Jan. 17, 1950 G. HAEBERLIN 2,494,808

DECATING MACHINE AND METHOD

Filed Nov. 10, 1948 3 Sheets-Sheet 1

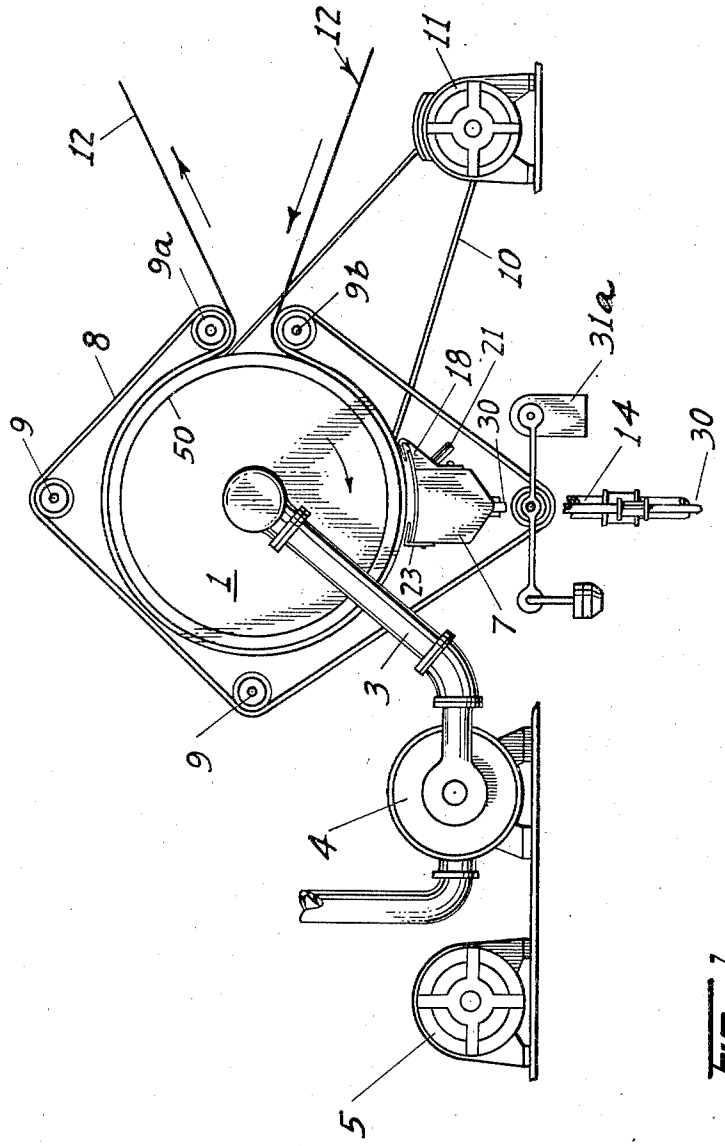

Fig. 1.

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Filed Nov. 10, 1948 3 Sheets-Sheet 2

