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MACHINE FOR MERCERIZING, DYEING, OR LIKE TREATMENT OF LOOSE OR WOVEN COTTON
OR OTHER VEGETABLE FIBER.

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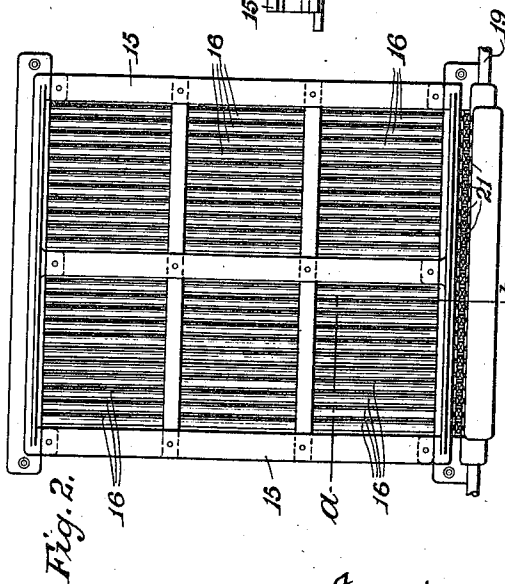
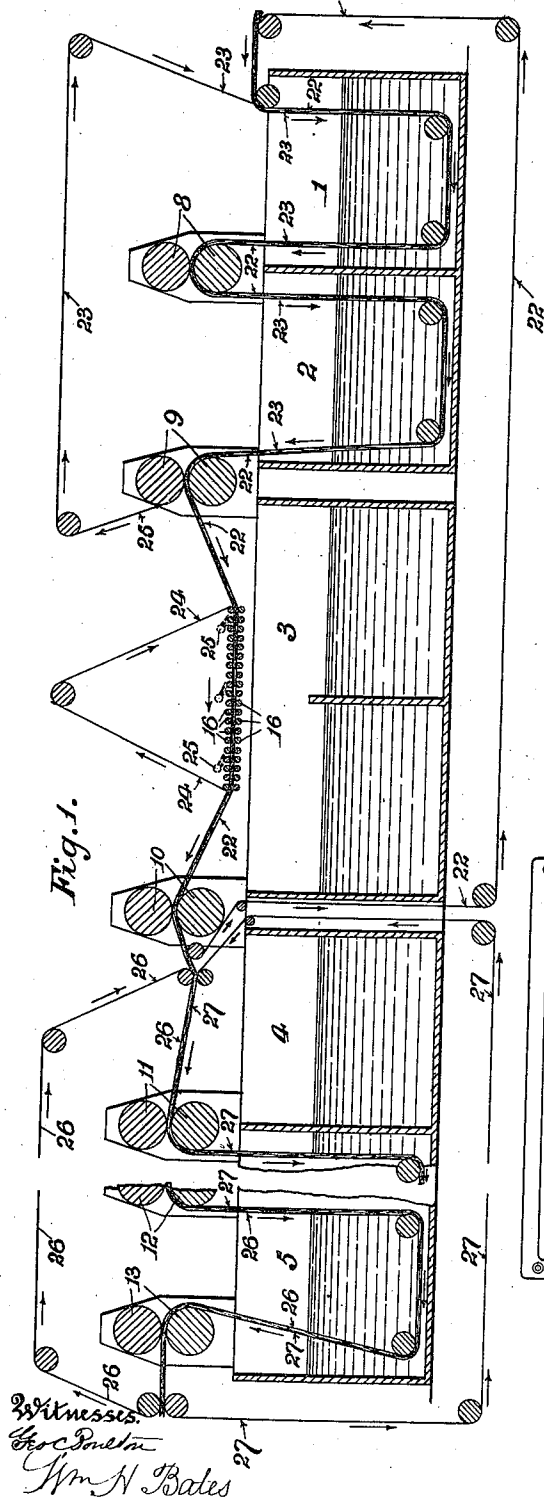


Fig. 3.

