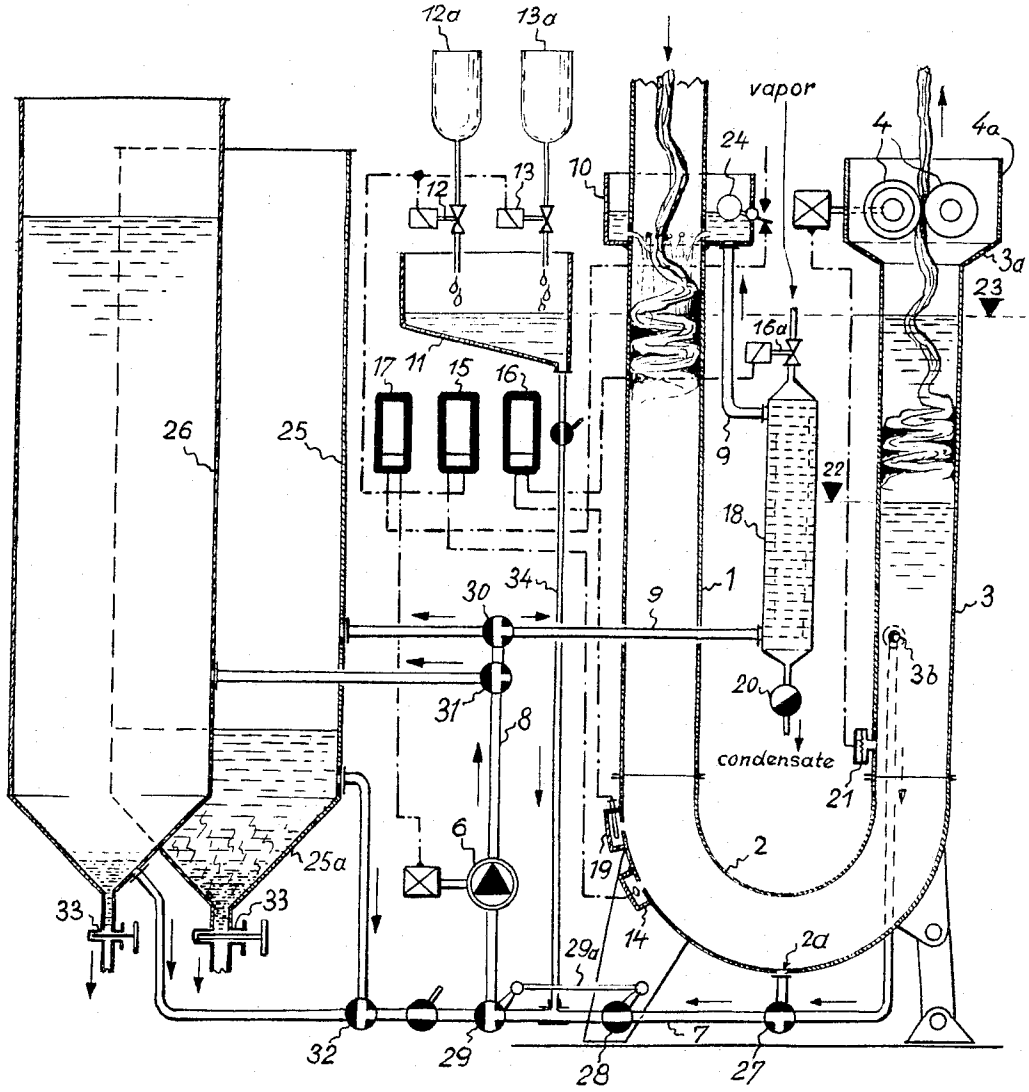
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TREATMENT BOX FOR WET TREATING TEXTILE GOODS AND THE LIKE

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TREATMENT BOX FOR WET TREATING TEXTILE GOODS AND THE LIKE

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The present invention relates to a J-box comprising two tubular legs and a tubular arched U-shaped connecting member interconnecting said legs. More specifically, the present invention relates to a J-box of the just mentioned type for wet treating textile goods in a continuous process.

