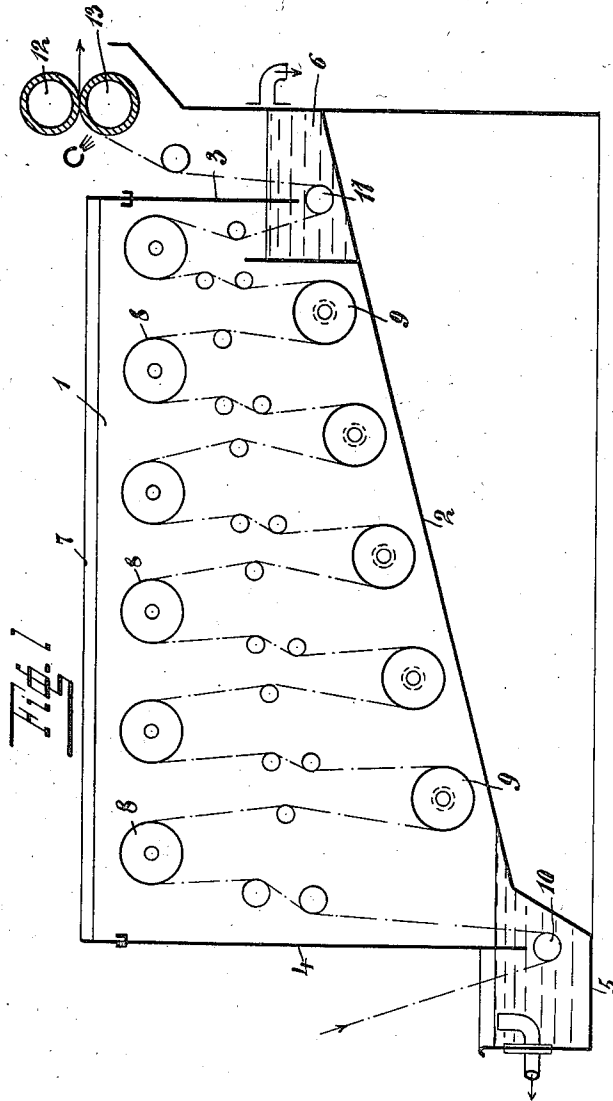


J. MATTER.
 APPARATUS FOR LEACHING AND RINSING MERCERIZED FABRICS AND RECOVERING THE LYE.
 APPLICATION FILED JAN. 28, 1913.

1,209,465.

Patented Dec. 19, 1916.