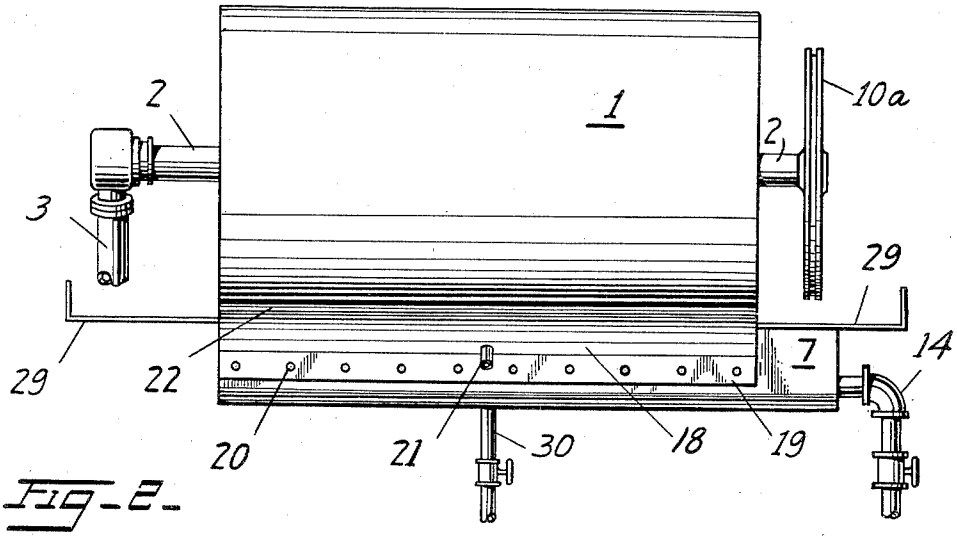

Fig-2-

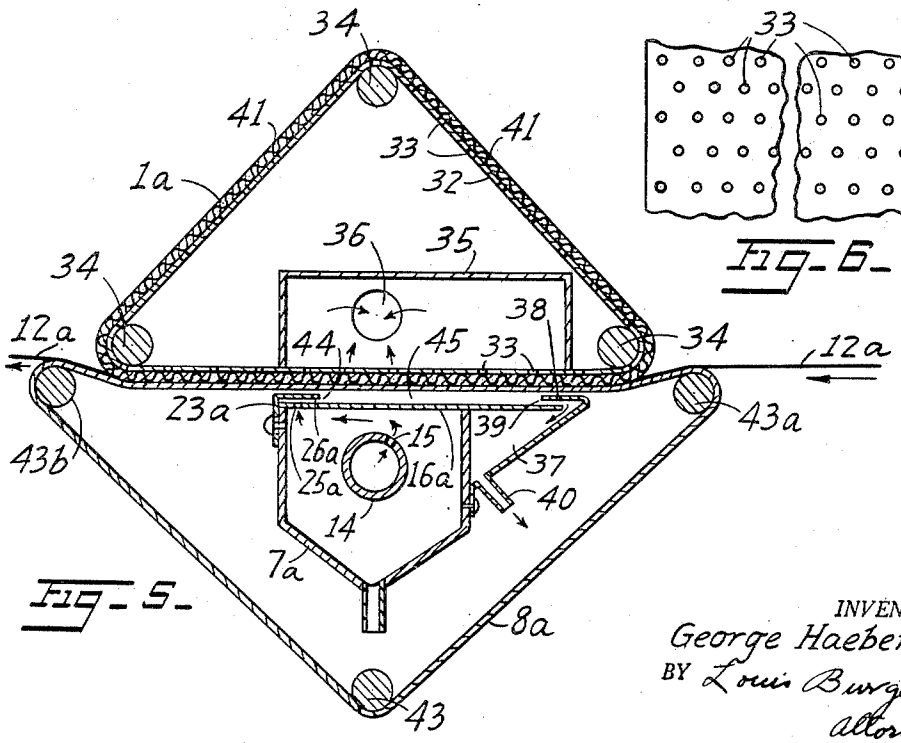

Fig-5-

Fig-6-

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DECATING MACHINE AND METHOD

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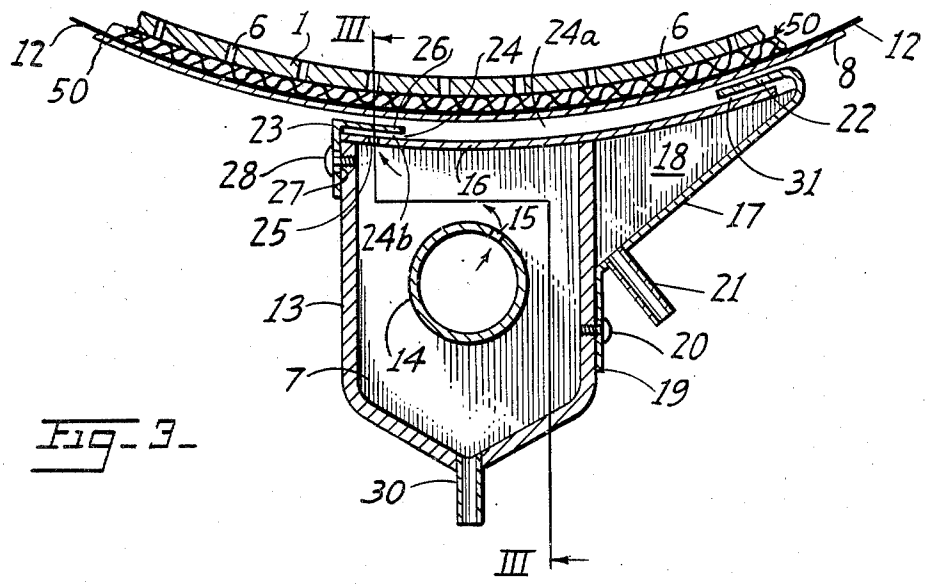

Fig. 3.