According to a heretofore known J-box of the above mentioned type, in which the textile goods are exposed to the bleaching effect of the bleaching liquor, bleaching liquor is continuously withdrawn from said connecting member and pumped back to where the textile goods to be treated enter the respective leg of the J-box. Such an arrangement, however, is disadvantageous inasmuch as the liquor withdrawn from said arched U-shaped connecting member is partially spent and is diluted by the condensate resulting from the customary supply of steam at the entrance leg of the J-box.

Another drawback of the above mentioned heretofore known J-box consists in that its tubular entrance leg is heated by a hot water coil around the outside of said entrance leg. Consequently, the thus obtained heating effect is not fully satisfactory inasmuch as the heat acts upon those parts of the goods only which are in contact with the wall of the tubular entrance leg, whereas those portions of the goods which are located away from the wall of the tubular entrance leg are, due to the insulating effect of the goods themselves, only insignificantly affected by the heat emanated from the heating coil. The result of this uneven heating manifests itself in spots and stripes.

Still another disadvantage of the above mentioned heretofore known J-box consists in that its exit leg has a cross section which is considerably less than that of the entrance leg so that the goods to be treated frequently back up where the exit leg joins the U-shaped connecting member, and form a plug making the withdrawal of the goods from the exit leg more difficult and even causing the goods being withdrawn through the exit leg to tear. Also the circulation of the treating liquid is impeded in this way, thereby causing the treating liquor to back up.

Finally, there may also be mentioned that since with the above referred to known J-box, the relative concentrations of the bleaching liquor in the two legs vary considerably, the bleaching liquor is only purely utilized inasmuch as the liquor augmented and diluted by the condensate of the heating medium is continuously discarded through an overflow in the U-shaped connecting member while still containing approximately 50% bleaching ingredients.

It is, therefore, an object of the present invention to provide a treating box for liquid treating textile goods and the like, which will overcome the above mentioned drawbacks.

It is another object of this invention to provide a treating box of the type set forth above which will bring about that the goods being treated will be subjected to the influence of heat and treating liquid considerably longer and in a more intensive way than with heretofore known treating boxes of the same size.

It is also an object of this invention to provide a treating box as set forth in the preceding paragraphs which will operate more economically than heretofore known treating boxes of the general type involved and

will in particular bring about a considerable saving in the relatively expensive bleaching chemicals such as sodium chlorite ($NaClO_2$), sodium hypochlorite

(NaClO)

peroxide (H_2O_2), and also all other ingredients such as sodium hydroxide (NaOH).

A still further object of the present invention consists in the provision of a treating box as mentioned above, which will make an impregnating machine superfluous.

These and other objects and advantages of the invention will appear more clearly from the following specification diagrammatically illustrating an arrangement according to the present invention for treating textile goods.

The present invention has been realized by one and more of the following features. The U-shaped arched connecting member between the entrance leg and the exit leg is of substantially uniform cross section, and also the two legs have substantially the same cross section. Furthermore, the treatment box is provided with a reservoir, a settling tank and a circulating pumping installation which makes it possible after completion of the work to pump the liquor back into the settling tank where it will be freed from impurities and gelatinous parts so that the liquor after adding a quantity of fresh liquor thereto can be used again for the next following process.

According to another feature of the present invention, in contrast to heretofore known devices, the diluted bleaching liquor is not discarded through an overflow but is brought back to its 100% strength. The obtained liquor excess is stored in a reservoir.

Referring now to the drawing in detail, the arrangement shown therein comprises the treatment box proper which is composed of a tubular entrance leg **1** into which the goods to be treated are introduced, an arched U-shaped tubular member **2** having one end connected to the lower end of leg **1** and having its other end connected to a tubular exit leg **3** through which the treated goods are being withdrawn and conveyed to a wet squeezer **4**. The wet squeezer **4** is, in conformity with the present invention, arranged in a box **4***a* which is wider than leg **3** and the bottom of which **3***a* is funnel-shaped and connected to leg **3**. It will thus be appreciated that the liquor squeezed out by the squeezer **4** will drip into leg **3**.

As will also be seen from the drawing, the exit leg **3** has approximately the same height as the inlet leg **1** and has at least the same cross section as leg **1**. If desired, the cross section of leg **3** may be somewhat greater than the cross section of leg **1**.