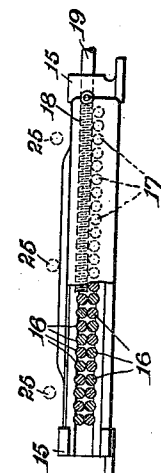
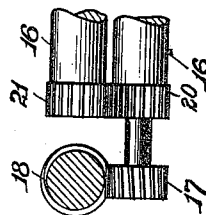


Fig. 4.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR MERCERIZING, DYEING, OR LIKE TREATMENT OF LOOSE OR WOVEN COTTON OR OTHER VEGETABLE FIBER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN HERBERT ROBSON, a subject of King George V of Great Britain, and resident of Huddersfield, in the county of York, England, have invented certain new and useful Improvements in Machines for Mercerizing, Dyeing, or Like Treatment of Loose or Woven Cotton or other Vegetable Fiber, of which the following description, in connection with the accompanying drawings, is a specification.

This invention relates to the mercerizing, dyeing or bleaching or like treatment of cotton or vegetable fiber in the roving, sliver, or loose state and comprises an improved machine for carrying out the operation of mercerizing, dyeing or bleaching, in a simple and effective manner.

My invention consists in providing in a machine having the usual series of nipping or squeezing rollers, two series of driven rollers of small diameter arranged in two rows one above the other and close to each other side by side, said rollers being located in a box, tray or frame in a suitable position in the machine, and submerged in the mercerizing liquor fed into the box or tray, or alternatively the liquor may be sprayed on to the rollers.

One set of rollers is positively driven and drives the other rollers by gearing, the speeds of the rollers from the feed to the delivery end being varied, or the diameters slightly varied, to give an accelerated surface speed to stretch the fiber as it is carried forward between the two sets of rollers, the small diameter of the rollers and their nearness to each other preventing any shrinkage of the fibers during the immersion in or spraying with the caustic soda or other mercerizing agent. The loose fiber or roving is preferably carried through the machine by carrier cloths or aprons.

In the accompanying drawings illustrative of my invention: Figure 1 is a longitudinal sectional elevation of an ordinary mercerizing machine having my improvements applied thereto; Fig. 2 is a plan view of the box or tray containing the small pairs of nipping rollers embodying the improvements; Fig. 3 is a part sectional side elevation taken on line *a, b*, Fig. 2, and Fig. 4 is, on an enlarged scale, an end elevation of a pair of nipping rollers showing the system of drive for same.

Referring to the drawing, 1, 2, 3, 4 and 5 represent a series of tanks through all or any of which, excepting the tank 3, the fibers can be conveyed as warp yarns are conveyed through ordinary mercerizing machines for impregnating the fiber at the commencement of the operation and for washing off purposes. In conjunction with the tanks are ordinary pairs of nipping or squeezing rollers 8, 9, 10, 11, 12 and 13 for expressing the liquid from the fibers after each immersion in the liquids in the tanks.

So far the parts described are common to warp yarn mercerizing machines and in themselves form no part of my invention, which consists in interposing at a convenient part of the machine, as between the nipping rollers 9 and 10 and over the tank 3, a box or open tray or framework 15 having journaled in each side thereof the opposite ends of two sets of rollers 16 of small diameter arranged in pairs in two planes with each pair of rollers placed as close as is possible to the adjacent pair of rollers so that there is a minimum amount of space between the point of surface engagement of the rollers of one pair and the point of surface engagement of the adjacent pair. The upper series of rollers can be self-adjusting so that pressure may be applied to suit requirements, but so far I have found it to answer very well to mount the upper roller of each pair so as to have surface contact with the lower roller of the respective pair.

On the outer ends of the lower series of rollers at one side of the machine are secured worm wheels 17 which engage with a worm 18, or a series of worms if preferred, fast on a revolving shaft 19 driven by strap or band from any convenient source of motion. Also secured on the axes of the lower rollers are pinions 20 which mesh with pinions 21 fast on the axes of the respective upper rollers of each pair of rollers 16 to drive same positively from the bottom rollers.

In order to convey loose fiber or roving through the machine I preferably employ endless cloths or aprons between which the fiber is fed and carried forward thereby without liability of being broken or damaged, as would be the case if unsupported. The fiber or roving is led directly from the roving cans or other receptacles on to an endless traveling belt 22 between which and a second endless belt 23 it is engaged and car-

ried through the tank 1, between the pair of nipping rollers 8, through the tank 2, then between the second pair of nipping rollers 9 and from thence is carried forward by the
5 apron 22 to the series of small rollers 16, the apron 23 passing over guide rollers back to the feeding end of the machine.