5 SHEETS—SHEET 1.



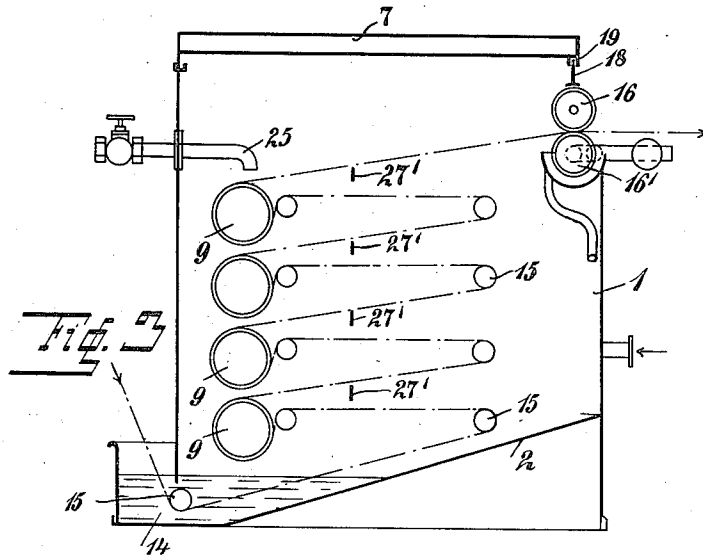
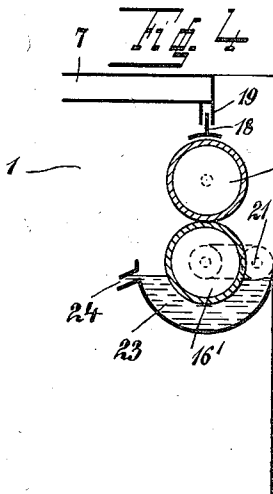
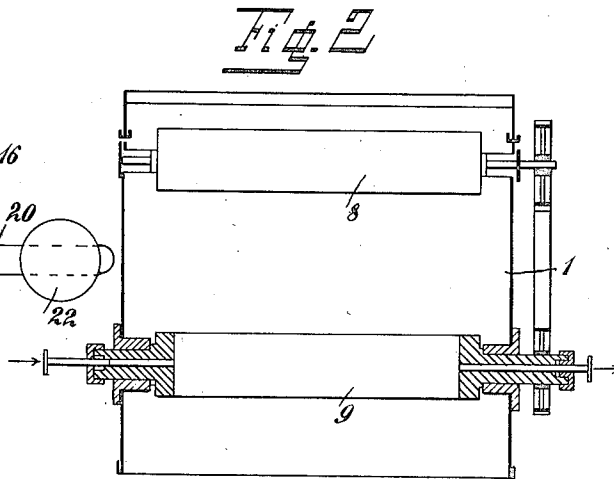
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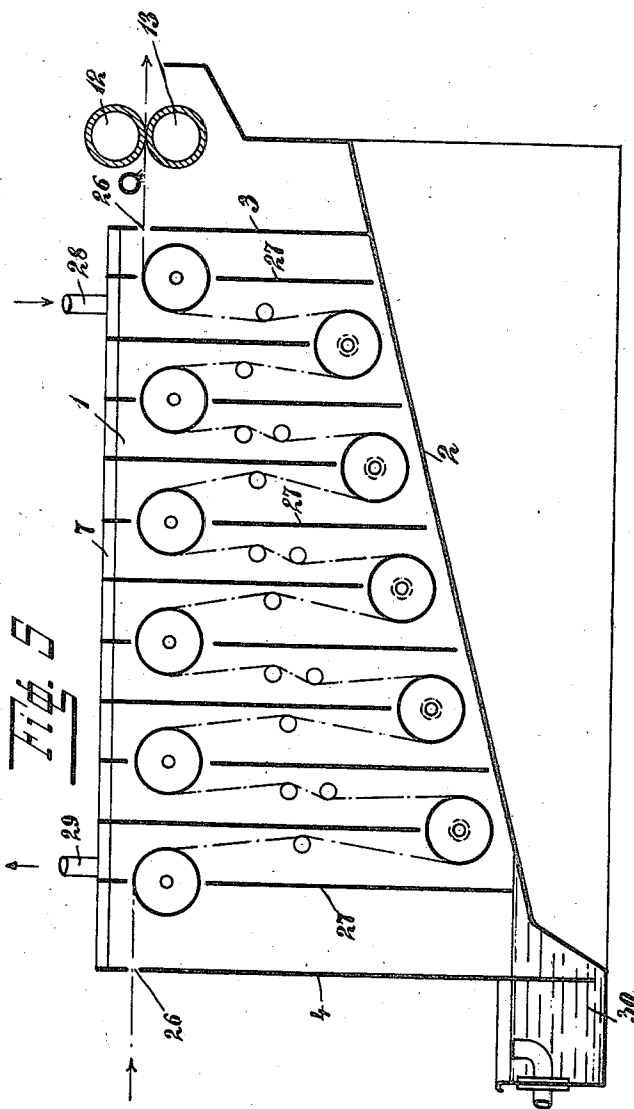
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 5 SHEETS—SHEET 3.



