Sept. 11, 1928. 1,683,687

P. MIJER

ART OF DYEING

Filed Feb. 14, 1924 2 Sheets-Sheet 1

Fig. 1,

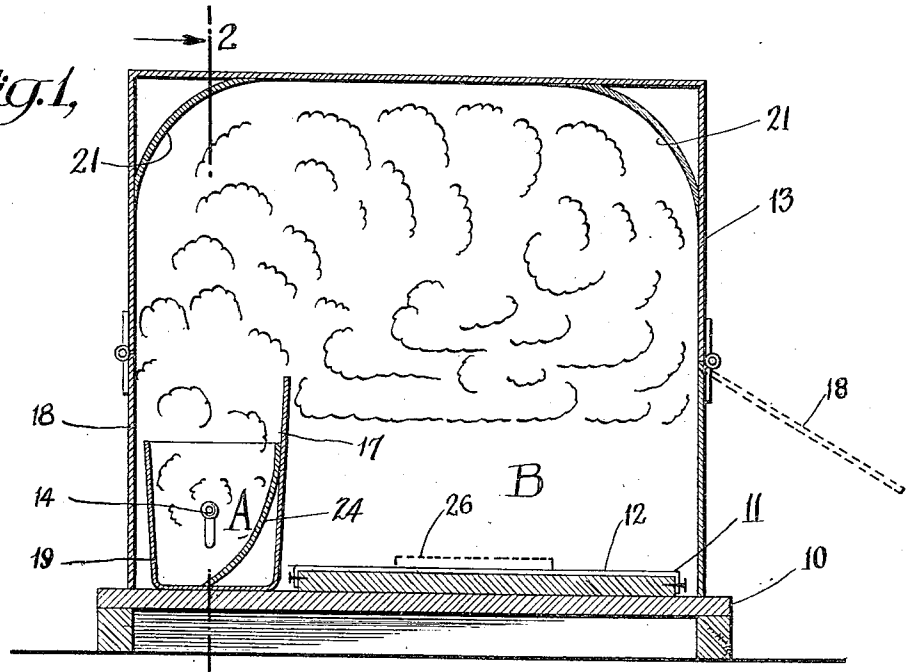
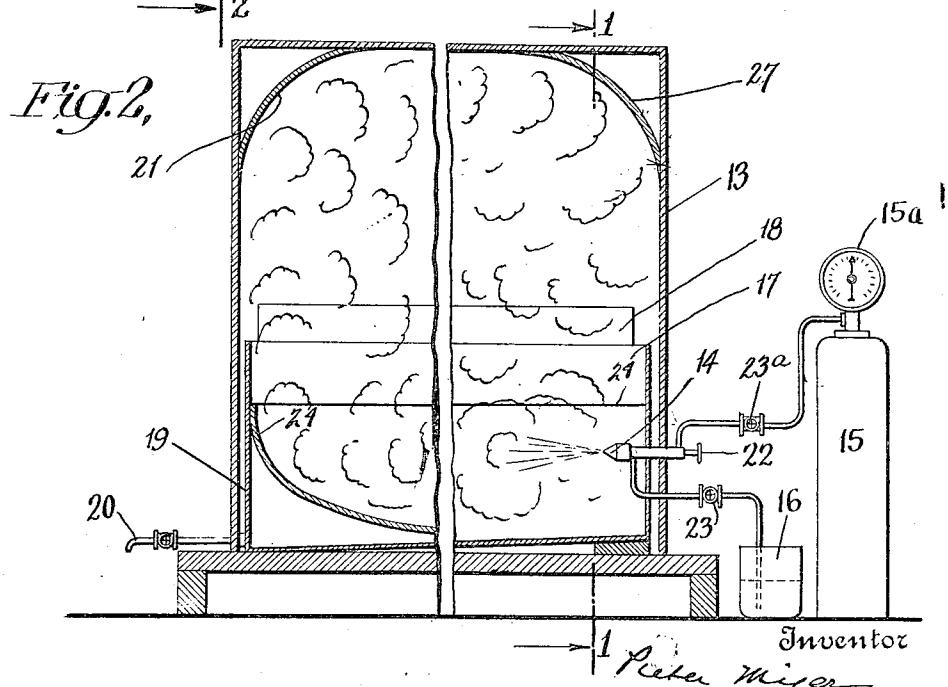