The apron 22 is joined on entering between the first pair of rollers 16 by an endless apron 24 between which and the apron 22 the fiber is carried between each pair of rollers 16 in succession, the minimum space afforded between the nip of the adjacent pairs of rollers preventing any shrinkage of
15 the individual fibers during their passage from the first to the last pair of rollers. During the traverse of the material between the pairs of rollers 16, the fibers are saturated with caustic soda or like mercerizing
20 liquid which may be contained in the box or tray 15 so as to cover the fiber, or sprayed on to the traveling aprons from perforated pipes such as 25 located above the box or
25 tray and fed from any convenient source, but preferably from the tank 3 from which the liquid is pumped through the pipes 25 and after passing through the material falls down into said tank so that the liquid is constantly circulated. The aprons 22 and
30 24 act as sponges for retaining the liquid and thoroughly impregnating the fibers carried between them.

On leaving the rollers 16 the fibers or rovings are carried forward by the apron
35 22 to the pair of nipping rollers 10 on emerging from which the said apron delivers the fibers to another pair of endless aprons 26, 27, and returns back to the feeding end of the machine, as shown in Fig. 1. The
40 fibers or rovings are carried by the aprons 26, 27, between the remaining nipping rollers and through any or all of the remaining tanks in the usual way for washing off purposes and may finally be led through any
45 ordinary drier, not shown. To stretch or extend the fibers or rovings during the passage of same between the pairs of rollers 16, some of said rollers at the entrance end are of slightly less diameter than those at the
50 discharging end so that the surface speeds will vary sufficiently to give the amount of stretch or extension desired, or the same result could be obtained by varying the gearing, but the former method is preferable by
55 reason of the limited space allowed for the parts.

By the means above described, vegetable fiber in the loose state or in the form of sliver or roving, is subjected to a series of
60 successive squeezes while traveling through the liquor in the box or tray, or under the liquor being sprayed upon the same, and as it is held at so many points close together in its traverse, no shrinkage of the fiber is pos-

sible, and in providing means in a mercerizing machine for thus enabling fiber in the roving, sliver or loose state to be dealt with, I render it possible to spin single counts direct from the mercerized roving or sliver
70 and eliminate the cost of additional handling in putting the fiber through other processes before it can be mercerized, as is essential at present. In treating fiber in the sliver or roving I find it an advantage to plait or loosely twist the same preparatory
75 to feeding it through the machine.

The machine will answer for the treatment of fabrics which are of too delicate a character to withstand treatment in ordinary mercerizing machines.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a machine for treating fiber, the combination, with tanks, a carrier apron for
85 supporting the fiber, and means for passing the carrier apron and fiber through the said tanks; of two series of rollers arranged respectively above and below the fiber and the carrier apron and between the said tanks,
90 driving mechanism for revolving the said rollers positively, and means for applying liquid to the fiber while passing between the said rollers.

2. In a machine for treating fiber, the combination, with tanks, a carrier apron for supporting the fiber, and means for passing the carrier apron and fiber through the
95 said tanks; of two series of rollers arranged respectively above and below the fiber and the carrier apron and between the said tanks, driving mechanism for revolving the said
100 rollers positively, the rollers at the delivery end of the series being driven at a greater surface speed than those at the receiving
105 end so as to stretch the fiber, and means for applying liquid to the fiber while passing between the said rollers.

3. In a machine for treating fiber, the combination, with tanks, a carrier apron for
110 supporting the fiber, and means for passing the carrier apron and fiber through the said tanks; of two series of rollers arranged respectively above and below the fiber and the carrier apron and between the said tanks,
115 driving mechanism for revolving the said rollers positively, an endless traveling apron having one of its stretches arranged between the upper series of rollers and the fiber, and means for applying liquid to the fiber while
120 passing between the said rollers.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN H. ROBSON.

Witnesses:

FREDERICK I. BRIGHT,
THOMAS H. BARRON.