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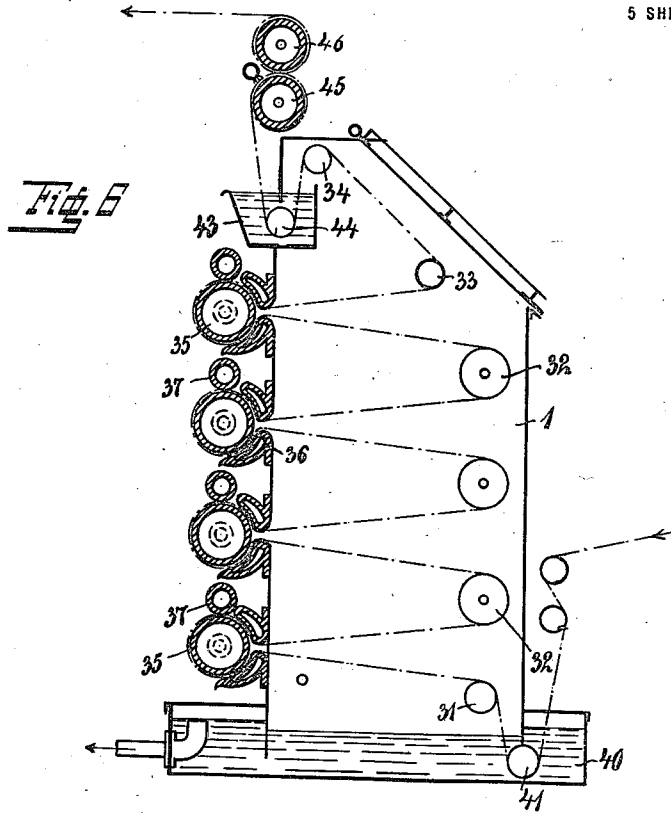
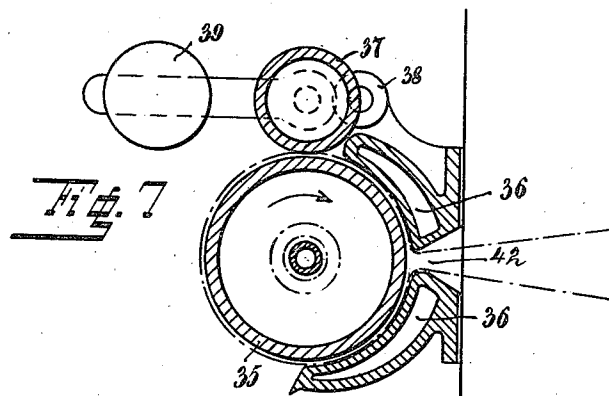
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5 SHEETS—SHEET 4.



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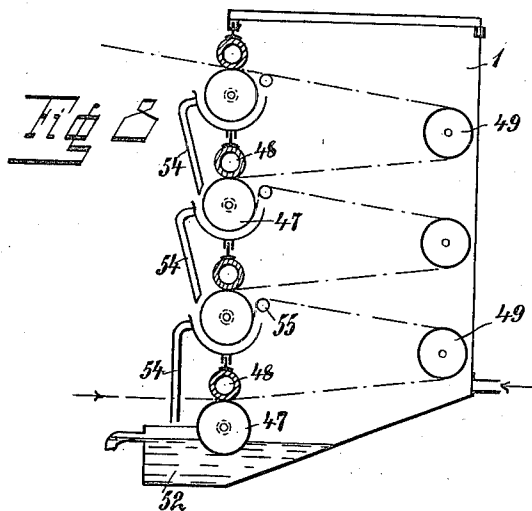
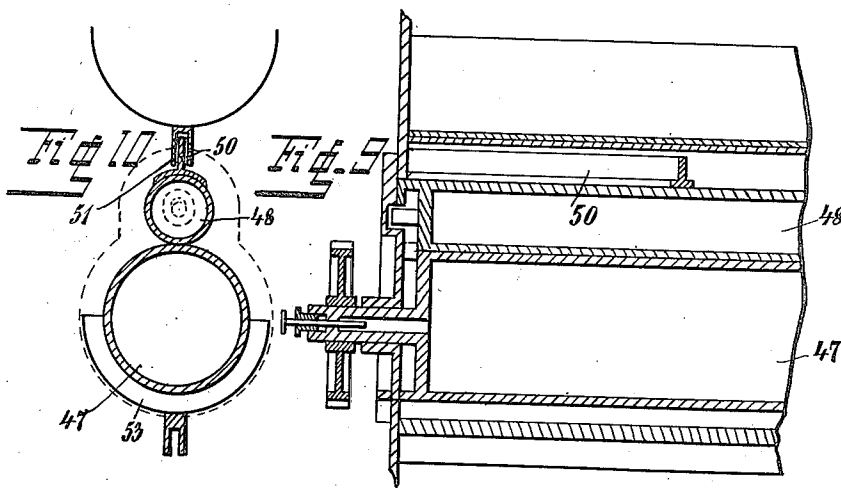
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE,

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APPARATUS FOR LEACHING AND RINSING MERCERIZED FABRICS AND RECOVERING THE LYE.

1,209,465.

Specification of Letters Patent.

Patented Dec. 19, 1916.

Application filed January 28, 1913. Serial No. 744,633.

