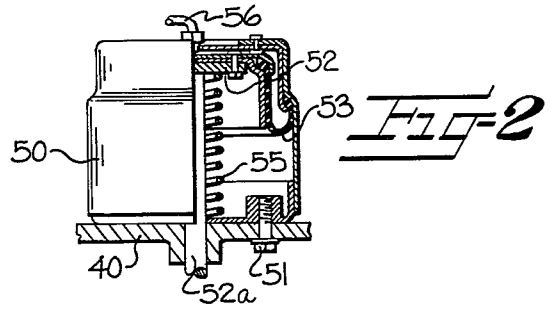



Fig-2




Fig-1

INVENTORS:
LAWTON L. JOHNSTON and
WILLIAM H. T. CARPENTER

BY Eaton, Bell, Hunt & Seltzer

ATTORNEYS

March 5, 1963 L. L. JOHNSTON ET AL 3,079,782

FABRIC FLUID TREATING APPARATUS

Filed Oct. 24, 1961 2 Sheets-Sheet 2

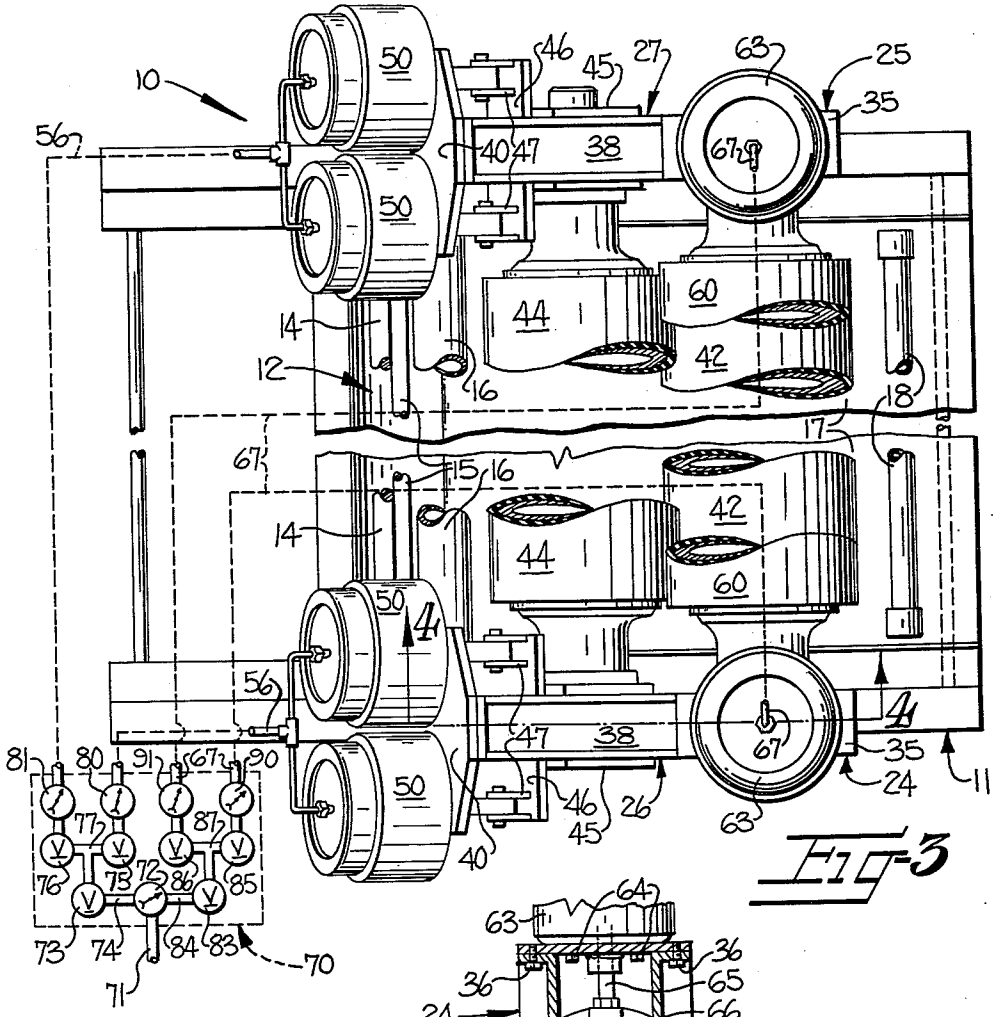



Fig-3

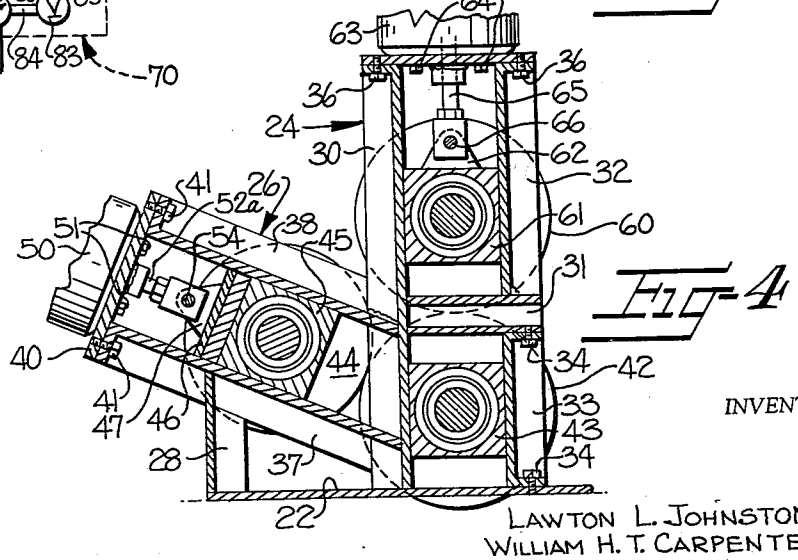



Fig-4

INVENTORS:

LAWTON L. JOHNSTON and
WILLIAM H. T. CARPENTER

BY Eaton, Bell, Hunt & Deltzer ATTORNEYS

United States Patent Office

3,079,782

Patented Mar. 5, 1963



3,079,782

# FABRIC FLUID TREATING APPARATUS

Lawton Lipscomb Johnston and William H. T. Carpenter, Graniteville, S.C., assignors to Graniteville Company, Graniteville, S.C., a corporation of South Carolina

Filed Oct. 24, 1961, Ser. No. 147,240
5 Claims. (Cl. 68—22)

The present invention relates to fluid treating apparatus for fabrics or the like and more particularly to an improved padder.

Heretofore, padders have utilized either two or three rolls depending upon the amount of squeezing desired upon the fabric. The conventional three roll padder has the rolls thereof mounted in vertically alined, superposed or stacked relation with the base or driven roll on the bottom, the intermediate roll resting thereon, and the upper roll resting on the intermediate roll.

In this padder, a pressure applying device is provided at opposite sides thereof adjacent the ends of the rolls to apply pressure to the upper roll to move the same into contact with the intermediate roll and to the intermediate roll to move the same into contact with the base roll. The pressure which must be applied to the rolls of this padder is necessarily great to adequately perform the squeezing operation. Since at least one of the rolls is covered with a rubber covering, this great pressure tends to cause the fabric to form a channel or groove in the surface of the rubber covered roll or rolls after a period of use. In conventional padders, this period of use is relatively short; i.e., in applicants' experience approximately one week of normal use.

When such a groove or channel is formed in the rubber covering of the rolls, the same must be removed from the apparatus and a grinding operation performed thereon to present a smooth surface on the roll. The removal of any one or more of the stacked rolls from the frame usually requires several employees a considerable amount of time. Also, to remove the intermediate roll or the base roll, the upper roll or rolls must first be removed before the particular lower roll can be removed from its mounting.

