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APPARATUS FOR TREATING FABRICS

Filed Nov. 20, 1925

2 Sheets-Sheet 1

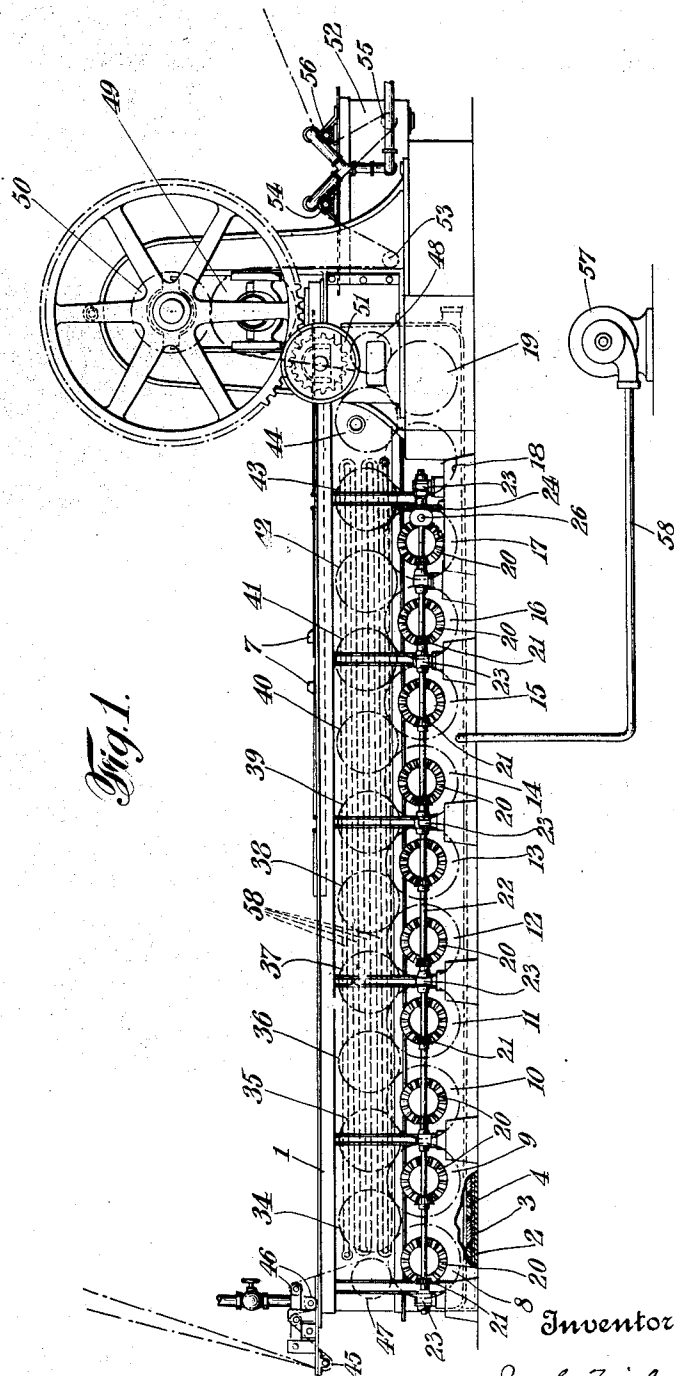


Fig. 1.