A treatment box according to the invention as just described has the advantage that the goods which, through the intervention of a folding mechanism (for instance of the type described in U.S. Patent 3,019,631) have been introduced in folds into the entrance leg **1**, and sink into the arched U-shaped connecting member **2** and will, due to their own weight without resistance, and without forming a plug, slide over into the rising or exit leg **3** to such an extent that it will extend beyond and above the liquor level **22**. The control of the liquor to level **22** is effected by a circulating pump **6**. At the lowest point **2***a* of the U-shaped connecting member **2**, liquor may through a three-way valve **27** entirely or partially at approximately half the height of leg **3** be withdrawn through a conduit **7** and pumped back through conduits **8** and **9** to a liquid distributor **10** at the entrance side of the treatment box.

Inasmuch as the liquor withdrawn from the exit leg due to its engagement with the goods has been somewhat reduced in its concentration, according to the present invention, prior to the liquor entering the inlet leg, the normal concentration of the liquor is again restored by making

up for the previous reduction in concentration. This may be effected by a dosing device **11** in which the chemical ingredients of the bleaching liquor as for instance $NaClO_2$ and NaOH are added by two dosing pumps **12** and **13** to the extent that is required for restoring the full concentration. Advantageously, these dosing devices are controlled completely automatically by controlling device **15** which in its turn is controlled for instance by a small pH meter **14** for the liquor concentration and by a volumetric or titrating apparatus for the sodium ingredient. The control of the lye ingredient may be effected by any standard conductivity measuring device.

As will furthermore be noted from the drawing, a float **24** in liquid distributor **10** controls a regulating device **17** by means of which the speed of the circulating pump **6** is controlled. In order to assure a good intermixture of the chemical ingredients with the liquor, the chemical ingredients are, through a conduit **34**, conveyed to the suction side of pump **6**.

Inasmuch as the withdrawal of the liquor from the treatment box may now be effected at two different points, according to a further development of the present invention, a heat exchanger **18** is, instead of being located in connecting member **2**, as is the case with heretofore known arrangements, placed in a riser **9**, which means into the pressure side of the circulating circuit. This results in a material structural simplification of the treatment box. The temperature control is effected by a temperature feeler **19** which controls the quantity of the heating medium through the intervention of a controlling device **16** and a magnetic valve **16***a*. A condensate discharge **20** permits the condensate formed during the steam heating to automatically be discharged.

In order to prevent that the goods be lifted up to the squeezer **4**, it is necessary that the level of the liquor in the exit leg **3** is held approximately at the level **22**.

A further control device, therefore, checks the liquid level in the exit leg **3**. To this end, at a suitable spot of the exit leg **3** there is provided a pressure sensitive device **21** which measures the pressure potential up to the level **22** and is operatively connected to the squeezer **4** so as to accelerate the operation of squeezer **4** if the desired pressure potential is exceeded. Inasmuch as the liquor will thus at full concentration and maximum temperature extend up to the level **22**, it will be appreciated that the goods are subjected to a longer and more intensive action by the liquor than was the case with heretofore known devices of the type involved.

According to a further feature of the present invention, the treatment box is provided with a settling tank **25** and a storage tank **26**. Pump **6** has valves associated therewith which permit the liquor alternately to be circulated or to be circulated together with added liquor, or to pump the liquor from the treatment box into the settling tank **25**. These valves also permit pumping liquor from the storage tank **26** for filling the treatment box. More specifically, ahead of pump **6** in conduit **7** there is provided a shut-off valve **28** and a three-way valve **29** which, advantageously, are coupled to each other by a linkage **29***a*. On the pressure side of pump **6** there are provided two three-way valves **30** and **31** which may be adjusted so that the liquor withdrawn from the treatment box can selectively be pumped into settling tank **25** or into storage tank **26**. Conduit **7** also has interposed a three-way valve **32** which is so adjustable that pump **6** draws liquor either from settling tank **25** or from storage tank **26**.

Settling tank **25** has as large a cross section as possible in order to permit the very light impurities, fibers, gelatinous particles or pectin substances forming during the bleaching process to easily settle in the lower funnel-shaped portion **25***a* of tank **25**. From here they may be withdrawn from time to time through a valve **33** of relatively large cross section. In this way, it will be assured that no unspent liquor ingredients are wasted while, on the other hand, the liquor in the treatment box after completion of the operation may be withdrawn and may be employed again for the next process. Furthermore, in the storage tank there will always be available a sufficient quantity of fresh liquor.