To all whom it may concern:

Be it known that I, JULIUS MATTER, a citizen of the Republic of Switzerland, residing at Laaken, near Barmen-Rittershausen, German Empire, have invented a new and useful Apparatus for Leaching and Rinsing Mercerized Fabrics and Recovering the Lye; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to an apparatus for leaching and rinsing mercerized fabrics and recovering the lye, which is designed to provide as great a condensation of the steam as possible on the surface of the fabric and a deep penetration of the condensed moisture into the interior of the threads of the fabric; this produces a rapid and complete dilution and leaching out of the lyes, acids, solutions of salts and the like therein contained.

According to this invention the fabrics are conducted in a zig-zag path through a steam chamber free from air and are submitted to the action of the steam and of the washing and rinsing liquid alternately. For the purpose of still further increasing the effect of the leaching process, the fabric is cooled after each steaming action not by means of the washing and rinsing liquid but by special rollers, which are cooled in any suitable manner, for instance by means of water. This increased effect is explained by the fact that the fabric is cooled after each steaming, without being passed through the liquid. The latter is, therefore, not allowed to form a covering film on the sides of the fabric after it has left the liquid tank, such as would prevent to a certain extent the entrance of the steam and its condensate into the fabric.

It is not imperative for the cooled rollers to be arranged inside the steam chamber, but on the contrary it is advisable in certain circumstances to arrange them outside the chamber, so as to prevent steam from condensing on the rollers and the rollers being heated by the steam, which would of course impair the cooling effect; such arrangement also renders it possible to conduct the fabric

completely out of the steam chamber, to squeeze it out by means of special rollers and then to conduct it back into the steam chamber. This will prevent the fabric from entering the steam chamber covered with a film of liquid, which would involve the above mentioned drawbacks.

Another modification of the arrangement may be obtained by dispensing with a liquid seal for introducing the fabric into the steam chamber and for conducting it out therefrom, the cooling rollers and also the squeezing rollers being arranged in such a manner, that they are shut out from the steam chamber and from each other by the fabric passing between them.

In the accompanying drawings there are illustrated by way of example several constructional forms of the present invention.

Figure 1 shows an arrangement with the cooling rollers inside the steam chamber, and liquid seals for the entrance and exit of the fabric, the view being a section perpendicular to the axis of the cooling rollers. Fig. 2 is a section in the plane passing through the axis of the cooling rollers. Fig. 3 is a constructional form, in which the cooling rollers are cooled not only from the inside but also by liquid poured on from the outside, and the fabric leaves the steam chamber through a seal formed by squeezing rollers. Fig. 4 is a detail of the squeezing roller seal on an enlarged scale. Fig. 5 illustrates an arrangement in which the steam chamber is not provided with any special sealing devices for the entrance and the exit of the fabric. Fig. 6 shows an arrangement with the cooling and squeezing rollers arranged outside the steam chamber. Fig. 7 is a separate view of a pair of cooling and squeezing rollers on an enlarged scale. Fig. 8 is an arrangement with the squeezing rollers and the cooling rollers arranged partly outside the steam chamber and sealed or packed toward the steam chamber and one against the other. Fig. 9 is a longitudinal section and Fig. 10 a transverse section through a pair of squeezing and cooling rollers on an enlarged scale.

In Figs. 1 and 2 the steam chamber 1 has

an inclined bottom 2, and vertical walls 3 and 4, which dip into liquids contained in the tanks 5 and 6. The chamber is closed at the top by the roof or cover 7. In the steam chamber are provided upper guide rollers 8 and bottom guide rollers 9. The latter are made hollow and are cooled by means of water or other medium. The fabric enters through the liquid seal 5 and travels over the guide rollers 10 to the first roller 8, then to the first cooling roller 9, and so on, up and down through the steam chamber until it leaves the latter over a guide roller 11 and through the liquid seal 6. In its course the fabric is continuously being cooled by the cold rollers 9, so that when it leaves the rollers, a large quantity of steam is condensed in the fabric. The lye washed out by the condensed steam drips onto the inclined bottom of the steam chamber, runs down the same and collects in the front liquid seal 5. To facilitate this dripping, strippers or wipers may be provided. As no rinsing water is employed, the lye can be recovered at a very high concentration. After the fabric has left the liquid seal 6 it is passed between two squeezing rollers 12 and 13, which remove the surplus liquid.