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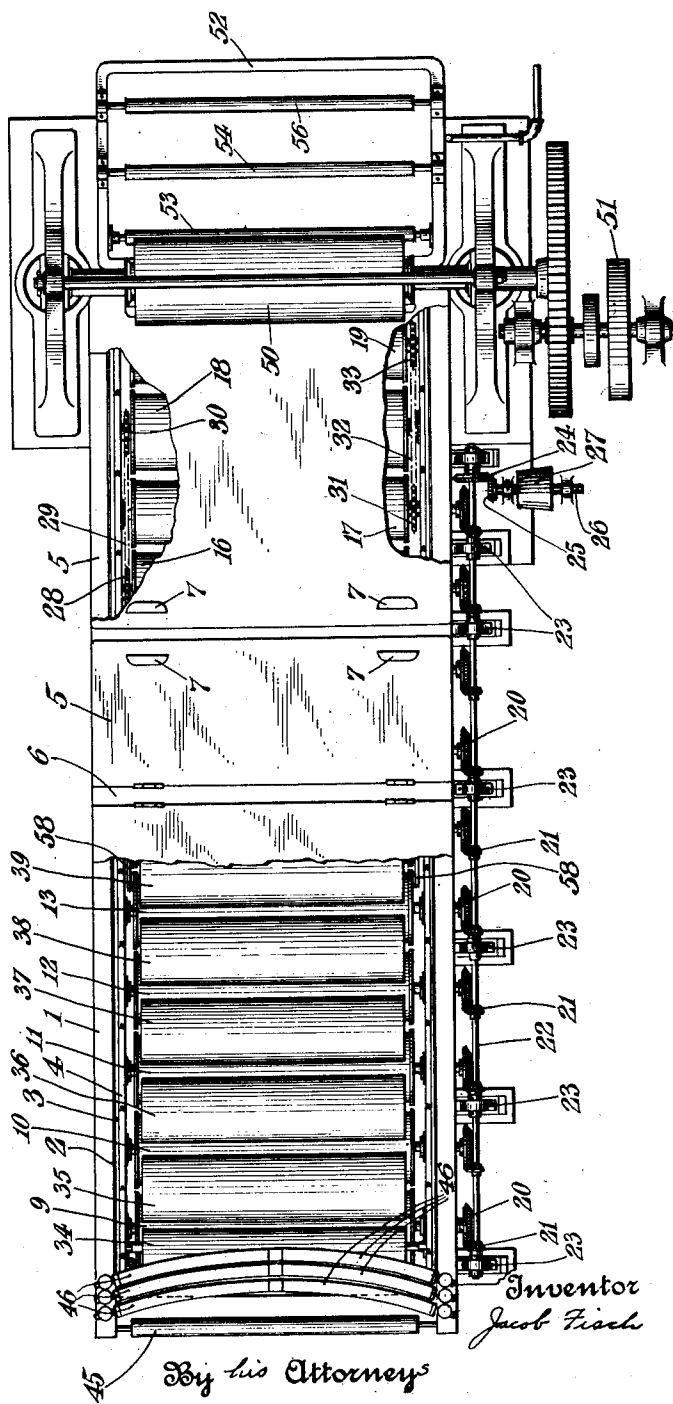
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Fig. 2.



UNITED STATES PATENT OFFICE

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APPARATUS FOR TREATING FABRICS

Application filed November 20, 1925. Serial No. 70,415.

This invention relates to apparatus for treating fabrics.

An object of the invention is to provide efficient and durable apparatus for treating the fabrics.

Processes for the treatment of fabrics with certain chemicals or reagents at certain desired temperatures are known. In such processes it is important to keep the temperature of the reagent acting upon the fabric within certain narrow temperature limits.

This invention is of particular value in connection with such processes, as one of its objects is the provision of apparatus which will insure that all portions of the reagent while acting upon the goods are maintained at substantially the same temperature.

I have found that greatly improved results may be obtained by not only maintaining the temperature of the body of the reagent constant, but also by keeping the fabric below the liquid level of the reagent throughout substantially the entire period during which the reagent is acting upon the fabric, as this insures a more uniform temperature of all portions of the reagents acting on the fabric substantially throughout the period in which it is acting.

Further objects of the invention will more fully appear from the following description taken in connection with the accompanying drawings illustrating, by way of example, the preferred embodiment of the apparatus used in carrying out the process.

The invention consists in the novel features, arrangement, construction and combination of parts of the apparatus and means hereinafter described in accordance with certain preferred embodiments thereof, and the invention will be more particularly pointed out in the appended claims.

Referring to the accompanying drawings:

Fig. 1 is a side elevation of the apparatus with certain parts broken away, and

Fig. 2 is a plan view of the apparatus with certain parts broken away.

Apparatus

Referring to the drawings, a suitable frame 1 constructed of any suitable material, such

for example as structural iron, is provided for supporting the tank for holding the treating solution. The bottom, sides and ends of the tank are formed with an outside shell 2 of any suitable material, such for example as galvanized sheet iron. A layer of thermal insulating material 3, such for example as asbestos, is applied on the inside of the shell 2. The inner lining 4 of the tank is formed of a material capable of withstanding the corrosive action of the particular treating solution, i. e. chemicals or reagents which are used. In the present embodiment, this lining 4 is constructed of wood, to withstand caustic alkali, and as shown in Fig. 1 is formed of groove and tongue boards. The top of the tank is provided with sections, such for example as 5 (Fig. 2), which are hinged to rigid portions of the top such as 6 and these sections are provided with suitable handles 7 by which they may be opened in order to inspect parts of the apparatus within the tank. The entire top of the tank is constructed in a manner similar to that employed in the construction of the sides, bottom and ends of the tank, i. e. an outer layer of metal and inner lining of wood and a layer of asbestos between the inner and outer lining. The tank so formed is watertight, is thermally insulated, and is adapted to be filled with chemicals or reagents in solution form which in the present embodiment is a caustic alkali, such for example as caustic soda, for treating the fabric.

