June 9, 1953 R. W. JACOBY 2,641,119

AGEING OR REDUCING APPARATUS

Filed May 3, 1950 2 Sheets-Sheet 1

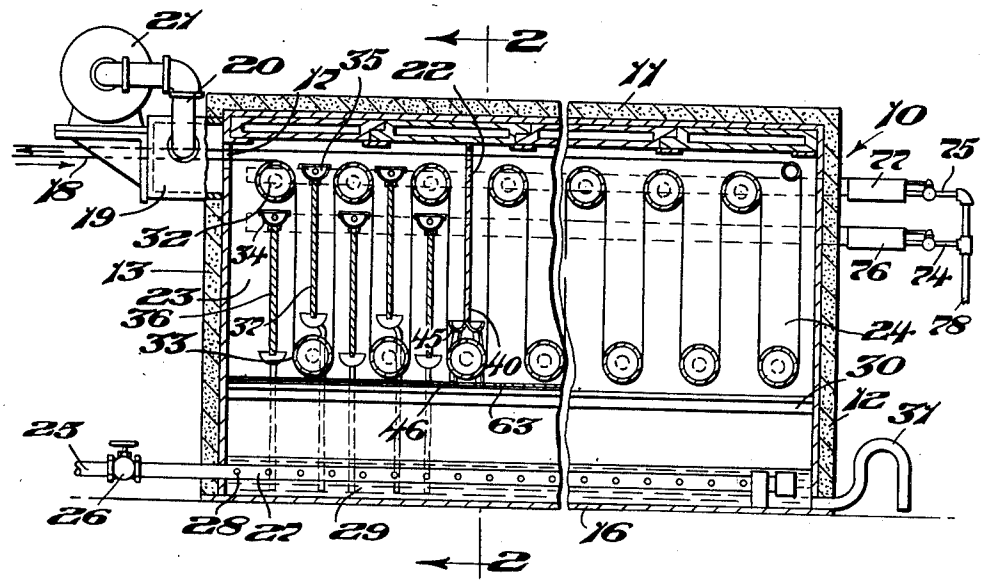


Fig. 1.

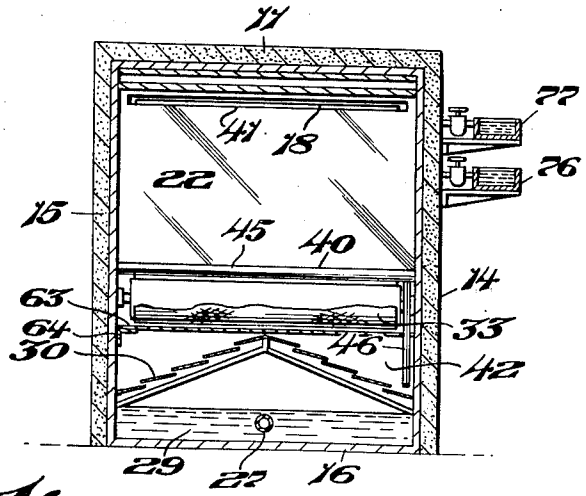


Fig. 2.

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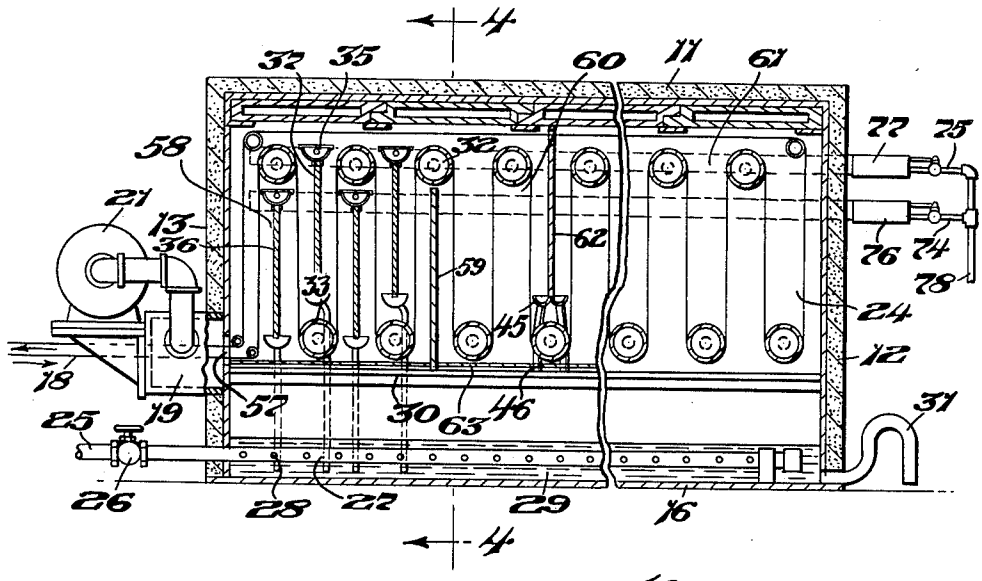


Fig. 3.