After any of the rubber covered rolls have been subjected to several grinding operations, a sufficient amount of rubber has been removed from the roll to leave an insufficient amount for the purpose for which the covering is placed on the rolls, namely resilience and good squeezing characteristics. These rolls then must be recovered with rubber which usually necessitates that they be transported to and returned from a re-covering plant by suitable freight carriers. This re-covering is quite expensive, because of the cost of the materials and labor involved in the re-covering, and because of the cost of freighting the rolls to and from the re-covering plant. Because of the time required to recover these rolls, the dye plant is usually required to either have extra rolls in storage to use while the rolls are being recovered or to remove the machine from production, both of which adds to the overhead cost.

A further disadvantage of a conventional three roll padder is the necessity for stopping the same to convert or change over from a three roll to a two roll padder which is desirable for certain applications to obtain proper treatment. Many times, this change over is desired during the run of a particular fabric resulting in a portion of the fabric remaining in the dye solution for a longer period of time when the padder is stopped. This stoppage normally results in an unevenly dyed fabric and therefore a fabric of materially reduced quality.

The present invention was developed to obviate the aforementioned deficiencies in the prior padders. The instant padder has a plurality of rolls arranged in such a



manner that any one of the rolls may be removed from its mounting without the removal of any of the other rolls and thereby materially lessening the time and labor involved in the removal of the rolls. These rolls are preferably arranged so that one of the rolls is engaged by the remaining rolls and cooperates therewith to define fabric squeezing nips. Pressure applying means is provided for each of the remaining rolls for urging these rolls against said one roll with an individually controlled variable pressure. This allows the squeezing action applied to the fabric to be individually controlled at each of the nips for better quality control of the dyed fabric. Also, the pressure applied to opposite ends of each of said remaining rolls may be varied to compensate for irregularities in the rolls and/or fabric to achieve an even squeezing action throughout the fabric which also provides better quality control on the dyed fabric.

A further advantage of the instant padder resides in the fact that it has been determined that the rubber covered rolls will operate in normal use for a considerable longer period of time than the aforementioned conventional padder before a groove is formed therein and grinding of the surface thereof becomes necessary. Therefore, not only is the time and labor involved in the removal of the rolls lessened but the frequency of removal is also lessened which further decreases the maintenance cost. It has also been determined that smaller rolls may be used with the instant padder than the rolls commonly used in conventional padders without adversely affecting the squeezing operation. The initial and maintenance cost of these smaller rolls and the associated bearings and other structure is considerably less than in conventional padders.

It is therefore an object of the present invention to provide a padder having a plurality of engaging rolls and wherein any one of the rolls may be removed from the padder without the removal of any other roll or rolls.

Another object of the present invention is to provide a padder having a plurality of rolls exceeding two in number and arranged with one of the rolls being engaged by the remaining rolls and cooperating therewith to define fabric squeezing nips, and pressure applying means for urging the remaining rolls against said one roll with an individually variable pressure.

A more specific object of the present invention is to provide a padder of the character last described wherein the rolls are three in number and wherein the padder may be readily used as either a two roll or three roll padder, the conversion being effectible while the padder is in operation.

A further object of the present invention is to provide a padder of simpler construction, which is less expensive to purchase and more economical to operate.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which:

FIGURE 1 is a side elevational view of the padder of the present invention;

FIGURE 2 is an enlarged detail, partially in section and with portions broken away of a means for applying pressure to the rolls of the padder shown in FIGURE 1;

FIGURE 3 is a top plan view with portions broken away of the apparatus shown in FIGURE 1; and

FIGURE 4 is a section with portions broken away taken substantially along line 4—4 in FIGURE 3.

Referring now to the drawings and more particularly to FIGURE 1, there is shown a fluid treating apparatus or padder generally indicated at 10, which includes a frame 11 and a fluid tank 12. Fluid tank 12 is adapted to contain a supply of fluid for treating a fabric F which passes therethrough. This fluid may be of any type with which fabric is normally treated with the preferable ap-

plication being to the dyeing of fabric. Padder 10 includes first and second inlet guide rolls 13, 14 for guiding the fabric into the tank 12. A guide roll 15 is positioned below the fluid level in tank 12, and is adapted to have the fabric F passed therearound. An outlet guide roll 16 is journaled in suitable bearings mounted on frame 11 and is adapted to have the fabric pass thereover as the same is drawn from tank 12 and to guide the fabric into a bank of squeeze rolls generally indicated at 20.