As will be evident from the above, aside from yielding a spot-free and uniform bleaching, the arrangement according to the present invention has the advantage that all parts of the goods passing through the treatment box will be exposed for a longer period and at a higher temperature and at a constant concentration of the liquor to a bleaching effect so that the treatment period may be reduced or the speed at which the goods pass through the treatment box may be increased. As an alternative, the contents of the treatment box may be reduced. All of these possibilities greatly contribute to reducing the cost for the apparatus and for the running of the apparatus. A further economic advantage of the present invention consists in the saving of the expensive bleaching chemicals such as sodium chlorite ($NaClO_2$), sodium hypochlorite (NaClO), peroxide (H_2O_2) and other ingredients such as sodium hydroxide (NaOH) inasmuch as all ingredients are completely used up.

It is, of course, to be understood that the present invention is, by no means, limited to the particular arrangement shown in the drawing but also comprises any modifications within the scope of the appended claims.

What I claim is:

1. In a textile treating arrangement: a treatment box for wet treating textile materials; said treatment box comprising an entrance leg with an inlet for receiving treating liquor and the goods to be treated, an exit leg with an outlet from which the treated goods are to be withdrawn, and an arched U-shaped tubular connecting member interconnecting said two legs; said connecting member having a substantially uniform cross-section throughout its length, said exit leg having a diameter at least equalling that of said entrance leg; first opening means at substantially the lowest point of said connecting member for withdrawing treating liquor therefrom; second opening means arranged in said exit leg intermediate the outlet thereof for the textile material treated therein and the connection of said exit leg with said connecting member for withdrawing treating liquor from said exit leg; circulating conduit means leading from said first and second opening means to the inlet of said entrance leg, pump means interposed in said conduit means with the suction side thereof connected to said first and second opening means and with the pressure side connected to the inlet of said entrance leg, said circulating conduit means also having interposed therein heating means interposed in said circulating conduit between the pressure side of said pump means and said inlet for heat treating liquor conveyed by said pump to said inlet; and means for feeding chemicals into said conduit means between said suction side of said pump and said first and second opening means to restore the concentration of the liquor withdrawn through said first and second opening means to the concentration of said liquor desired at the inlet of said entrance leg.

2. A machine according to claim **1**, in which said second opening means is so located and so dimensioned with regard to the delivery of said pump that the level of treating liquor introduced into the exit leg from said inlet leg will stay below and in spaced relationship to said outlet of said exit leg.

3. An arrangement according to claim **1**, in which said heating means is in the form of heat exchanger means.

4. In a textile treating arrangement: a treatment box for wet treating textile materials; said treatment box comprising an entrance leg with an inlet for receiving treating liquor and the goods to be treated, an exit leg with an outlet from which the treated goods are to be withdrawn, and an arched U-shaped tubular connecting member interconnecting said two legs; said connecting member having a substantially uniform cross-section throughout its length,

said exit leg having a diameter at least approximating that of said entrance leg; first opening means at substantially the lowest point of said connecting member for withdrawing treating liquor therefrom: second opening means arranged in said exit leg intermediate the outlet thereof for the textile material treated therein and ther connection of said exit leg with said connecting member for withdrawing treating liquor from said exit leg; circulating conduit means leading from said first and second opening means to the inlet of said entrance leg, pump means interposed in said conduit means with the suction side thereof connected to said first and second opening means and with its pressure side connected to the inlet of said entrance leg, heating means interposed in said circulating conduit means between the pressure side of said pump means and said inlet for heating liquor conveyed by said pump means to said inlet; means for feeding chemicals into said conduit means between said suction side of said pump means and said first and second opening means to restore the concentration of the liquor withdrawn through said first and second opening means to the concentration of said liquor desired at the inlet of said entrance leg, storage tank means having an inlet for connection with the suction side of said pump means and having an outlet for connection with the pressure side of said pump, and valve means interposed between said storage tank and said pump means and operable selectively to control communication between said pump means and said storage tank for selectively feeding treating liquor to and withdrawing treating liquor from said storage tank.

5. An arrangement according to claim 4, which includes: a settling tank having an inlet and an outlet respectively connected to the pressure side and suction side of said pump, and valve means interposed between said pump and said inlet and outlet of said settling tank for controlling communication between the latter and said pump.

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