Fig. 2,



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ART OF DYEING

Filed Feb. 14, 1924 2 Sheets-Sheet 2

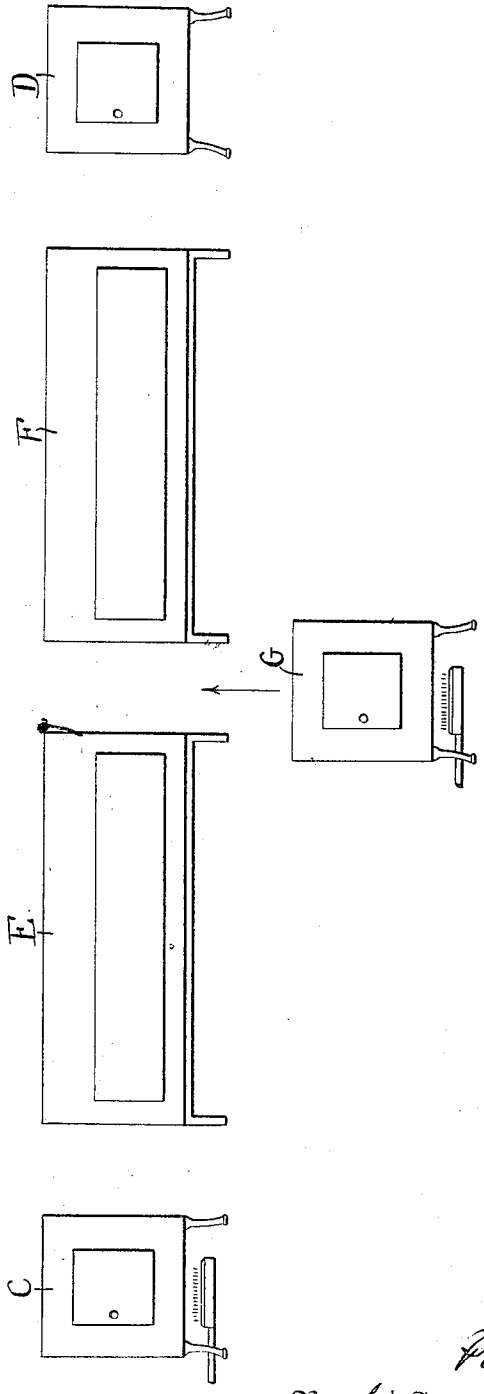


Fig. 3.

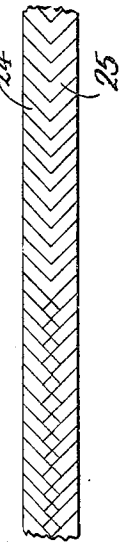


Fig. 4.

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Patented Sept. 11, 1928. 1,683,687

UNITED STATES PATENT OFFICE.

PIETER MIJER, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE TWO-TONE CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ART OF DYEING.

Application filed February 14, 1924. Serial No. 692,762.

This invention relates to an improved process of and apparatus for coloring or dyeing fabrics, and to an improved colored or dyed fabric or the like, which is preferably a textile fabric; while the invention is hereinafter described with reference to the dyeing of silk, which presents special difficulties, it will be obvious that the process is also valuable for dyeing or coloring all kinds of textiles, as well as other articles of every class.

In accordance with a preferred embodiment of my improved process, I form a cloud or spray of dye or coloring matter mixed with air or other suitable vapor, the coloring matter being suspended in the cloud in finely atomized condition, and I bring this cloud into such proximity with the material being colored that it receives the finely-divided particles coming from this cloud, while protecting the material from the direct action of the atomizing spray, whereby the material is evenly colored throughout its entire surface. By protecting or shielding the material from the coloring matter which falls in the form of drops at the spray from which the cloud is formed, we avoid the possibility of spotting of the material which would render it unsuitable for commercial use.