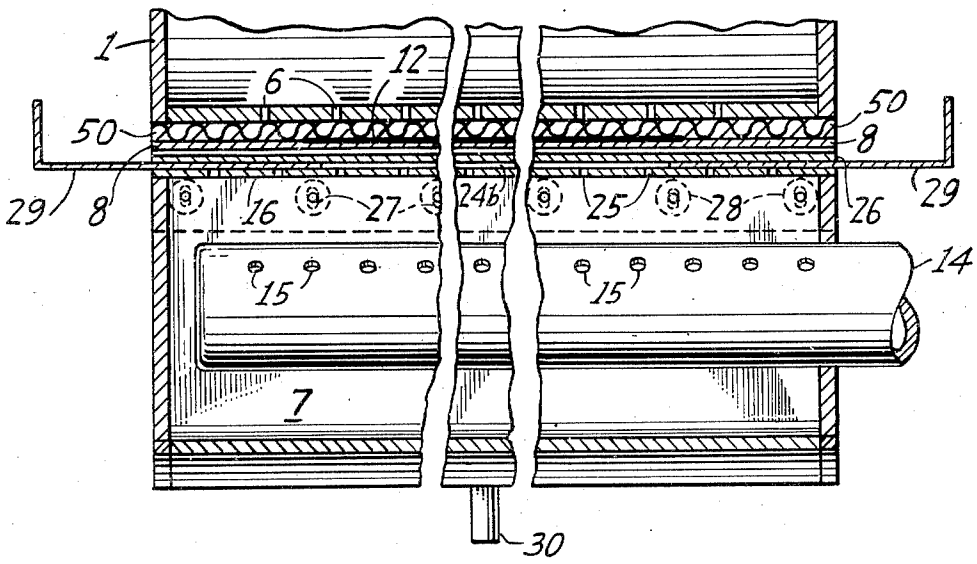

Fig. 4.

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Patented Jan. 17, 1950 2,494,808

UNITED STATES PATENT OFFICE

2,494,808

DECATING MACHINE AND METHOD

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Application November 10, 1948, Serial No. 59,359

16 Claims. (Cl. 26—18.5)

1

This invention relates to new and useful improvements in decating machine and method.

Webs of textile material are conventionally subjected to a decating operation which improves the finish and feel of the goods and at the same time desirably preshrinks the same. Decating is normally carried out with a decating machine in which a continuously moving web of textile material is subjected to a steaming operation by transporting the same between an endlessly moving blanket and web carrier over a steam chest. The steam is sucked through the blanket and the goods, usually by way of a vacuum applied to the other side of the usually felt padded steam and air permeable carrier.

Hitherto used decating machines of the endless carrier and blanket type, however, are not always too satisfactory in operation. They permit only a relatively slow speed of web travel through the machine and the finish applied to the goods is not consistently uniform.

An improved construction, set forth in my copending application, Serial No. 641,392, filed January 15, 1946, provides for a steam chest with an arcuate face plate and a steam nozzle-orifice therein, extending transverse to the direction of travel of the goods for ejecting steam onto the traveling web. Although this improvement permits of somewhat more uniform operation and better finishing results, it has been found that the speed with which a fabric web can be treated is still relatively low. Furthermore, particularly in starting up, spotting of the goods easily occurs by reason of the spattering of droplets of water onto the blanket by reason of partial condensation of steam and the propulsion of the resultant droplets by the steam ejected from the orifice.

One object of the present invention comprises a decating machine which will permit a substantially increased rate of travel of a web of textile material therethrough.

Another object of the invention comprises a decating machine substantially free from spattering effects of condensation droplets.