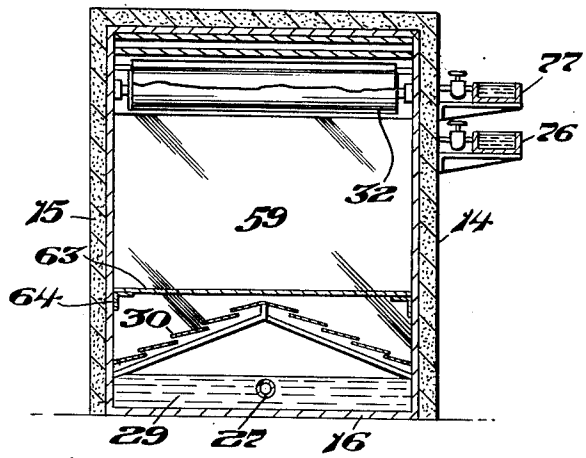


Fig. 4.

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Patented June 9, 1953

2,641,119

UNITED STATES PATENT OFFICE

2,641,119

AGEING OR REDUCING APPARATUS

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Application May 3, 1950, Serial No. 159,703

2 Claims. (Cl. 68—5)

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This application is a continuation-in-part of a copending application Serial No. 127,644 filed November 16, 1949.

The invention relates to what is known as vat color printing or dyeing, or "discharge printing" and particularly to ageing or treating vat color prints or dyes or discharge prints or any other product where a reduction is necessary by suitable reagents, such as, with hydrosulphite.

The chemical reactions and physical reactions, such as liberation of latent heat or vaporization of steam by the absorption of moisture by the cloth may cause the steam to reach a temperature of 240° Fahrenheit or even more. This excess heat produces super-heated steam which retards the action as the relative humidity drops and as the temperature rises; for instance, at 230° Fahrenheit and atmospheric pressure the steam has a relative humidity of 70 per cent, and at 70 per cent relative humidity the moisture regain is only 50 per cent of what it is at 95 per cent relative humidity. As moisture is necessary to dissolve the reduced leuco combination of the vat colors and allow them to be absorbed by the fabric, the reduction in moisture available in the steam at this higher temperature reduces or retards the action. Also, it is found that increase in temperature due to the reactions which occur causes non-uniform temperatures in different parts of the box and this further causes an uneven chemical reaction and results in uneven effects upon the goods. It is further found that the excess of heat occurs where the chemical reaction first takes place or the steam first contacts the fabric to produce the reaction desired, and thus at this location the temperature rises to a greater amount than in other locations of the chamber.

One of the objects of this invention is to produce an improved apparatus through which the fabrics being aged may be passed during the reduction process without the usual disadvantages accompanying the use of apparatus heretofore used for this purpose. As is well known, it is essential in such treatment of printed or dyed goods, that oxygen of the atmosphere should be kept away from the portions of the fabric undergoing chemical reactions. This is usually accomplished by carrying out the reactions in a suitable chamber from which air has been displaced by a suitable gas, usually live steam.

Another object of this invention is to prevent the rise of the temperature of the steam in certain parts of the apparatus where the fabric passes through.

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Another object of this invention is to prevent the rise of the temperature of the steam at the first portion of the chemical reaction on the goods which takes place in the apparatus.

More specifically, an object of this invention is to direct a greater volume of steam about the portion of the fabric where the reaction first occurs so that this greater volume may more readily absorb the greater amount of heat which is present due to the chemical and physical reactions which occur as treatment first commences.

Another object of this invention is to provide two or more chambers either physically separated or close together through which the work passes rather than a single chamber as shown in the above-mentioned patent and to exhaust the steam from the chambers beyond the first through the first chamber where the chemical reaction first occurs so that a greater volume of steam will pass through the location where the reaction first occurs.