The material is exposed to this even or homogeneous deposition of minute particles of coloring matter from the cloud until it is dyed on the exposed surface to the desired extent, after which the material is removed from proximity with the cloud.

I prefer to arrange so that the dye does not penetrate entirely through the material, or beyond a determined extent, so that the material can be colored one color on one side, and another color, or another shade of the same color, on the other side. To this end, the material after it has been dyed by subjecting it to the action of a cloud of atomized coloring matter in suspension, is turned over and subjected to the action of a cloud of a different coloring matter; in both cases it is important that the dye should actually be found to have penetrated the fibres or into the thickness of the material, after the steaming operation, described below. In the preferred form of the invention, the process is carried on to a point where the material is not merely colored on its surface, but the penetration of the dye into the material takes place to a substantial extent, so that the preferred fabric is, in actual fact, after steaming, a dyed fabric, and not merely a fabric having a coating of coloring matter. On the other hand, when dyeing the fabric on both sides, it is important to avoid the penetration of the dye through the entire thickness of the fabric; to this end, the fabric itself should be dry, and if it is not dry, it should be subjected to a drying operation, which may take place either before or even during the time that the material is subjected to the action of the cloud of atomized dye. The process is of particular value in connection with the dyeing of silk, and I find that if the silk is maintained in a dry condition, even the very finest tulles can be dyed successfully on both sides thereof. Silks made in accordance with this form of the present process are penetrated to a substantial extent below the surface, but not to such an extent that the dye on one side passes to the other side thereof. The dyeing of the fabric may take place in a suitable dyeing chamber, and it is in some cases preferable to heat the fabric before dyeing it.

Apparatus employed for carrying out the process of the invention, in accordance with the preferred form thereof, comprises means for producing a spray to form a cloud of dye, means for confining said cloud and means for shielding the material from said spray while the material is in proximity with said cloud.

In order that the invention may be more clearly understood, the same will now be described with reference to a preferred embodiment thereof, which is illustrated in the accompanying drawings, in which:

Figure 1 is a section of one unit of the improved dyeing apparatus taken along the line 1—1 of Figure 2;

Figure 2 is a longitudinal section along the line 2—2 of Figure 1.

Figure 3 represents diagrammatically and in elevation, certain apparatus which may be successively used in carrying out the process.

Figure 4 is an enlarged diagrammatic cross-section of a piece of material colored in accordance with the process.

Referring to the drawings, it will be seen that 10 represents a table bearing thereon a removable support 11 upon which the material 12 to be dyed is placed. The material

here represented is adapted to serve as a dress length, and is laid flat and without wrinkles or folds upon the support 11, to which it is attached at its edges as shown, by suitable thumb tacks. 13 represents a box-like cover or hood which is seated on the table 10 and encloses the cloud of atomized dyeing matter held in suspension. 14 represents an air-brush of well-known character, such as a "Wold" air-brush, connected to a tank 15 or other source of compressed air, and the tank 16 or other source of liquid dye. 17 is a shield running longitudinally of the hood and dividing it into two chambers, the spray chamber (*a*) and the cloud chamber (*b*), the shield being interposed between the spray and the support 11 on which the materials is supported, and protecting the fabric from the action of the spray. 18 represents doors to permit inspection, and the insertion and withdrawal of the support 11 and the material thereon, and the removal of the trough 19. It will be noted that the lower portion of the shield forms this trough 19, which is slightly inclined as seen in Figure 2, so should the coloring matter collect in this trough in any quantity, it can be drawn off through the tap 20. It is to be particularly noted that the roof of the hood 13 has curved portions 21 in order to shape the cloud of atomized dye to predetermined form, thereby assisting in insuring an even or homogenous coloring of the material.