A trough member 17 is mounted under rolls 20 and is inclined downwardly to tank 12 with which it communicates. Trough member 17 is adapted to catch the fluid squeezed from the fabric by rolls 20 and to return the fluid to tank 12. In addition, a fluid supply line 18 is positioned above trough member 17 for supplying fluid to trough member 17 to replenish the fluid in tank 12 which is absorbed by the fabric. A suitable float controlled valve (not shown) controls the passage of fluid through line 18 into trough member 17.

Bank 20 comprises a frame 21 having a pair of base plates 22 mounted on frame 11 by suitable bolts 23 and including a pair of generally upright standards 24, 25 mounted on base plates 22 at opposite sides of the frame 11 and a pair of standards 26, 27 mounted on the upright standards 24, 25 at one end and extending upwardly and outwardly at an acute angle therefrom. A pair of upright brace members 28 are mounted on base plates 22 and are connected at their upper ends to standards 26, 27.

Standards 24 and 25 each comprises a first laterally opening channel member 30 which is mounted on the corresponding base plate 22 in upright relation by any suitable means such as welding. A horizontally disposed member 31 is mounted at one end on channel member 30 and is spaced above base plate 22 to define spaced frame members for mounting of opposite ends of a roll to be presently described. A second upright laterally opening channel member 32 is mounted by any suitable means on top of member 31 in spaced relation to first channel member 30 to define a trackway for mounting opposite ends of another roll. A third upright laterally opening channel member 33 is mounted between base plate 22 and member 31 by suitable bolts 34 so that member 33 may be removed to removably retain the ends of the roll between the spaced frame members. A closure plate 35 is mounted on the upper end of each pair of channel members 30, 32 by suitable bolts 36 and serves to bridge the space therebetween and to close the upper end of the trackway defined thereby.

Standards 26, 27 each comprises a pair of spaced laterally opening channel members 37, 38, defining another trackway for mounting opposite ends of still another roll. It is noted that standards 26, 27 are arranged relative to standards 24, 25 so that the trackways defined by members 37, 38 and members 30, 32 converge toward each other and that the spaced frame members 22, 31 are disposed adjacent the point of convergence. Channel member 37 of each standard is supported intermediate its ends by one of the brace members 28 in the manner described above. A closure plate 40 is mounted on the upper ends of each pair of channel members 37, 38 by suitable bolts 41 and serves to bridge the space therebetween for reasons to be presently described.

A first roll 42 is journaled at its opposite ends in bearings 43 for rotation about a generally horizontal axis and preferably has a rubber covering. Bearings 43 have a vertically extending groove in opposite sides thereof of a width substantially the same as the width of channel members 30 and 33. Bearings 43 are mounted in vertical standards 24, 25 between channel members 30, 33 which are received in the grooves therein and between spaced frame members 22, 31. It is noted that roll 42 is held in place by channel members 33 and may be removed from standards 24, 25 by removal of channel members 33. Roll 42 is suitably driven in a manner which is conventional in padders and apparatus of this type, and which is not shown or described herein, the same forming no part of the present invention.

A second roll 44 is journaled at its opposite ends in bearings 45 which are substantially identical to previously described bearings 43 including the grooves formed therein and, also, preferably has a rubber covering. Bearings 45 are slidably mounted in the trackways defined by channel members 37, 38 for sliding movement toward and away from the first roll 42 such that roll 44 is moved into and out of engagement with first roll 42. The point or area where rolls 42 and 44 are in engagement constitutes a first nip where the fabric is adapted to be squeezed. Bearings 45 are guided in this movement by the mating relationship of the grooves and channel members 37, 38. A plate member 46 is mounted on the upper surface of each of the bearings 45 by any suitable means and extends outwardly from opposite sides thereof. A yoke member 47 is mounted adjacent each end of plate member 46 for reasons to be presently described.