Still another object of the invention is a new method for the decating of continuously moving webs of textile material for the decating of continuously moving webs of textile material in an improved manner, permitting high operational speeds.

The foregoing and still further objects of the invention will be seen from the following description read in conjunction with the drawings in which:

2

Fig. 1 represents a side view of a construction in accordance with the invention;

Fig. 2 is a front view of part of the construction shown in Fig. 1;

Fig. 3 is a cross-sectional, enlarged side view of part of the construction shown in Figs. 1 and 2;

Fig. 4 is a sectional view of the construction shown in Fig. 3 in the plane 4—4 thereof;

Fig. 5 shows a construction in accordance with the invention, using an alternative form of carrier transport; and

Fig. 6 illustrates a top view of a section of the carrier shown in Fig. 5.

Specifically referring to Figs. 1-4, a suction drum 1 is rotatable by way of hollow axle 2 and pulley 10a. One side of hollow axle 2 is connected by way of pipe 3 to the vacuum pump 4, suitably driven by motor 5. Drum 1, preferably of a non-staining metal such as stainless steel, carries the multiple perforations 6. A steam chest 7 is positioned below the drum. The endlessly moving field blanket 8 passes around the various guide rolls 9 and around the periphery of drum 1. The drum is suitably driven by way of the belt 10 and motor 11. A web of textile material 12 is passed at the guide wheel 9a onto the endlessly traveling blanket 8 to between blanket 8 and peripheral padding 50. Web 12 travels around drum 1 and is held in close contact position over its entire surface with the drum padding 50 by the pressure of the blanket 8 until it leaves the drum and blanket at the guide roll 9b.

Specifically referring to Figs. 3 and 4, the steam chest 7 comprises outer housing 13 and a pipe 14 carrying the perforations 15. The top of the steam chest is provided with an arcuate face plate 16 in substantial alignment with the curvature of the drum 1 and extending as a lip or apron to beyond the steam chest, to form with the extension and the side portion 17 the ancillary chest 18. Side portion 17 is secured to the housing 13 of the steam chest by way of the bent portion 19 and screws 20. A steam and condensate take-off 21 is provided adjacent the lower end of the ancillary chest 18. Side portion 17 is bent backwards to form a lip 22 overlapping the arcuate face plate 16 in spaced relation thereto, to form an outlet slot.

Steam chest 7 carries adjacent the other end of the arcuate face plate 16 an angle member 23, one arm of which forms a lip 26 in spaced relation to the face plate 16 to define with its end portion the steam nozzle-slot 24. Perforations 25

are provided for passing steam from steam chest 7 into space 24b between lip 26 of angle member 23 and the top of the arcuate plate 16. The nozzle orifice slot 24 may be adjusted by the slotted cut-outs 27 and screws 28, permitting upwards and downwards positioning of the angle portion 23. Lip 26 of angle portion 23 is with its under surface downwardly inclined in a direction at least 90° to the direction of blanket travel and preferably substantially tangential to the circumference of the drum to thereby impart to any steam ejected from nozzle opening 24, a direction away from the blanket and thus away from the moving web of fabric at or adjacent the nozzle.

Gates 29 may be interposed, as illustrated in Figs. 2 and 4, in the space between the arcuate face plate 16 and the lip 26 of the angle member 23. These gates are slidably movable in and out to cover or uncover some of the perforations 25 to thereby adapt the width of the nozzle slot area 24 to the width of the particular fabric web being treated, thereby eliminating wastage of steam should such web be narrower than the normal effective steaming width of the machine. It is apparent that instead of two such gates one may be used with equal effect. A drain 30 is provided to remove any condensate that may have formed in steam chest 7. A conventional tension arrangement 31a is provided to keep the endless blanket 8 under tension so that the blanket will pass around drum 1 in a relatively tight and snug fit assuring the fabric web 12 to be held securely and uniformly in position on the padded periphery of the drum.