The dye in liquid form is contained in the container 16 and in the form of air-brush here illustrated, it is drawn into the nozzle by aspiration, but it will be obvious that the dye may be fed into the air brush in any usual manner, as by gravity, for example. The liquid dye is prepared in the same manner as for the usual vat dyeing processes, except that the solution is considerably more concentrated. The degree of concentration depends upon the final tint of color desired; for example, I have obtained good results with the use of a half ounce to one ounce of the dye, to a quart of the other liquid constituents of the dyeing mixture.

The air-brush 14 is provided with the usual needle valve 22 for regulating the extent of orifice thereof, and a valve 23 is provided in the line between the air-brush and the source of dye supply or tank 16 in order to control further the amount of color supply if desired. The amount of air and dye supply can be varied within a wide range by operating the needle valve 22 of the air-brush 14, and the pressure of the atomizing air by means of the cut-off and pressure regulating valve 23^a being preferably supplied at a pressure of about 30 pounds. In most cases, this regulation will be sufficient, but it may also be desirable to provide for the further regulation of the quantity of the dye supplied by means of the aforesaid valve 23. It will be obvious that the contents of the mixture emitted from the mouth of the air-brush is under the positive control of the operator, and that he can determine with exactitude the conditions obtaining in the spray; as a consequence, the cloud formed from this spray will be controlled by the operator as to its pressure and density, and it is further controlled as to its shape by the shape of the hood; it is further controlled as to the quantity of dye present in proportion to the quantity of air present, and represents a substantially homogeneous mass of extremely fine particles of liquid dye held in suspension in the air. It is to be noted that the point of formation of this cloud is in front of the spray, which spray is not directed on to the fabric, but on the contrary, is shielded from the fabric by means of the shield 17, which prevents the coloring matter from coming into contact with the fabric directly from the mouth of the air-brush, or in the form of a spray; in other words, the fabric is not subjected to the direct action of the air-brush spray itself, or to the droppings or spattering of the air-brush, but only to the action of the cloud. The cloud can be controlled, and also held substantially uniform, as a result of which, the conditions existing in the dye chamber can be maintained substantially constant during the operation of the process.

I find it advantageous to provide curved guide portions 24 located at the side and at the end of the trough opposite from that which supports the air-bush, which serve as guides to the particles in the formation of the cloud.

While I have here illustrated only one air-brush, it will be apparent that any suitable number of such brushes may be employed as is desired, and that these may be arranged in any suitable or convenient location.

A preferred operation of the improved method and apparatus will now be described with referencewith reference to the drawings and including the diagram of Figure 3.

The silk is first dried, if it is not already dry enough, by being placed in a suitable heating chamber "C", where it may be heated to the desired extent. The support 11 with the material 12 thereon is placed in the chamber "B", and subjected to the action of the cloud, which cloud is maintained by the continuous operation of the air-brush during the dyeing process. Once the cloud has been formed, and is being maintained, it is not necessary to stop the operation of the air-brush after the piece of material has been colored to the desired extent, as this piece of material can be withdrawn, and another piece of material placed in the dyeing chamber through the right-hand door 18. The slight disturbance of the cloud caused by the

opening of the door 18 is not sufficient to materially affect the coloring operation. The extent of penetration of the dye into the fabric depends upon the length of time the material remains within the chamber, the amount of dye in the spray, and the nature of the dye. Complete penetration can be effected by leaving it in long enough, but if it is not desired to penetrate more than a predetermined amount, as will be the case where the process is employed for coloring articles on both sides, which appears to be one of the most valuable uses of the process, the material will be removed from the dyeing chamber before the penetration of the dye has exceeded a desired point, and thereafter it may be dyed on the opposite side thereof by placing it in a second apparatus similar to the apparatus just described, as illustrated diagrammatically in Figure 3, wherein E represents the apparatus for dyeing a piece of fabric one color, for example, blue, while F is the apparatus for dyeing the material with a second color on the opposite side thereof; in this same diagram G represents an intermediate apparatus for heating or drying the material after it has passed through the first dyeing chamber, and D a steaming apparatus for steaming the fabric to set the dye, after it has been placed on the second chamber F, and colored thereon on the other side thereof. As illustrated in Figure 4 in diagrammatic cross-section, the materials or silk colored in accordance with the present invention presents the characteristic that the dye penetrates the surface to a substantial extent, and this extent is preferably so predetermined that in the case of light fabrics, the penetration on both sides is substantially equal to a full dyeing of the material for example, the upper surface of the fabric, which is here shown diagrammatically on a highly magnified scale, is penetrated with a dye to the extent indicated by the shaded lines 24, while the other side is penetrated by a different dye to the extent indicated by the lines 25. It will be apparent that in many instances, the inter-penetration of the dyes will be such as to provide at some intermediate point in the fabric a zone where both dyes intermingle as shown by the cross-hatching at the left-hand side of said figure.

