

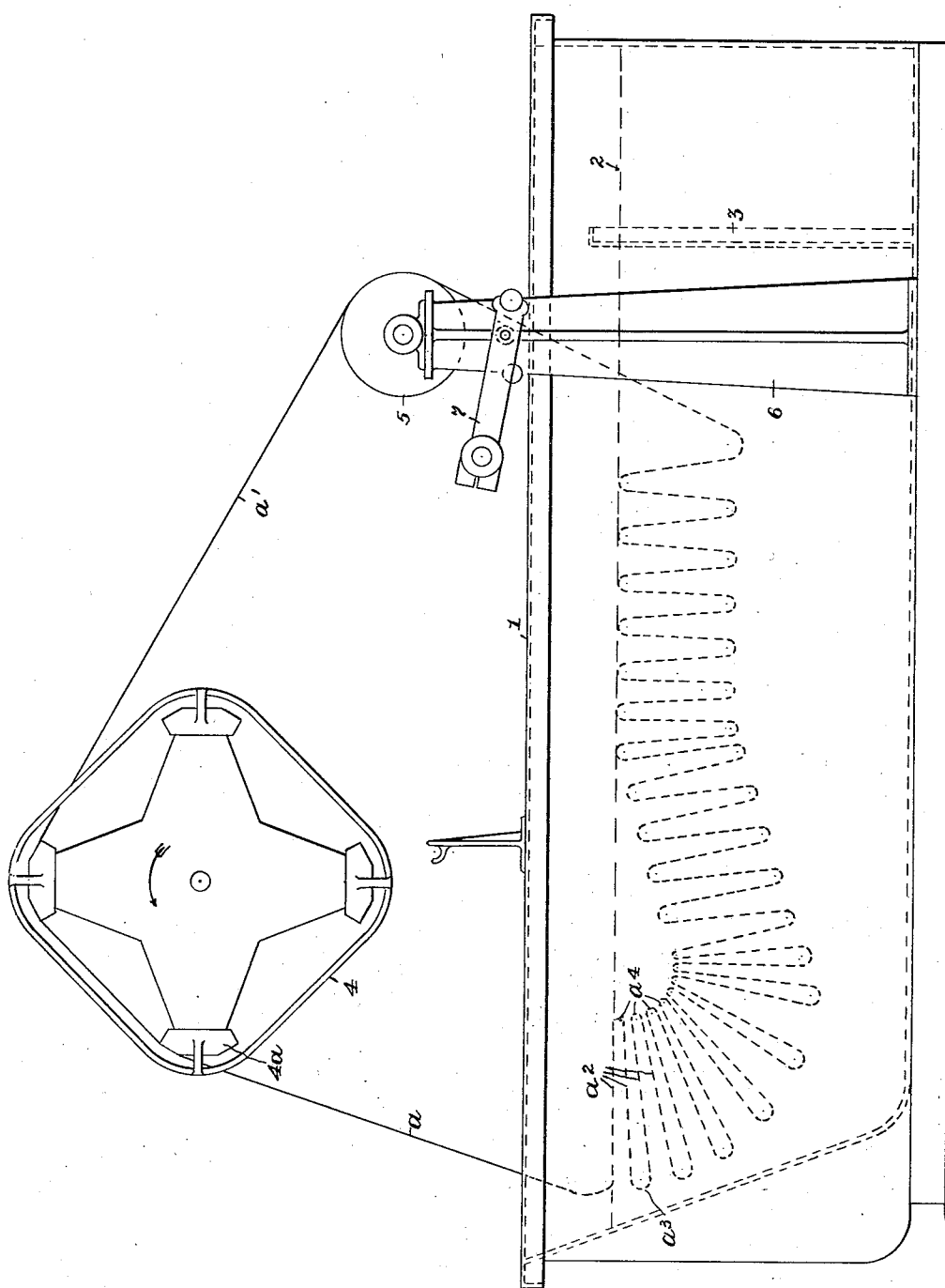
April 25, 1939.

M. G. HINNEKENS

2,156,090

METHOD OF TREATING FABRICS

Filed July 1, 1937



INVENTOR,
Maurice G. Hinnekens,

BY

John M. Howard.

ATTORNEY.

UNITED STATES PATENT OFFICE

2,156,090

METHOD OF TREATING FABRICS

Maurice G. Hinnekens, Paterson, N. J.

Application July 1, 1937, Serial No. 151,346

2 Claims. (Cl. 8—151)

This invention relates to the dyeing of fabrics by passing them longitudinally of themselves through dye liquid, they being usually in endless form, as so-called "ropes", so as to be adapted continuously thereof and repeatedly to be passed through the liquid; although in "rope" form they are not in such compact state that they will not be capable of undergoing reverse pleating, and in this pleated form they are deposited in the liquid, such pleated form continuing more or less during each immersion.

According to this invention each fabric, on entering the liquid in pleated form, is made in that form to follow a course through the liquid which at first is diverted laterally and then proceeds in the lateral direction toward the point at which the fabric leaves the liquid, thus distinguishing from the usual procedure in which the fabric in pleated form falls practically vertically and so forms a pile on the bottom of the liquid-containing vat from under which pile the fabric must be drawn, with consequent injury thereto as an incident of the friction between it and such vat bottom and being necessarily extended or unpleated from the pile to where the pulling effort is applied.