Figs. 3 and 4 illustrate a modified constructional form of the arrangement hereinbefore described, in which the cooling rollers are arranged vertically, above one another. The fabric enters the apparatus through a liquid seal 14 and travels over guide rollers 15 to the first cooling roller 9, from the latter over further guide rollers 15 to the next cooling roller and so on until it leaves the steam chamber 1 through the squeezing roller seal 16, 16'. Between the guide rollers stripper blades or wipers 17 are provided. The stripper blades are preferably made of a knife-like shape. The lye wiped off by them drips on to the next lower run or stretch of fabric. The lye squeezed out by the rollers 16, 16' collects in the liquid tank 14. The roller 16 is journaled in a rigid manner and is packed as regards the steam chamber by a slide 18, ground to it and moving with a steam-tight joint in a guide 19 in the wall of the steam chamber. The lower roller 16' is suspended on a double armed lever 20, pivoted on a pin 21 and carrying a counterweight 22. The roller 16' dips for a part of its circumference into a trough 23 (Fig. 4) with discharge pipe 24. The liquid squeezed off collects in this trough and forms a seal for the roller 16' as regards the steam chamber. As already stated the surplus liquid runs down the bottom of the steam chamber and it finally collects in the seal 14. The end-faces of the rollers are closed by means of suitable packing toward the steam chamber. The joint between the rollers themselves is produced by the fabric passing be-

tween them. For obtaining a greater cooling effect, cold water or some other suitable cooling liquid may be made to flow through a pipe 25 (Fig. 3) on to the upper cooling roller 9. The cooling liquid will then run from roller to roller and be gradually heated in its course. If a specially intense cooling is required, a separate liquid pipe 25 may be provided for each roller 9.

In place of passing the fabric through seals of any kind into and from the steam chamber, it is also possible, as shown in Fig. 5, to let the fabric enter through slits 26 in the walls 3 and 4 of the steam chamber. The steam must then be introduced at a small pressure above that of the atmospheric air at the slits 26. The spaces between the rollers 8 and 9 are closed by intermediate walls 2 which approach comparatively closely to the bottom of the steam chamber and the rollers. The steam enters through a pipe 28 at the end of the steam chamber, travels in the same zig-zag path as the fabric, being guided by the walls 27, and leaves through the pipe 29. The liquid which drips off collects in the tank 30 serving as seal.

In the constructional form shown in Figs. 6 and 7, only guide rollers 31, 32, 33 and 34 are provided in the steam chamber 1, while the cooling rollers 35 are arranged outside the steam chamber. At the sides of each roller are circular jointing pieces or cheeks 36 (Fig. 7) and a squeezing roller 37 may be arranged above each of the rollers 35, the squeezing rollers being pivoted on a pin 38 under action of a weight 39. The cheeks 36 are hollow and are cooled with water. The fabric enters through a liquid seal 40 over a guide roller 41 into the steam chamber, travels over the guide roller 31, through a slot 42 (Fig. 7) in the front wall of the steam chamber, then between the lower jointing piece 36 and the first cooling roller 35, around the circumference of the roller, underneath the squeezing roller 37 and between the cooling roller and the upper cheek-piece 36 back into the steam chamber on to the next guide roller 32, and so on until it leaves the steam chamber, passing over the upper cooling roller 35, over the guide rollers 33 and 34, through the liquid seal 43 and over the guide roller 44. The liquid which is absorbed by the fabric during its passage through the liquid seal 43 is removed by a pair of squeezing rollers 45, 46. In passing over each of the cooling rollers, the fabric is cooled both by the roller itself and by the cheek-pieces 35-36, and at the same time the liquid absorbed is removed by the squeezing rollers and the cheek-piece 36 and allowed to drip on to the next lower pair of rollers. Cooled in this manner and without any adhering liquid, the fabric returns after traveling around one of the cooling rollers.

back into the steam chamber, so that the steam will be strongly condensed on it, and the fabric will be well washed out. This washing out is assisted by the liquid which
 5 drips down from the higher cheek-pieces 36 continually increasing its content of lye on the way. Instead of being placed vertically one above another, the rollers 35 may be arranged beside one another or below the steam
 10 chamber.