It will be apparent from this description of my improved process that the silk is not in all cases merely coated, but is actually penetrated by the dye to such an extent, that the silk possesses highly desirable qualities and compares with silk ordinarily in use; the color will not come out after fixing to any substantially greater extent than is the case with the ordinary fabrics now dyed in vats, and the fabric presents on each surface an homogeneously and differently colored face, which makes it possible to employ the fabric for a large variety of commercial purposes; for example, lamp shades, ladies' blouses, in which the collars and cuffs are formed by turning over the material, umbrellas and other uses.

It will be noted that in accordance with the preferred manner of carrying out the process, the material is steamed in the usual steaming apparatus after having been dyed on both sides, so as to set the dyes; the fabric is otherwise treated in the manner usual in the dyeing art. While the form and density of the cloud will vary according to the dye employed, and the nature of the material, I have obtained good results in accordance with this invention by using a "Wold" type of air-brush to produce a cloud of fine particles with an air pressure of about 30 pounds, operating in a chamber one yard wide, one yard long and one yard high, to dye yard lengths of fabric.

It will be apparent that, if desired, a stencil 26 (shown in dotted lines, Fig. 1) can be placed over the material 12 in order to secure the imprint of a design thereon, and that this design may be printed in colors if positive and negative stencils are used, in which case, it becomes necessary to provide a third or fourth dyeing chamber according to whether three or four colors are to be employed. In such case the part which is colored in the first coloring chamber is protected by a stencil in the second coloring chamber, and the material is then colored on the other side in the manner described above.

It will be apparent that the textile fabric made in accordance with my invention differs from other fabrics of a similar character, in the following respects:

(*a*) The surface of my improved dyed fabric is evenly colored, or homogeneously colored, that is to say, the colored surface does not appear to the eye as a large number of small specks of color, but as an evenly colored surface, similar as to its evenness to the surface resulting from the ordinary vat dye processes;

(*b*) Threads in the fibre which run from one surface to the other, are colored one color near and at one surface, and the other color near and at the other surface, so that a continuous cross-thread, if taken out of the fabric, will be found to be made up of a number of different colored portions; in this respect the fabric differs essentially from the well-known double-woven fabric, made up of different colored interwoven threads, now on the market, and which presents different colors on different sides; each thread of said double-woven fabric is all of one color and is dyed before weaving, in contradistinction to threads dyed by my process, as described above, after weaving has been effected, it being understood that my invention applies to the dying of all classes of fabrics, including the ordinary

"single-weave" fabrics, as well as to "double-weave" fabrics, such as referred to above.

It is one of the important advantages of the present invention that it provides a process and apparatus by which the dyeing of the fabric or other material can be carried on without drops of liquid in insufficiently atomized condition being deposited on the fabric. For example, in making two-tone fabric, that is, fabric dyed in different colors or different shades of the same color on the two sides, the mass or cloud of finely atomized dye solution is "non-spotting"; in other words, the cloud does not contain drops of sufficient size to fall on the fabric and form visible spots of color, or to soak through so that a spot appears on the other side; nor are other spots formed which spoil the cloth for commercial purposes, since any drops in the cloud which are large enough to form such spots or blotches fall by gravity into the trough 19. Thus the apparatus presents in effect a separating zone in the chamber A above the trough 19, and a dyeing zone in the chamber B above the fabric, which dyeing zone contains only the finely atomized particles of the dye in true cloud form, which particles are so small that when they are deposited upon the fabric they form a desirable color surface of sufficiently homogeneous appearance to present a pleasing effect, of commercially utilizable value. Furthermore, it is to be noted that drops forming upon the walls of the aforesaid apparatus as the result of particles condensing on the walls thereof, do not fall upon the fabric but pass down onto the bottom of the chamber B. The support 11 not only serves to hold the material flat and without wrinkles, but it also protects the under surface of the material from the action of the color cloud by raising the material above the bottom of the chamber in which liquid condensing on the side walls and floor can collect.