In the practical operation of the decating device in accordance with my invention, the drum is rotated in the direction of the arrow (Figs. 1 and 3) and the fabric web 12 is passed onto the blanket 8 at the guide roll 9b, traveling thence around perforate drum 1 between the padded drum periphery and the snugly fitting endless blanket 8. Steam is passed through pipe 14 and issues through the perforations 15 into the steam chest 7. Perforations 15 are preferably so arranged that they face upwardly away from the perforations 25. The steam in chest 7 is preferably maintained under a pressure of about 2 to 20 lbs. above atmospheric and issues through perforations 25 into space 24b defined between lip 26 of angle member 23 and arcuate plate 16.

Steam is ejected through the nozzle slot 24 at a relatively high nozzle velocity and preferably a nozzle velocity of at least 150 feet per second. The top limit of the velocity of the steam depends inter alia upon the dimensions of the steaming zone and particularly the length thereof, and further depends, at least to some extent, upon the suction force applied to that portion of the blanket which is in contact with the steaming zone. Within conventional steaming requirements, however, it is normally desirable that the velocity of the steam jet does not exceed about 1600 feet per second, and within the preferred embodiment of the invention I find it of advantage to use a steam velocity of an order of magnitude of between 400 and 1200 feet per second.

The steam jet issuing from nozzle slot 24 is ejected therefrom in a direction tangential to the path of travel of the blanket 8 substantially against arcuate face plate 16 and thus substantially in a direction slightly away from blanket 8. At the same time the ejecting steam is in its direction counter to the direction of the traveling blanket and fabric web carried thereby, i. e. counter to the rotation of drum 1. Suction is

applied in the conventional manner to the interior of drum 1 and the steam is sucked into the same through the blanket 8 and the fabric web 12, thoroughly permeating the fabric web. A certain graded balance between the suction force of drum 1 and the ejection velocity of the steam issuing out of nozzle 24 occurs within the space 24a defined by the arcuate face plate 16 and the lower surface of the moving blanket 8. In the area nearest the nozzle slot 24 the velocity of the steam will maintain the same at first in approximately the direction of issue, i. e. substantially tangential to the path of travel of the blanket 8. As the velocity of the issuing steam abates with greater distance from nozzle slot 24, the suction force of the drum 1 will make itself more and more felt, together with the counter directional force of rotation of the blanket so that there results a graded suction of steam into the drum from comparatively little dry hot steam at a point adjacent the nozzle slot 24 to comparatively larger amounts of wet cooler steam farthest removed from the nozzle slot 24. The steam at the far end of the steaming zone (blanket entrance end) is substantially wet steam whereas the steam at the nozzle end of the zone is substantially dry steam, and the wet steam portion of the zone is somewhat cooler than the dry steam portion of that zone.

The steam and possible condensate droplets reaching the end of the space 24a adjacent the lip portion 22, and which has not as yet been sucked into the drum, passes through the slot 31 defined between the lip portion 22 and the arcuate face plate 16. Slight suction of about 2 lbs. below atmospheric is maintained at the tap pipe 21, causing the excess steam passing through slot 31 to be drawn into the side chest 18, and together with such condensate as may have formed therein, out through pipe 21. Normally the conditions of suction in drum 1, speed of rotation of the drum, velocity and volume of issuing steam, are so balanced that comparatively little steam passes into chest 18 and practically no steam will issue out of the open-ended sides of space 24a.

Any condensate droplets that may have been formed (especially in starting up) are forced to follow arcuate face plate 16 at high velocity and pass through slot 31 into ancillary chest 18 where condensate and excess steam is sucked away through pipe 21.

Specifically referring to Figs. 5 and 6, an alternative embodiment of the invention is illustrated. As there shown the endlessly moving carrier defines a substantially straight path of travel for the blanket 8. Accordingly a substantially straight face plate 16a is provided for the steam chest 7a, having the steam inlet pipe 14 and perforations 15. The flexible, endlessly moving carrier 1a, which may be for instance composed of the flexible sheet material 32 (Fig. 6) is provided with multiple perforations 33 and is guided for endless travel by the guide rolls 34. A suction chest 35, carrying suction pipe 36, is provided above the lower, substantially straight line section of the carrier 1a. The steam chest 7a is mounted below the carrier 1a and the suction chest 35. An angle member 23a is provided on the upper portion of chest 7a and forms with one arm the lip 26a, which is slightly bent to an angle of less than 90° and preferably about 85° and which defines with its length edge and the substantially straight surface of plate 16a, a steam nozzle-slot 44. Steam passes under pressure from the pipe 14 through perforations 15 into chest 7a, and hence through perfora-

tions 25a to nozzle 44. The side chest 37 carries the bent upper lip portion 38 overlapping the end of face plate 16a and being spaced apart therefrom to form an inlet slot 39. Pipe 40 of side chest 37 serves the removal of steam and condensate.