As has been said in the introductory remarks, it is desirable for producing a maximum condensation to introduce the fabric in as dry a condition as possible into the
 15 steam chamber. This is obtained in the form of apparatus shown in Figs. 8 and 10 by the fabric being sent into and withdrawn from the steam chamber through pairs of cooling and squeezing rollers 47, 48 respectively. This will obviate the saturation of the fabric with liquid which is unavoidable with a liquid seal, and as the fabric enters the steam chamber 1 in an already cooled condition, this also will allow of an effective
 25 condensation. As shown in Fig. 8, the arrangement is such that the whole front wall of the steam chamber 1 is formed by the pairs of cooling and squeezing rollers 47, 48 and their packings. At the opposite side
 30 to these pairs of rollers there are arranged the guide rollers 49. The fabric coming from the mercerizing machine, supposed to be situated at the left enters between the rollers of the lowermost pair 47, 48, travels
 35 over the first guide roller 49 to the next higher pair of rollers and so on, until it leaves through the uppermost pair of rollers. The pairs of rollers are so arranged, as in the form according to Figs. 6
 40 and 7, that one of the rollers, viz. the lower one 47, is a rigidly journaled cooling roller, while the upper roller 48, which is the squeezing roller proper, is journaled in a displaceable manner and bears upon the
 45 lower roller either by its own weight, or under a suitable load as described with reference to Fig. 7. The upper roller, however, may be made to serve as a cooling roller.

50 In order to form the joint, the upper roller of each pair is provided with a slide 50, which is ground on to the roller like the slide 16 in Fig. 3. This slide 50 is displaceably fitted in a jointed guide 51, (Fig.
 55 10), so that it can always adapt itself to the roller if the latter should become untrue or eccentric. With the exception of the lowermost one, the roller 47 of which dips into a liquid seal 52 in the bottom of the steam
 60 chamber, the lower roller 47 of every pair runs in a trough 53, from which an overflow pipe 54 (Fig. 8) leads to the next lower roller 47 or to the liquid seal 52.

The fabric entering from the left and

saturated with lye is at its entrance into 65 the apparatus freed from the adhering liquid and at the same time cooled by the rollers of the lowermost device 47, 48. The liquid pressed out runs off the roller 47 and mixes with the liquid in the seal 52 while 70 the fabric passes over the roller 49 to the next pair of rollers. During this travel it becomes saturated with liquid, as the steam in the steam chamber condenses upon it. From the roller 49 it runs first over a guide 75 roller 55 arranged in front of the pair of rollers 47, 48, then around the underside of the roller 47, next between the rollers 47 and 48 and so on to the next guide roller 49. The liquid expressed collects in the trough 80 53 and thus forms with the roller 47 a liquid seal against the steam chamber, while the upper roller 48 is made tight as already described by the slide 50, and the joint between the rollers themselves is produced 85 by the fabric. Any surplus of liquid in the troughs 53 is removed through the pipes 54. In the manner described the fabric travels through the whole steam chamber, absorbing liquid and being again freed 90 therefrom and cooled in regular phases, finally leaving the steam chamber by passing between the rollers of the uppermost pair 47, 48.

I claim:

1. In an apparatus for leaching and rinsing mercerized fabrics and recovering the lye, a steam chamber, devices for guiding the fabrics into, through and out of said steam chamber, certain of said devices being adapted to cool said fabrics alternately with the steaming thereof on their way through said steam chamber. 95

2. In an apparatus for leaching and rinsing mercerized fabrics and recovering the lye, a steam chamber, devices for guiding the fabrics into, through and out of said steam chamber, certain of said devices being adapted to cool said fabrics alternately with the steaming thereon on their way 105 through said steam chamber, and certain of said devices being adapted to remove from said fabrics the liquid they carry.

3. In an apparatus for leaching and rinsing mercerized fabrics and recovering the lye, a steam chamber, devices for guiding the fabrics into, through and out of said steam chamber, certain of said devices comprising cooling rollers adapted to cool said fabrics alternately with steaming them on 115 their way through said steam chamber and certain of the devices comprising squeezing rollers for removing from said fabrics the liquid they carry.

4. In an apparatus for leaching and rinsing mercerized fabrics and recovering the lye, a steam chamber, cooling rollers over which the fabrics are guided and squeezing 125

rollers for removing from said fabrics the liquid they carry, said cooling rollers being arranged in one of the walls of said steam chamber in such a manner that the steam
5 contained in said steam chamber has access to that part of their surfaces which is directed toward said steam chamber.

5. In an apparatus for leaching and rinsing mercerized fabrics and recovering the
10 lye, a steam chamber, cooling rollers over which the fabrics are guided and squeezing rollers for removing from said fabrics the liquid they carry, said cooling rollers being arranged in one of the walls of said steam
15 chamber in such a manner that the steam contained in said steam chamber has access to that part of their surfaces which is directed toward said steam chamber, and a roller seal for guiding said fabrics into said
20 steam chamber.