While the invention has been described herein with reference to a preferred embodiment, it will be obvious that the method, apparatus and product may be varied through a wide range without departing from the spirit of the invention and the ambit of the claims which follow. In particular, the process lends itself to numerous industrial applications, especially where employed in conjunction with stencils, as for example, in the manufacture of wallpaper, rugs and other articles having a pattern surface.

While I have described this process with reference to the coloring of materials, it will be apparent that it applies to any case where it is desired to apply liquid matter evenly to a surface exposed thereto, and that the invention is not to be limited to the art of dying or coloring materials or objects.

It is further to be understood that while I have described my process with reference to the penetration of the dye into the fibres of the material, it can be also employed for surface coating materials and objects with liquid colors or the other liquids.

What I claim is:

1. Process of applying liquid coloring matter uniformly to textile materials, comprising atomizing the liquid coloring matter under control, accumulating said atomized liquid matter to form a homogeneous cloud of minute particles and locating the material beneath the cloud and exposing it thereto whereby only non-spotting particles of the liquid are deposited on such material.

2. Process of applying liquid coloring matter to textile material, comprising forming of the liquid coloring matter a cloud composed entirely of minute non-spotting particles, and exposing the textile material to contact with such cloud.

3. Process of applying liquid coloring matter to textile material, comprising atomizing the liquid coloring matter and exposing the textile material to the atomized coloring material while preventing contact with particles large enough to spot the material.

4. Process of applying liquid coloring matter to textile material, comprising atomizing the liquid coloring matter at one locality and after removing the larger particles from the spray thus produced passing to another locality the remaining fine particles, and there exposing the textile material to said fine particles.

5. Process of applying liquid coloring matter to textile material, comprising spraying the coloring matter by atomization, accumulating the fine particles of the spray, and exposing the textile material to said cloud of fine particles while shielding the material from the spray.

6. Process of applying liquid coloring matter to textile material, comprising spraying the coloring matter by atomization, accumulating the fine particles of the spray, exposing the textile material to said cloud of fine particles while shielding the material from the spray, spraying by atomization a coloring matter of different color to form a cloud, withdrawing the textile fabric from said first mentioned cloud, and exposing the other side of the textile material to the last mentioned cloud of fine particles while shielding the material from the spray from which such cloud was produced.

7. Process of applying liquid coloring matter to textile material, comprising spraying the coloring matter by atomization and separating from the spray thus produced the

finer particles to form a substantially homogeneous cloud, and subjecting the textile material to said cloud.

8. Process of applying liquid coloring matter to textile material, comprising atomizing the coloring matter at one locality wherein relatively large particles are separated from the minute particles produced by the atomization, and passing the resulting cloud of minute particles to another locality, and in the latter exposing the material to the cloud.

9. Process of applying liquid coloring matter to textile material, comprising separately atomizing liquid coloring matters, and from the sprays thus produced forming separate clouds of fine particles devoid of spotting particles, and exposing one side of the textile material to one of said clouds and the other side to the other cloud, while shielding the material from the sprays which form said clouds.

10. Process of applying liquid coloring matter to textile material, comprising separately atomizing liquid coloring matters, and from the sprays thus produced forming separate clouds of fine particles devoid of spotting particles, exposing one side of the textile material to one of said clouds and the other side to the other cloud, while shielding the material from the sprays which form said clouds, and drying the textile material before each of said exposures.