Suitable power driven rolls such as the cylindrical rolls 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19, preferably provided with rubber surfaces, are mounted within the tank adjacent the bottom thereof and are supported in suitable bearings. One end of the axle of each of these rolls, with the exception of the rolls 18 and 19, passes through a cooperating stuffing box in the side of the tank and projects beyond the tank a distance sufficient to allow a bevelled gear such as 20 to be attached thereto providing thereby a drive engaging portion for each of said rolls. Each of these bevelled gears 20 is in mesh with a cooperating driving pinion 21. Driving pinions 21 are fastened to driving shaft

22 extending longitudinally of the tank and supported on suitable bearings 23. A bevel gear 24 is attached to this shaft 22 adjacent the right hand end thereof and is in mesh with a driving bevelled gear 25 attached to the shaft 26, which is supported in suitable bearings and which is provided with a driving pulley 27, by means of which suitable motive means may be applied through the intermediary of a pulley belt to thereby rotate the power driven rolls. The roll 18 is driven from roll 16 in the following manner: a sprocket 28 is attached to the roll 16 and carries a driving chain 29 which engages a sprocket 30 carried by the roll 18. The roll 19 is driven in a similar manner by means of a sprocket 31 carried at the end of the roll 17 adjacent to the front of the apparatus and engaging a chain 32 which also engages a sprocket 33 carried by the roll 19 at the end adjacent the front of the machine. It will therefore be seen that when the machine is in operation, the rolls 8 to 19 inclusive are rotated by suitable motive means applied to the pulley 27. The direction of rotation of each of the rolls of this series is the same, and is in an anti-clockwise direction with reference to Fig. 1.

A series of friction rolls 34, 35, 36, 37, 38, 39, 40, 41, 42, 43 and 44 are supported by the power driven rolls; each of the friction rolls being supported by two of the power rolls. The friction rolls are preferably cylindrical in form and are in the form of metal pipes open at the ends and of comparatively thick walls. Both the power driven rolls and the friction rolls are positioned in the tank at a point below the liquid level of the tank. By this I mean that the treating solution in the tank is maintained at such a level that the power driven rolls and the friction rolls will be substantially submerged.

An idle roll 45 is mounted adjacent the left hand end of the tank on an extension of the frame 1. A plurality of Mycock rolls designated as 46 are mounted on an extension of the frame 1 adjacent the idle roll 45 between the idle roll 45 and the tank. A roll 47 is mounted within the tank adjacent the top of the power driven roll 8.

A similar roll 48 is mounted within the tank at the right hand end thereof adjacent the power driven roll 19.

A foulard of the type well known to those skilled in the art is mounted adjacent the right hand end of the tank and carries the usual rolls 49 and 50. The foulard is operated by suitable motive means applied to the pulley 51 (Fig. 2).

An open top tank 52 is provided adjacent the right hand side of the foulard machine and idle rolls 53, 54, 55 and 56 are supported by this tank in suitable bearings.

Suitable means is provided for maintain-

ing the treating solution in the insulated tank at a relatively low temperature; and will be designated diagrammatically by means of the brine pump 57 and the brine pipes 58 which extend into the solution tank and are adapted to circulate the brine therethrough for cooling the solution, as will be well understood by those skilled in the art. Other parts of the cooling system are omitted for the sake of brevity and it is to be understood that the brine pump 57 and brine pipes 58 are intended to diagrammatically represent a suitable complete cooling or refrigerating system such as is well known to those skilled in the art.

Operation

The insulated tank is filled with the liquid reagent desired, for example according to one use of the invention a caustic alkali of a strength of at least 15° Baumé, to a level which will substantially cover the top of the friction rolls. The refrigerating apparatus is now put into operation to bring the treating solution, i. e. the caustic alkali, to and maintain it at the desired temperature; which temperature is substantially maintained throughout the treatment. For example, if the fabric is to be treated to produce a linen like effect according to Patent No. 1,439,519, the caustic alkali may be of a strength of 30° Baumé and maintained at a temperature of about minus 10° C.