A pair of pneumatic motors 50 are mounted on each of the closure plates 40 by suitable bolts 51 and each has a piston 52 therein which is connected to a suitable diaphragm 53. A connecting rod 52*a* is connected to each of the pistons 52 and extends through mating openings formed in the pneumatic motor casing and plate 40. The outer end of each of the connecting rods 52*a* is connected to one of the yoke members 47 by means of a pin 54. A compression spring 55 surrounds each of the connecting rods 52*a* and is positioned between the corresponding piston 52 and the lower end of the pneumatic motor casing so as to bias the piston to the retracted or pressure relieving position. It is noted that springs 55 are of sufficient strength and the connecting rods are of such length that roll 44 is moved out of engagement with roll 42 when pistons 52 are moved to the retracted or pressure relieving position. A pneumatic transmission pipe 56 is connected to motor 50 on the opposite side of the diaphragm 53 and piston 52 from the spring 55 and is connected at its other end to a control panel 70 to be described later.

A third roll 60 is journaled at its opposite ends in suitable bearings 61 which have grooves in opposite sides thereof for receipt of the channel members 30, 32 in like manner to that described above to slidably mount opposite ends of roll 60 in the trackways defined by channel members 30, 32. As in the case of rolls 42 and 44, roll 60 is preferably provided with a rubber covering. Roll 60 is likewise movable into and out of engagement with first roll 42 and the area of this engagement constitutes a second nip where the fabric is adapted to be squeezed. To effect this movement, each of the bearings 61 has a yoke member 62 mounted on the top thereof. A pneumatic motor 63 substantially identical to pneumatic motor 50 described above is mounted on each of the closure members 35 by suitable bolts 64 and has a connecting rod 65 which is connected at its outer end to the corresponding yoke member 62 by a suitable pin 66 and at its inner end to the piston (not shown) of the motor 63. A pair of pneumatic transmission lines 67 is connected to the pneumatic motors 63 at one end and to the aforementioned control panel 70.

Control panel 70 comprises a transmission line 71 which is connected at one end to a suitable pneumatic source, such as a compressor, not shown, and at the other end to a suitable pressure gauge 72 included in control panel 70. Gauge 72 is connected to a control valve 73 by a line 74 for controlling pneumatic motors 50. Valve 73 is connected to a pair of valves 75, 76 connected to the end of lines 56 opposite from motors 50 by a T-type connecting line 77. Valves 75 and 76, respectively, allow the pneumatic pressure applied to the motors 50 at opposite ends of roll 44 to be varied such that the pressure applied to opposite ends of roll 44 may be individually

controlled and varied as desired. Suitable gauges 80, 81 are mounted in lines 56 for visual indication of the amount of pressure present therein.

Gauge 72 is connected to a valve 83 by a line 84 for controlling the pneumatic pressure applied to motors 63 for controlling the pressure applied to roll 60. Valve 83 is connected to a pair of valves 85, 86 by a T-type connecting line 87 with the valves 85, 86 being connected to the end of lines 67 opposite from motors 63. Suitable gauges 90, 91 are mounted in lines 67 for visual indication of the amount of pneumatic pressure therein.

In operation, the fabric F is passed over the guide rolls 13, 14, 15 and 16 and through the fluid treating apparatus tank 12, where the same is passed through the fluid contained in the tank. The fabric is then threaded through the bank of rolls 20 by passing the same between rolls 42, 44 and then between rolls 42 and 60.

As aforementioned, roll 42 is driven in a manner which is conventional and hence not shown herein. During normal operation of the padder 10, roll 44 is in contact with roll 42 and pressure is applied to the bearings 45 to move roll 44 into squeezing relation with roll 42. This pressure is applied by opening valve 73 on control panel 70 and by suitable setting of valves 75, 76 which allow pneumatic pressure to be applied to motors 50 through lines 77 and 56 and to act on piston 52 and diaphragm 53 to move piston 52 to the extended position against the action of compression spring 55. Pistons 52 apply downward pressure to bearings 45 through connecting rods 52*a*, pins 54, yoke members 47 and plates 46. It is noted that the amount of pressure applied to each of the bearings 45 may be individually varied through valves 75 and 76 such that more or less pressure may be exerted at one end of roll 44 than at the other or equal pressure may be applied to the opposite ends thereof as desired to compensate for irregularities in the rolls and/or fabric and to achieve an even squeezing action on the fabric.