11. Process of applying liquid coloring matter to textile material, comprising forming of the coloring matter a homogeneous cloud of minute non-spotting particles, and exposing the material to the cloud for deposition of minute particles.

12. Process of applying liquid coloring matter to textile material, comprising forming of the coloring matter a homogeneous cloud of minute non-spotting particles, and exposing the material, in a substantially dry state, to said cloud for deposition of minute particles upon the surface of the material.

13. Process of applying liquid coloring matter to textile material, comprising forming a non-spotting cloud of predetermined density, composed of minute particles of the liquid coloring matter, and subjecting the textile material thereto for deposition of such minute particles.

14. Process of applying liquid coloring matter to textile material, comprising forming of the coloring matter a homogeneous dense cloud of minute non-spotting particles, confining said cloud and exposing the material beneath the cloud for the deposition of minute particles from said cloud thereon.

15. Process of applying coloring matter to textile material, comprising forming a cloud containing such matter in finely divided form and devoid of drops capable of spotting the textile material, heating the textile material, and thereafter exposing the material to the cloud.

16. Process of applying coloring matter to textile material, comprising forming a cloud containing such matter in finely divided form and devoid of particles sufficient in size to spot the material, exposing the material to the cloud for deposition of fine particles of coloring matter, and thereafter steaming the material to set the dye.

17. Process of applying liquid coloring matter to textile materials, comprising atomizing the liquid coloring matter and from the spray thus produced forming a cloud devoid of spotting particles, exposing the textile material to the cloud without exposing it to the spray, and steaming the material after such exposure to set the dye.

18. Process of applying different coloring matter to the opposite sides of textile material, comprising forming non-spotting clouds composed of fine particles of the different coloring matter, exposing one side of the textile material to one cloud for partial penetration of the material by deposition of cloud particles, and similarly exposing the other side of the material to the other cloud, whereby both sides are uniformly colored without spotting and without complete penetration.

19. Process of dyeing permeable textile fabric, comprising exposing the fabric beneath a cloud of dye solution in finely atomized condition and withdrawing the fabric from exposure to the cloud before the dye solution has passed from one surface of the fabric to the other surface thereof.

20. Process of dyeing textile fabrics, comprising dyeing the fabric by exposing it beneath a cloud of atomized dye solution made up of extremely minute particles without drops, and thereafter setting the dye by a steaming operation.

21. Process of dyeing textile fabrics comprising exposing the fabric to a cloud of dye solution in a finely atomized condition without drops and withdrawing the fabric from exposure to the cloud before the coloring matter has passed from one surface of the fabric to the other surface thereof, and thereafter setting the dye by a steaming operation.

22. The method of coloring materials, consisting in forming a cloud of substantially homogeneous matter, heating the material and exposing it to the action of said cloud.

23. The method of coloring materials which consists in forming two clouds of different atomized dyes, drying the material and exposing one side thereof to one cloud, again drying the material and exposing the other side to the other cloud, and steaming the material to set the dyes.

24. The method of coloring materials con-

sisting in forming a cloud from an atomized spray, exposing the material to be colored to the action of said cloud without exposing it to the action of the spray, and steaming the material to set the dye.

25. The method of uniformly coloring textile materials consisting in heating the material, partially penetrating the material with the dye on one side thereof, again heating the material, and partially penetrating it with the dye on the other side thereof.

26. Method of dyeing consisting in coloring a heated fabric different colors on each side thereof by means of dyes which partially penetrate the thickness of the fabric on either side thereof.

27. Method of dyeing consisting in forming a plurality of clouds of dye and subjecting exposed surfaces of a heated material to said clouds.

28. Method of dyeing consisting in applying a liquid dye to one side of a heated fabric, then applying a liquid dye to the other side of the heated fabric, and treating the fabric to set the dye.

29. Apparatus for coloring textile fabrics, comprising an atomizing chamber, a cloud chamber communicating with the former a source of coloring matter, means for atomizing said coloring matter in said atomizing chamber to form a cloud in said communicating cloud chamber, and means for supporting the fabric to be colored in said cloud chamber.