In the practical operation of the last described embodiment of my invention, an endlessly moving blanket 8a moves in the triangular path defined by the guide rolls 43, 43a and 43b. Fabric web 12a is passed onto the blanket 8a at the guide roll 43a and is carried along the substantially straight path of travel defined by guide rolls 43a and 43b along the blanket in firm engagement with the lower padded surface 41 of the endlessly moving carrier 1a. The linear speed of travel of the carrier is substantially synchronized with the linear speed of travel of the blanket 8a. Steam ejected from the nozzle slot 44 is passed into the space 45 defined between the lower surface of the endless blanket 8a and the upper surface of the face plate 16a, being thence exhausted into the suction chest 35 by way of the perforations 33 of the endlessly moving carrier 1a. The balance of the steam which has not passed into the suction chamber is removed by way of the opening 39, side chest 37 and pipe 40, which is under slight vacuum of about 1–2 lbs. below atmospheric.

Thus, as will be seen from the foregoing the invention is essentially concerned with an improvement in a decating machine of the blanket and endless carrier type having means defining a steaming zone along the path of travel of said blanket and means for drawing steam from said zone through a web of textile material continuously transported by and between said carrier and blanket, the said improvement primarily relating to the steam supplying means for said zone and comprising steam nozzle-orifice means at and substantially across the blanket exit end of said zone and positioned for steam ejection into said zone counter the direction of blanket travel and substantially at an angle away from said blanket and means for passing steam to said orifice. If, within the preferred embodiment of the invention, the path of travel of said blanket is one defined by a substantially cylindrical carrier, the face is a substantially arcuate face plate conforming to said path of travel and the said steam nozzle-orifice is substantially positioned for steam ejection onto said face plate counter the direction of blanket travel and substantially at an angle about tangential to the path of blanket travel at about the orifice.

The method in accordance with my invention is essentially concerned with an improvement in the decating of webs of textile material which includes continuously passing a web of textile material held between a steam permeable blanket and endlessly moving carrier, along a steaming zone with said blanket in contact with said zone, the said improvement comprising directing a jet of substantially dry steam into said zone from and substantially across the blanket exit end thereof in a direction counter the direction of blanket travel and away from said blanket and applying suction to said jet of steam through said blanket and web.

I claim:

1. In a decating machine of the blanket and endless carrier type having means defining a steaming zone along the path of travel of said blanket and means for drawing steam from said zone through a web of textile material continuously transported by and between said carrier and blanket, the improvement in steam supplying means for said zone comprising steam nozzle-orifice means at and substantially across the blanket exit end of said zone and positioned for steam ejection into said zone counter the direction of blanket travel and substantially at an angle away from said blanket and means for passing steam to said orifice.

2. Improvement according to claim 1 in which there are additionally included means for removing steam and condensate from the entrance end of said zone.

3. Improvement according to claim 1 in which said last mentioned means include a steam chest, means for passing steam from said chest to said nozzle-orifice means, and a perforate pipe for distributing steam substantially uniformly to within said chest, the perforations in said pipe being positioned to direct steam upwards and away from the entrance end of said means for passing steam to said orifice means.

4. In a decating machine of the blanket and endless carrier type having an externally perforate hollowed cylinder, means for rotating said cylinder, means for applying suction to the interior of said cylinder and a blanket running against a part of the periphery of said cylinder adapted to hold a band of textile material in engagement with the periphery of said cylinder, the improvement which comprises an arcuate face plate substantially concentric with said cylinder, steam nozzle-orifice means at the blanket exit end of said face plate, extending longitudinally of said cylinder adjacent the exterior of said blanket and positioned for steam ejection onto said face plate counter the direction of blanket travel and substantially at an angle away from said blanket, and means for supplying steam to said orifice.