Another object of this invention is to increase the moisture in the first chamber only of the plurality of chambers by use of wet blankets.

Another object of this invention is to increase the turbulence of the steam about moist blankets in the locality of the chemical reaction so that the water may act to pick up the heat.

Another object of this invention is to prevent the steam from directly entering the first chamber and by forcing it through the other chambers increase the turbulence in the first chamber.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a sectional view through an apparatus showing this invention;

Figure 2 is a sectional view on line 2—2 of Figure 1;

Figure 3 is a view similar to Figure 1 but showing a modified form of apparatus; and

Figure 4 is a section on line 4—4 of Figure 3.

In carrying forward this invention I provide two or more chambers which may be physically separated but it is possible to utilize an apparatus having a single housing by dividing the volume into two or more chambers while maintaining the exhaust from the entrance and exit openings into the first chamber and causing all of the steam to enter the last chamber and then move progressively toward the first chamber to pass through the first chamber in order that it may be exhausted, thus providing for a greater flow of

steam through the first chamber so that the temperature may be reduced in this chamber and super-heating may be reduced to a minimum. Blankets of water may be positioned in the first chamber where the reaction initially occurs between the stretches of the fabric for increasing the moisture content of the chamber.

Referring to the figures of the drawings, 10 designates a casing of sheet material with insulation thereover. There is provided a top wall 11 and end walls 12 and 13 with side walls 14 and 15 and a bottom wall 16. The end wall 13 is provided with an opening 17 through which the cloth or fabric 18 to be treated enters and leaves the casing. The fabric in thus entering and leaving the casing also passes through a chest 19 from which leads a conduit 20 for drawing gases out of the casing either by natural flow due to the heat of the gas or by means of a pump 21, by which the steam may be sucked away and discharged from the casing by means of this pump or blower 21.

Within the casing I have provided a division wall 22 to divide the casing into a first chamber 23 and a second chamber 24. A steam pipe 25 controlled as at 26 enters the casing through the wall 13 and extends the lentgh thereof through both chambers 23 and 24. The steam pipe within the casing now designated 27 is provided with a plurality of openings 28 to discharge steam. Water 29 is in the lower part of the casing and within both chambers into which the steam discharges so that the steam will pass upwardly through the water to be discharged above its surface and prevent any super-heated steam from entering the chambers. Between the level of the water 29 and the bottom rollers 33, baffles 30 known as shingles are inserted in order to give an even distribution of the steam throughout the lower portion of the casing and prevent water from spattering on the goods. A trap 31 extends through the wall 12 of the casing so as to prevent the water from rising above a certain predetermined height in the casing, as condensed steam may cause accumulation of the water in the bottom of the casing and an automatic discharge to maintain the proper level will thus be provided. A baffle 63 extends above the shingle 30 from side wall 14 to side wall 15, being supported on the opposite side walls by brackets 64 (see Figure 2). This baffle 63 extends throughout the length of the first chamber 23 and well into the last chamber 24, thus forcing all steam which is produced below the shingle to be discharged into the last chamber 24 from which it must make its way about the partition 22 into the first chamber 23 and thence out.

As the cloth enters the casing through the opening 17, it passes alternately over rolls 32 spaced along the upper portion of the casing and rolls 33 spaced along the lower part of the casing but above the baffle 63. Thus, the cloth passes back and forth in different stretches between the rolls 32 and 33 so as to expose a large part of its surface in the casing to the heated gas there present where reaction may take place.

Although not essential in some cases troughs 34 are positioned beneath each of the rolls 32 and troughs 35 are positioned above each of the rolls 33 and from these troughs there extend sheets 36 and 37 of water conducting material so that a large area of water may be exposed, that the steam within the chamber may pick up moisture and the moisture may be conveyed to the fabric 18 passing back and forth between these rolls 32 and 33, so that this fabric may pick up this moisture and the leuco combination of vat colors may be absorbed by the fabric. The troughs 34 and 35 are supplied by conduits 74 and 75 through float chambers 76 and 77 to maintain the level of liquid in them to an amount so that the dispersing means 36 and 37 are constantly supplied. Both of these conduits may be fed from a common conduit 78 connected to the main supply.