Roll 60 is also normally in squeezing relation with roll 42 and is urged downwardly into such relation partially due to the effect of gravity thereon and by the application of downward force or pressure to the bearings 61 by pneumatic motors 63. To apply this downward pressure, valve 83 on control panel 70 is opened and valves 85 and 86 are suitably set to allow a predetermined amount of pneumatic pressure to be applied to the piston and diaphragm of motors 63 to move the same toward extended position against the action of the compression spring therein. These pistons apply pressure to bearings 61 through pins 66 and yoke members 62. As in the case of roll 44, the amount of pressure applied to opposite ends of roll 60 may be individually varied by suitable control of the air flow in the respective line 67 through valves 85, 86 for the same reasons as mentioned in connection with roll 44 above.

It it is desired to operate the padder 10 as a two roll padder as opposed to a three roll padder, the same may be converted thereto without interrupting the operation of the apparatus. To convert to a two roll padder, the desired roll, either roll 44 or 60, may be moved out of squeezing relation with first roll 42 by stopping the application of pneumatic pressure to the respective motors 50 or 63. In this regard, it is only necessary to close valve 73 or 83 to interrupt this application of pneumatic pressure and allow the respective springs to move the desired roll away from the first roll 42 and out of squeezing relation therewith.

After a period of use, the rubber covering on the rolls has a groove formed therein in the manner mentioned above. When this condition occurs, the roll or rolls must be removed from the apparatus and a grinding operation performed thereon. To remove first roll 42 from the apparatus, the same is disconnected from its drive and the channel members 33 are removed by removing bolts 34 from threaded engagement with base plates 22 and members 31. Bearings 43 and roll 42 may then be withdrawn horizontally from the apparatus without disturbing either roll 44 or roll 60.

If roll 44 is desired to be removed, the pins 54 are removed from the outer ends of connecting rods 52*a* and yoke members 47 and the closure plates 40 and pneumatic motors 50 carried thereby are removed from the channel members 37 and 38 by removal of bolts 41. The bearings 45 and roll 44 are then removed by sliding the same outwardly from between the channel members 37 and 38. Roll 60 is removed in like manner by removal of the closure plates 35 from the channel members 30, 32.

It will therefore be apparent that an improved padder is provided wherein the rolls are arranged in such manner that any one roll may be removed from the apparatus without the necessity of removing any of the other rolls which materially decreases the time and labor involved in this operation. Also, an improved padder is provided wherein pressure applying means are provided for the rolls which are individually controlled such that individually variable pressure may be applied to the rolls resulting in an increased control over the squeezing action of the rolls and hence an increased control of the quality of the resulting product.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

We claim:

1. In a padder for treating fabrics with a liquid, said padder having a frame, a tank mounted on said frame for containing the liquid, and inlet and outlet guide rolls for directing the fabric into and out of said tank; the combination of

(*a*) three rolls arranged to define a pair of nips which are adapted to receive the fabric therethrough to exert a squeezing action thereon,

(*b*) a pair of vertical standards disposed at opposite ends of said rolls and each comprising a pair of laterally opening spaced frame members for removably receiving opposite ends of one of said rolls and a pair of upwardly opening spaced frame members defining a first trackway extending outwardly from said laterally opening spaced frame members for removably receiving opposite ends of another of said rolls,

(*c*) a pair of standards mounted on said vertical standards intermediate their ends and extending outwardly therefrom, each of said outwardly extending standards having a pair of spaced frame members defining a second trackway convergingly arranged relative to said first trackway for removably receiving opposite ends of the remaining roll therein, and

(*d*) pressure applying means operatively connected to said rolls for urging the same together to effect a squeezing action on the fabric at said nips.