6. In an apparatus for leaching and rinsing mercerized fabrics and recovering the lye, a steam chamber, cooling rollers over which the fabrics are guided, squeezing
25 rollers for removing from said fabrics the liquid they carry, said cooling rollers being arranged in one of the walls of said steam chamber in such a manner that the steam contained in said steam chamber has access
30 to that part of their surfaces which is directed toward said steam chamber, and means for directing the liquid removed from said fabrics to the outside of said steam chamber.

7. In an apparatus for leaching and rinsing mercerized fabrics and recovering the
35 lye, a steam chamber, cooling rollers over which the fabrics are guided, squeezing rollers for removing from said fabrics the liquid they carry, said cooling rollers being
40 arranged in one of the walls of said steam chamber in such a manner that the steam contained in said steam chamber has access to that part of their surfaces which is directed toward said steam chamber, means
45 for directing the liquid removed from said fabrics to the outside of said steam chamber, and a roller seal for guiding said fabrics into said steam chamber.

8. In an apparatus for leaching and rinsing mercerized fabrics and recovering the
50 lye, a steam chamber, cooling rollers cooling said fabrics and a roller seal for guiding said fabrics into said steam chamber.

9. In an apparatus for leaching and rinsing mercerized fabrics and recovering the
55 lye, a steam chamber, cooling rollers for cooling said fabrics, means for removing from said fabrics the liquid they carry, and a roller seal for guiding said fabrics into
60 said steam chamber.

10. In an apparatus for leaching and rinsing mercerized fabrics and recovering the lye, a steam chamber, means for guiding the fabrics into said steam chamber,
65 means for intermittently cooling said fab-

rics, means for removing from said fabrics the liquid they carry, and a roller seal for guiding said fabrics out of said steam chamber.

11. In an apparatus for leaching and rinsing mercerized fabrics and recovering the lye, a steam chamber, means for intermittently cooling said fabrics, means for removing from said fabrics the liquid they
75 carry, and a roller seal for guiding said fabrics into said steam chamber, the bottom roller of said seal being carried on a weighted lever and provided with a trough adapted to form a liquid seal, the top roller
80 of said seal being arranged in fixed bearings and having a slide ground onto its surface making a tight fit with the walls of said steam chamber.

12. In an apparatus for leaching and rinsing mercerized fabrics and recovering the lye, a steam chamber, means for guiding the fabrics into said steam chamber,
85 means for intermittently cooling said fabrics, means for removing from said fabrics the liquid they carry, and a roller seal for guiding said fabrics out of said steam chamber, the bottom roller of said seal being
90 carried on a weighted lever and provided with a trough adapted to form a liquid seal, the top roller being arranged in fixed bearings and having a slide ground on to its surface making a tight fit with the walls
95 of said steam chamber.

13. In an apparatus for leaching and rinsing mercerized fabrics and recovering the lye, a steam chamber, cooling rollers
100 over which the fabrics are guided and squeezing rollers for removing from said fabrics the liquid they carry, said cooling rollers being arranged vertically above each other, and in such a manner that they form
105 one of the walls of said steam chamber.

14. In an apparatus for leaching and rinsing mercerized fabrics and recovering the lye, a steam chamber, cooling rollers
110 over which the fabrics are guided and squeezing rollers for removing from said fabrics the liquid they carry, said cooling rollers being arranged vertically above each other, and in such a manner that they form
115 one of the walls of said steam chamber, and a roller seal for guiding the fabrics into said steam chamber.

15. In an apparatus for leaching and rinsing mercerized fabrics and recovering the lye, a steam chamber, cooling rollers
120 over which the fabrics are guided and squeezing rollers for removing from said fabrics the liquid they carry, said cooling rollers being arranged vertically above each other and in such a manner that they form
125 one of the walls of said steam chamber, and means for directing the liquid removed from said fabrics to the outside of said steam chamber.

16. In an apparatus for leaching and
rinsing mercerized fabrics and recovering
the lye, a steam chamber, cooling rollers
over which the fabrics are guided and
5 squeezing rollers for removing from said
fabrics the liquid they carry, said cooling
rollers being arranged vertically above each
other and in such a manner that they form
one of the walls of said steam chamber, and
10 means for directing the liquid removed

from said fabrics to the outside of said
steam chamber, and a roller seal for guiding
said fabrics into said steam chamber.

In testimony whereof, I have signed my
name to this specification in the presence of 15
two subscribing witnesses,

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