The pleated fabric is made to assume the mentioned course as follows: In the pleat-forming step those bends or returns in the fabric which project in the direction in which the fabric-course is to be diverted are formed more acute than those which project in the opposite direction. Due to the disparity in the acuteness of the two classes of bends the pleated fabric on entering the liquid veers off in the direction in which the more acute bends project, apparently for the following reason: When each less acute bend is being formed there is a correspondingly greater length-wise extent of the fabric to, as it were, dive into the liquid or enter it longitudinally (and so be most favorably positioned to absorb the liquid) than when each more acute bend is being formed; and there is also a greater delay before the ensuing laying of the fabric on the liquid surface to complete the pleat and less tendency to trap air in the bend, not to mention greater weight because greater quantity of fabric at the less than at the more acute bend, wherefore there is a sinking more rapidly as to each less acute bend than as to each more acute bend, and so the diversion proceeds. And, as the pleat-succession continues to advance through the liquid after being diverted, it remains in the lateral or substantially horizontal part of its course (usually so that the pleats appear project-

ing somewhat above the liquid surface) evidently because of air entrapped in its more acute bends and the greater displacement at its other bends.

The ordinary reel used in dyeing fabrics is elliptical and it acts in forming a pleat-succession to form the bends of both classes equally acute, wherefore the conditions being equal at both its sides the pleat-succession sinks vertically to and comes to rest on the bottom of the vat, as explained.

In order to carry out my invention I employ a reel having four staves or stave elements parallel with the reel axis and equally spaced therefrom and from each other and each of such appreciable width that the described phenomenon characterizing my invention will be accomplished; the reel must of course be rotated at the proper speed to effect pleating. With this reel, which I herein term the primary reel, I preferably use another or secondary reel journaled on an axis parallel with that of the first reel and which, being rotated at the same surface speed as the primary reel (as by being rotated through the fabric from that reel), pulls the fabric from the liquid.

However, as will appear from the appended claim, my invention is not concerned with the particular apparatus used but only with the novel method involved.

The accompanying drawing illustrates my invention diagrammatically in connection with apparatus which I preferably use.

In the drawing, 1 is a dye-vat and 2 indicates the level of the dye-liquid therein. In the vat near one end thereof is the usual foraminous partition 3 in which the dye is deposited. The primary reel is shown at 4, above the vat and with its axis horizontal and transverse thereof; it may be supported in any way (not shown) and is to be understood to be suitably driven at a speed which is proper for producing pleating of the fabric. The secondary reel is shown at 5 with its axis horizontal and traversing the vat, being supported by standards 6. It is located at that side of the axis of the primary reel toward which the more acute bends in the fabric will project. It is in the present case assumed to be driven from the primary reel under the draft of the portion a' of the fabric a which extends, out of the liquid, from the secondary to the primary reel. There is the usual rake at 7 having projections (not shown) which keep separated the several fabric ropes where, as usual, more than one is being dyed. The primary reel has staves 4a spaced equally from the axis of the reel and

from each other and having not less than about the width, relatively to the spacing between staves, or affording not less than about the radius which is shown.

5 Assume the primary reel to be rotated as per the arrow, incidentally acting through the portion *a'* of the fabric to rotate the secondary reel. The primary reel forms the fabric into a succession of pleats *a2* in the liquid, as shown and
10 as will be obvious. The bends in such pleat-succession at *a3* are less acute than those at *a4* at the right. This is due to the fact that, whereas on the forming of a pleat on a sweep of the fabric to the right nothing interposes to delay the beginning of the next sweep to the
15 left, on a sweep to the left the adequately broad face of the then acting stave acts to provide such delay of the beginning of the ensuing sweep to the right. Each pleat sinks into the liquid but the pleat-succession undergoes diversion as
20 shown toward the right (or in the direction in which the more acute bends *a4* project) to such extent that each pleat finally assumes the more or less vertical position shown, with its bend *a4*
25 up. Meanwhile the secondary reel is pulling the fabric from the liquid and as the fabric is thus withdrawn the pleat-succession continues to advance to the right, assuming the path of least resistance. In practice, the pleats in the pleat-succession from the point of its entry to the
30 liquid at the left to a vertical plane near the secondary reel, will actually crowd each other (assuming the circuit of the fabric is sufficiently extensive) usually without any sinking thereof to the bottom of the vat.

35 The secondary reel is present principally to provide for withdrawal of the fabric from the liquid only after it has proceeded in the lateral course therethrough to a sufficient extent to be well charged with the dye-liquid.

40 Reels having several staves which are equally spaced from the axis of the reel and from each other may be known. But I know of no instance

in which such reels were rotated at the proper speed actually to cause pleating of the fabric and in which the reel staves also had the proper width to form the two classes of bends incident to the pleating with that disparity in acuteness which is essential to the performance of my
5 method.

Of course my invention is applicable to other procedures than dyeing in which a fabric is treated with liquid by passing it through a liquid.
10

Having thus fully described my invention what I claim is:

1. The method of treating a fabric with liquid which consists in delivering the fabric downwardly into the liquid and progressively forming
15 the fabric therein into reverse pleats having returns which on the one hand are less acute than on the other, whereby the pleat-succession so formed in the liquid will therein veer off toward the direction in which the more acute bends
20 project, and simultaneously pulling the fabric from the liquid at a point relatively in advance of the pleat-succession.

2. The method of treating a fabric with liquid which consists in delivering the fabric lengthwise of itself into the liquid and meanwhile causing the part of the fabric which is immediately
25 above the surface of the liquid to move back and forth, in each direction with a broad face thereof leading, and delaying the beginning of each return movement in one direction longer
30 than the beginning of each return movement in the other direction, whereby the fabric will be formed into a pleat-succession in the liquid having the bends therein of the one hand less acute
35 than those of the other hand and such pleat succession will veer off in the liquid toward the direction in which the more acute bends project, and simultaneously pulling the fabric from the liquid at a point relatively in advance of the pleat
40 succession.

MAURICE G. HINNEKENS.