For such treatment the fabric to be treated is started through the machine by means of a web in the manner well understood by those skilled in the art. The fabric passes below and around the roll 45 and through the Mycock rolls 46, which stretch the fabric transversely, thence around the roll 47 around and beneath the roll 8, up over the friction roll 34, down and beneath the roll 9, and so on alternately between one of the power driven rolls and one of the friction rolls, around one of the friction rolls and so on until the fabric has passed around each respective roll of both series of rolls. In this way the fabric is not only firmly held against the power driven rolls and the friction rolls, but also acts to drive the friction rolls as the fabric is moved through the machine by the power driven rolls. The speed of the fabric in such treatment is timed so that it is immersed in caustic alkali for say one to two minutes. The fabric is then passed over the roll 48 and thence out of the treating tank and up between the rolls 49 and 50 of the foulard. From this point the fabric may be passed down into the tank 52 which may contain a washing solution such as water. The fabric passes beneath roll 53, over roll 54, beneath the roll 55, over the roll 56, and thence out of the machine.

It will therefore be seen that the fabric is first stretched transversely or laterally, thence it is passed into the treating solution

which is maintained at substantially a constant, relatively low temperature and the fabric is held in a transversely stretched condition and it is passed at a uniform predetermined rate of speed through the treating solution or reagent beneath the liquid level thereof during substantially the entire period that it is subjected to the caustic alkali or other reagent and is then passed out through the foulard. From the foulard the fabric may be passed through the tank 52 where it may be additionally treated or washed according to the finish desired.

According to this method and apparatus, all parts of the fabric which are being acted upon by the reagent are immersed in the body of the reagent so as to insure all portions of the reagent that are acting upon the fabric being maintained at the desired temperature of the body of the reagent, the temperature of which is controlled.

While I have described my invention in connection with the use of a caustic alkali, such for example as caustic soda, at a particular low temperature, it is to be understood that the invention is useful in any case where it is desired to have any reagent act upon the fabric within some particular narrow range of temperature limits, and particularly where this range is substantially above or below room temperature.

Having thus described my invention in detail in its present preferred embodiment, it will be obvious to those skilled in the art, after understanding my invention, that various changes and modifications may be made therein without departing from the spirit and scope thereof, and I aim in the appended claims to cover all such modifications and changes.

What I claim as new and desire to secure by Letters Patent is:

1. In apparatus for treating fabric, the combination of a tank for holding a liquid reagent, a plurality of power driven rolls supported in said tank adjacent the bottom thereof, a plurality of hollow, cylindrical, open-end friction rolls supported by the peripheries of said power driven rolls and having substantially their entire peripheries below the top of said tank, and motive means for rotating said power driven rolls, whereby with said liquid reagent present in said tank and when said fabric is fed between said power driven rolls and said friction rolls said friction rolls and said power driven rolls will be rotated simultaneously and said fabric moved through said liquid.

2. In apparatus for treating fabric, the combination of a thermally insulated tank for holding a liquid reagent at a substantially predetermined level, means for maintaining the reagent at substantially a constant relatively low temperature, means for stretching said fabric laterally before treat-

ment, and means in said tank for holding said fabric in stretched condition and for moving said fabric through the said reagent in said tank below the level at which said liquid is adapted to be maintained during substantially the entire period of such treatment with said reagent.

3. In apparatus for treating fabric, the combination of a thermally insulated tank for holding a liquid reagent at a substantially predetermined level, means for maintaining the reagent at substantially a constant relatively low temperature, and a plurality of rolls in said tank for holding said fabric in a stretched condition and for moving said fabric through the reagent in said tank below the level at which said liquid is adapted to be maintained during substantially the entire period of such treatment with said reagent.

4. In apparatus for treating fabric, the combination of a thermally insulated tank for holding a liquid reagent, means for maintaining said reagent at substantially a constant relatively low temperature, a series of power driven rolls and a series of friction rolls mounted in said tank with the rolls of one series mounted above the rolls of the other series in such arrangement that the rolls of one series alternate with the rolls of the other series and are adapted to hold said fabric in intimate contact therebetween, the peripheries of said upper series of rolls being substantially entirely below the top of said tank, and motive means for driving said rolls at substantially a uniform rate of speed, whereby when said fabric is fed between said power driven rolls and said friction rolls, said friction rolls will be rotated simultaneously with said power driven rolls and said fabric will be moved through said liquid, and will be maintained below the top of said tank during substantially the entire period of such treatment with said liquid.