2. In a padder for treating fabrics with a liquid, said padder having a frame, a tank mounted on said frame for containing the liquid, and inlet and outlet guide rolls for directing the fabric into and out of said tank; the combination of

(*a*) a plurality of rolls exceeding two in number rotatably mounted on said frame adjacent the outlet guide roll and on the opposite side thereof from said tank so as to be disposed exteriorly of said tank, one of said rolls being engaged by the remaining rolls and cooperating therewith to define at least two nips the first of which is adapted to receive the fabric therethrough from said outlet guide roll and to exert a squeezing action thereon and the remaining of which is adapted to receive the fabric therethrough from said first nip and to exert additional squeezing action thereon, each of said remaining rolls being mounted

for selective movement out of engagement with said one roll while said padder is in operation, and

(*b*) pressure applying means operatively connected to each of said remaining rolls for urging the same against said one roll, said pressure applying means being operable to exert an individually variable pressure on each of the remaining rolls for effecting a variable squeezing action on the fabric at each of said nips and to selectively move said remaining rolls out of engagement with said one roll to further vary the squeezing action on the fabric.

3. The structure set forth in claim 2 wherein said pressure applying means is fluid operable and includes valve means for varying the amount of fluid applied thereto.

4. The structure set forth in claim 2 wherein said pressure applying means comprises pneumatic motor means operatively connected to opposite ends of each of said remaining rolls, valve means operatively associated with said motor means for individually controlling the amount of pneumatic pressure applied to each of said motor means to vary the pressure applied to said remaining rolls, and means responsive to deactivation of said pneumatic motor means for moving said remaining rolls out of engagement with said one roll.

5. In a padder for treating fabrics with a liquid, said padder having a frame, a tank mounted on said frame for containing the liquid, and inlet and outlet guide rolls for directing the fabric into and out of said tank; the combination of

(*a*) a first roll rotatably mounted on said frame adjacent the outlet guide roll exteriorly of said tank,

(*b*) a second roll rotatably mounted on said frame in juxtaposed relation to said first roll, said second roll being mounted for movement into and out of engagement with said first roll and defining therewith a first nip which is adapted to receive the fabric therethrough from said outlet guide roll and to exert a squeezing action thereon,

(*c*) a third roll rotatably mounted on said frame in superposed relation to said first roll, said third roll being mounted for vertical movement into and out of engagement with said first roll and defining therewith a second nip which is adapted to receive the fabric therethrough from said first nip and to exert a squeezing action thereon,

(*d*) pneumatic motor means mounted at opposite ends of said second and third rolls and each comprising a cylinder and a piston disposed therein, said pistons being movable between a retracted pressure relieving position and extended pressure applying position,

(*e*) means connecting said pistons to said second and third rolls,

(*f*) means for supplying pneumatic pressure to said pistons for moving the same to extended pressure applying position,

(*g*) valve means operatively associated with said pneumatic supplying means for controlling the amount of pneumatic pressure supplied to each of said motor means whereby the pressure applied to said second and third rolls may be varied to exert a variable squeezing action on the fabric at said first and second nips, and

(*h*) spring means operatively connected to said pistons and responsive to deactivation of said supplying means for biasing the pistons to retracted pressure relieving position and thereby biasing said second and third rolls out of engagement with said base roll.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 72,647 | Lee | Dec. 24, 1867 |
| 620,579 | Fries | Mar. 7, 1899 |
| 1,168,736 | Palmer | Jan. 18, 1916 |
| 2,434,367 | Moffatt | Jan. 13, 1948 |
| 2,575,590 | Goulding | Nov. 20, 1951 |
| 2,603,077 | Dungler | July 15, 1952 |
| 2,720,910 | Rockstrom | Oct. 18, 1955 |
| 2,832,280 | Hold | Apr. 29, 1958 |
| 2,846,862 | Morrill | Aug. 12, 1958 |
| 2,977,662 | Freeze | Apr. 4, 1961 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 84,342 | Germany | Dec. 3, 1895 |
| 809,199 | Great Britain | Feb. 18, 1959 |
| 1,071,643 | Germany | Dec. 24, 1959 |