5. Improvement according to claim 4 in which said nozzle-orifice means are positioned for steam ejection, substantially at said orifice, substantially tangential to the path of blanket travel.

6. Improvement according to claim 5 in which there are additionally included means for removing steam and condensate from the blanket entrance end of said face plate.

7. Improvement according to claim 6 in which said steam supplying means include a steam chest, the top of which is formed by at least a portion of said face plate, means for passing steam from said chest to said orifice means and means for uniformly distributing steam to within said chest.

8. In a decating machine of the blanket and endless carrier type having an externally perforate hollowed cylinder, means for rotating said cylinder, means for applying suction to the interior of said cylinder and a blanket running against a part of the periphery of said cylinder adapted to hold a band of textile material in engagement with the periphery of said cylinder, the improvement which comprises a steam chest, an arcuate face plate substantially concentric with said cylinder and forming with at least a part thereof a top for said steam chest, means at the blanket exit end of said face plate substantially defining a lip overlapping said face plate in spaced relation thereto, to form between the lip end and the face plate surface a steam nozzle-orifice substantially extending across said face plate longitudinally to said cylinder, the inner surface of said overhanging lip being inclined towards its end substantially at an angle away from said blanket, means for passing steam from said chest into the space between said lip and said face plate and means for supplying steam to substantially uniformly within said chest.

9. Improvement according to claim 1 in which said inner lip surface is inclined towards its end substantially at an angle about tangential to the path of blanket travel at about said orifice.

10. Improvement according to claim 9 in which there are additionally provided means for removing steam and condensate from the blanket entrance end of said face plate and substantially including a lip member adjacent said blanket and overlying said face plate at said end to define therewith a steam and condensate exit slot.

11. Improvement according to claim 10 in which said means for supplying steam to the space between the nozzle-orifice lip and the arcuate face plate include perforations in said face plate adjacent the end thereof under said lip, and in which said means for supplying steam to said chest include a perforate pipe longitudinally extending through said chest, the perforations of said pipe being positioned to direct steam upwards and away from said perforations for passing steam to under said lip.

12. Improvement according to claim 11 in which said lip defining means comprise an angle member, one arm of which forms said lip and the other of which is slidably secured to said chest for variable adjustment of said nozzle orifice.

13. In the method of decating webs of textile material which includes continuously passing a web of textile material held between a steam permeable blanket and endlessly moving carrier, along a steaming zone in blanket contact therewith, the improvement comprising directing high velocity substantially dry steam into said zone substantially across the blanket exit end thereof in a direction counter to the direction of blanket travel and away from said blanket and applying suction to said steam through said blanket and web.

14. The improvement according to claim 13 in which said steam is directed into said zone counter to the direction of blanket travel defined by a substantially cylindrical carrier and substantially at an angle about tangential to said direction at about said exit end, and in which excess steam including any condensate formed is continuously removed from the blanket entrance end of said

zone in substantially tangential direction relative to the blanket travel direction at about said entrance end.

15. In the method of decating webs of textile material the improvement which comprises continuously passing a web of textile material, held between a steam permeable blanket and endlessly moving carrier, along and in blanket contact with a first substantially wet steam zone and a following second substantially dry steam zone of higher temperature than said first zone, continuously passing wet steam through said first zone, continuously passing high velocity substantially dry steam through said second zone counter to the direction of blanket travel, and at least at the blanket exit end in a direction away from said blanket, and supplying suction to said zones through said blanket and web.

16. Method according to claim 15 in which said high velocity steam is directed into said second zone counter to the direction of blanket travel defined by a substantially cylindrical carrier and substantially at an angle about tangential to said direction at about the blanket exit end for said second zone, in which said wet steam is passed through said first zone substantially counter to the direction of blanket travel, and in which excess steam including any condensate formed is continuously removed from the blanket entrance end of said first zone in substantially tangential direction relative to the blanket travel direction at about said end.

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The following references are of record in the file of this patent:

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Certificate of Correction

Patent No. 2,494,808 January 17, 1950

GEORGE HAEBERLIN

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 1, lines 48 and 49, strike out the words "for the decating of continuously moving webs of textile material"; column 7, line 1, for the claim reference numeral "1" read *8*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of May, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.