As the chemical and physical reactions take place, further heat is liberated and this occurs primarily in chamber 23 into which the cloth first enters prior to its passing from the chamber 23 to the chamber 24 and within the first fifteen seconds of being exposed to the steam. Accordingly, in order that the heat which is liberated in this first chamber may be better absorbed and prevented from raising the temperature of the steam in this first chamber, all of the steam is directed into the second chamber and in order to leave the chamber must pass through the first chamber, such as below the end 40 of this wall, where the greatest opening occurs between the chambers. Very little of the steam will pass through the narrow slot 41 through which the exit stretch of the cloth 18 passes from the chamber 24 to the chamber 23. This wall 22 extends from one side 14 to the other side 15 of the casing and thus the major opening 42 provided is that below the end 40 of the wall. By this arrangement all of the steam which enters the chamber 24 will pass through the chamber 23 with increased turbulence and about the cloth where reaction is first occurring and the increased volume and turbulence will serve to pick up more water from the blankets and better reduce the rise in temperature caused by the chemical and physical reactions which are taking place in that chamber to a greater extent than in the later reactions on the cloth and thus will prevent the temperature from rising and, consequently, prevent the reduction in the percentage of relative humidity of the steam in the chamber and thus in turn supply a greater amount of moisture to the cloth, which is desirable for the greater development of the color on the cloth.

The relative volume of steam supplied to the first chamber may be proportioned such for example, if five times the volume of steam is desired to reduce the temperature in the first chamber, this chamber will be made one-fifth the total volume of the chambers in which the work is treated.

Trough 45 on bottom of dividing sheet will carry condensed water to the side so it will be conveyed by tubes 46 downwardly and will not drop onto the goods.

In some cases instead of arranging the casing and dividing it into chambers, as shown in Figure 1, the opening through the casing, as shown in Figure 3, is located at 57 in the lower part of the casing. The chest 19, conduit 20 and blower 21 are the same as described in Figure 1, as are also other parts being similarly numbered such as control 26. However, in this arrangement a division wall 59 to provide the first chamber 58 is shown as extending upwardly from the shingle 30 to a point just short of one of the upper rolls 32 so that all of the steam from the other chamber or chambers will have to pass over the top of the wall 59 and then across the chamber 58 to exit opening 57.

In some cases it may be desirable to have a second chamber **60** and a third chamber **61** by providing an additional division wall **62** extending downwardly and substantially a duplicate of the wall **22** which is shown in Figure 1, there being provided at the end of this wall troughs **45** with their conduits **46**, as heretofore described.

In this case, by having three chambers with the walls between them alternating, it is necessary for the steam in chamber **61** to pass beneath the wall **62**, into the chamber **60**, and then this steam from both of these chambers must pass over the upper end of the wall **59** and then downwardly again to be extracted from the lower part of the first chamber **58** thus providing a large flowing volume of steam in the first chamber.

The baffle **63** is shown in Figures 3 and 4 similar to the showing in Figures 1 and 2, the baffle extending across the first and second chambers so that all steam which is produced below these chambers will be discharged into the end chamber **61** from which it must make its way through each of the chambers to the first chamber **58** where it will be discharged. Blankets are also provided in the first chamber as heretofore mentioned and are given the same numbers in Figures 3 and 4 as in Figures 1 and 2.

I claim:

1. An ageing or reducing apparatus comprising a generally rectangular casing having enclosing walls, means in said casing dividing the same into a plurality of chambers comprising a first chamber and at least one additional chamber, said casing being closed to the atmosphere except for entrance and exit opening means provided in one of the enclosing walls of the first chamber adjacent one corner thereof, said means which divides the first chamber from the additional chambers extending from one wall and terminating short of the opposite wall providing a space at a location diagonally across the first chamber from the entrance and exit opening means, means for passing printed or dyed fabric into said opening means through the first chamber thence through said space and through an additional chamber in successive runs and thence out of said opening means, means for supplying steam to said casing, means for directing all of the steam from all additional chambers through the first chamber to be discharged through said entrance and exit opening means, whereby a greater volume of steam per cubic foot of chamber space passes through the first chamber where chemical and physical reactions first occur than any additional chamber.

2. An ageing or reducing apparatus as set forth in claim 1 wherein said casing has top, bottom, side, and end walls, said dividing means comprises a wall which extends from the top wall toward but short of the bottom wall, said means for supplying steam is below the work and the means for directing the steam is a solid baffle located between the means for supplying steam and the work and extending across the chamber from side to side and from the end of the casing having the opening means toward but just short of the opposite end of the casing in a position to direct all of the steam to the last chamber, said steam being applied to the chamber ahead of it from the last chamber.

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