30. Coloring apparatus comprising a pair of communicating chambers a source of coloring matter, means in one of said chambers to atomize said coloring matter, said other chamber confining a cloud of atomized coloring matter, and means within said other chamber to support the material to be colored.

31. Apparatus for coloring materials, including a cloud chamber, means for filling the same with a non-spotting cloud of coloring matter, said cloud chamber determining the dimensions of the cloud contained therein, and means for supporting the material within said cloud chamber.

32. Apparatus for coloring materials by means of a cloud of atomized coloring matter, comprising an arched hood for the cloud chamber to shape the cloud therein.

33. Apparatus for coloring materials, said apparatus including a table to receive the material, an atomizing means, a hood covering said atomizing means and table, and a shield dividing said hood into two communicating chambers and protecting the material from the direct action of the air brush.

34. Apparatus for dyeing fabric on both sides, comprising; means for forming two homogeneous controlled non-spotting clouds of atomized color for dyeing the fabric, and intermediate drying means for drying the fabric after it has been dyed on one side.

35. Apparatus for coloring textile fabrics comprising an atomizing chamber, a cloud chamber communicating with the former, a source of coloring matter, means for atomizing such coloring matter in said atomizing chamber to form a cloud in said communicating cloud chamber, and means for supporting the fabric to be colored in said cloud chamber and in a position beneath the cloud.

36. Apparatus for coloring textiles of the kind described, comprising cloud-generating means to generate a cloud of atomized coloring matter the particles of which are substantially all minute and without drops; means for enclosing said cloud; and means for supporting the material to be treated within said cloud-enclosing means.

37. Apparatus for coloring textiles, comprising means for atomizing coloring material; means providing a separating zone for the atomized coloring matter in which said atomizing means is located; a chamber communicating with the separating zone; and means for supporting the material to be colored within said chamber.

38. Apparatus for dyeing fabrics on both sides thereof, comprising a plurality of chambers; cloud-generating means communicating with said chambers to generate clouds of atomized coloring matter the particles of which are substantially all minute and without drops; and drying means intermediate said cloud chambers.

39. Apparatus for dyeing textiles, comprising a chamber, means for generating a non-spotting cloud of dye to be enclosed by said chamber, and means for supporting the fabric to be dyed within said chamber, said chamber being provided with side walls spaced away from the support for the material.

40. Apparatus for coloring or dyeing textiles, comprising a dyeing chamber, means for generating a non-spotting cloud of dye to be enclosed by said chamber, means for supporting the fabric to be dyed in said chamber, and means for holding the fabric flat while exposing it to said cloud.

41. Apparatus for coloring materials, comprising a dye chamber and means for generating a non-spotting dye cloud to be enclosed by said chamber; said means including an atomizing device, a dye tank, a source of pressure medium with controlling means for controlling the supply of pressure medium to the atomizing device, means for controlling the supply of dye to the atomizing device, and means for supporting the fabric within the chamber.

42. Apparatus for coloring materials, comprising a dye chamber, means for generating a non-spotting cloud therein com-

posed of finely divided particles of dye solution, regulating means for said atomizing device located outside of said dye chamber, and means for supporting the fabric within the chamber.

43. The process of piece-dyeing textile fabrics which consists in partially penetrating a thin permeable textile fabric with minute particles of atomized dye liquid distributed substantially evenly over one of the surfaces thereof to form a substantially even color ground on one side of said fabric.

44. The process of piece-dyeing textile fabrics which consists in partially penetrating a thin permeable textile fabric with minute particles of atomized dye liquid distributed substantially evenly over one of the surfaces thereof to form a substantially even color ground, and thereafter steaming the fabric for a sufficient length of time to set the dye.

45. The process which consists in partially penetrating a thin permeable textile fabric with minute particles of atomized dye liquid distributed substantially evenly over one of the surfaces thereof to form a substantially even color ground, and thereafter partially penetrating said fabric from the other side thereof with minute particles of atomized dye liquid distributed substantially evenly over the opposite surface thereof to form a substantially even color ground on said opposite surface.

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

PIETER MIJER.