5. In apparatus for treating fabric, the combination of a thermally insulated tank for holding a treating solution, means for maintaining the treating solution at substantially a constant relatively low temperature, a series of power driven rolls mounted within said tank adjacent the bottom thereof and supported on suitable bearings and each provided with drive engaging portions, motive means exteriorly of said tank and geared to said rolls for driving said rolls at substantially a uniform rate of speed, and a series of hollow cylindrical open-end friction rolls whose peripheries are substantially entirely below the top of said tank and which are supported by said power driven rolls and adapted to hold said fabric in intimate contact with said power driven rolls and adapted to be partially surrounded by said fabric, whereby said fabric will have continuous surface contact with the rolls of both series

and will be moved through said solution in said tank during substantially the entire period of such treatment with said solution.

6. In apparatus for treating fabric, the combination of a thermally insulated tank for holding a liquid reagent at substantially a predetermined level and under a substantially constant temperature, a plurality of power driven rolls supported in said tank below the level at which said reagent is adapted to be maintained, a plurality of hollow cylindrical open end friction rolls supported by the peripheries of said power driven rolls and having their peripheries disposed substantially below said level, and motive means for rotating said power driven rolls, whereby when said fabric is fed between said power driven rolls and said friction rolls said friction rolls will be rotated simultaneously with said power driven rolls and said fabric will be moved through said liquid and thereby maintained at a relatively constant temperature.

7. In apparatus for treating a fabric web, the combination with means for laterally stretching said web, of a tank containing a liquid reagent, and means for passing the laterally stretched web from said first named means and then through the reagent in said tank below the level at which said reagent is adapted to be maintained, said second named means maintaining said web in substantially its laterally stretched condition while passing through said reagent.

8. In apparatus for treating a fabric web, the combination with means for laterally stretching said web, of a tank containing a liquid reagent, and means for passing the laterally stretched web from said first named means and then through the reagent in said tank below the level at which said reagent is adapted to be maintained, said second named means maintaining said web in substantially its laterally stretched condition while passing through said reagent and comprising driven and idler rolls having substantially smooth and even faces.

9. In apparatus for treating a fabric web, the combination with means for laterally stretching said web, of a tank containing a liquid reagent, and means for passing the laterally stretched web from said first named means and then through the reagent in said tank below the level at which said reagent is adapted to be maintained, said means comprising coacting roll structure operating substantially below said level of said reagent.

10. In apparatus for treating a fabric web, the combination with means for laterally stretching said web, of a tank containing a liquid reagent, and means for passing the laterally stretched web from said first named means and then through the reagent in said tank below the level at which said reagent is adapted to be maintained, said

second named means maintaining said web in substantially its laterally stretched condition while passing through said reagent and comprising driven and idler rolls operating substantially below said level of said reagent.

11. In apparatus for treating a fabric web, a tank, means for passing said web through said tank, said means comprising driven rolls in said tank and disposed in side-by-side relation, and idler rolls in said tank, each idler roll being supported solely by adjacent driven rolls.

12. In apparatus for treating a fabric web, a tank, means for passing said web through said tank, said means comprising driven rolls in said tank and disposed in side-by-side relation, and idler rolls in said tank, each idler roll being supported solely by adjacent driven rolls, the exterior surfaces of said driven rolls comprising resilient material.

13. In apparatus for treating a fabric web, a tank, means for passing said web through said tank, said means comprising driven rolls in said tank and disposed in side-by-side relation, and idler rolls in said tank, each idler roll being supported solely by adjacent driven rolls, said idler rolls being hollow and open at their ends.

14. In apparatus for treating a fabric web, a tank containing a liquid reagent, and means for passing said web through said tank, said means comprising coacting driven and idler roll structure operating substantially below the level at which said reagent is adapted to be maintained in said tank.

15. In apparatus for treating a fabric web, a tank containing a liquid reagent, and means for passing said web through said tank, said means comprising coacting driven and idler roll structure operating substantially below the level at which said reagent is adapted to be maintained in said tank, the exterior surfaces of the rolls of said driven roll structure comprising resilient material.

16. In apparatus for treating a fabric web, a tank containing a liquid reagent, and means for passing said web through said tank, said means comprising coacting driven and idle roll structure operating substantially below the level at which said reagent is adapted to be maintained in said tank, the rolls of said idler roll structure being hollow and open at their ends.

In testimony whereof I have signed my name to this specification.

JACOB FISCH.