

No. 648,115.

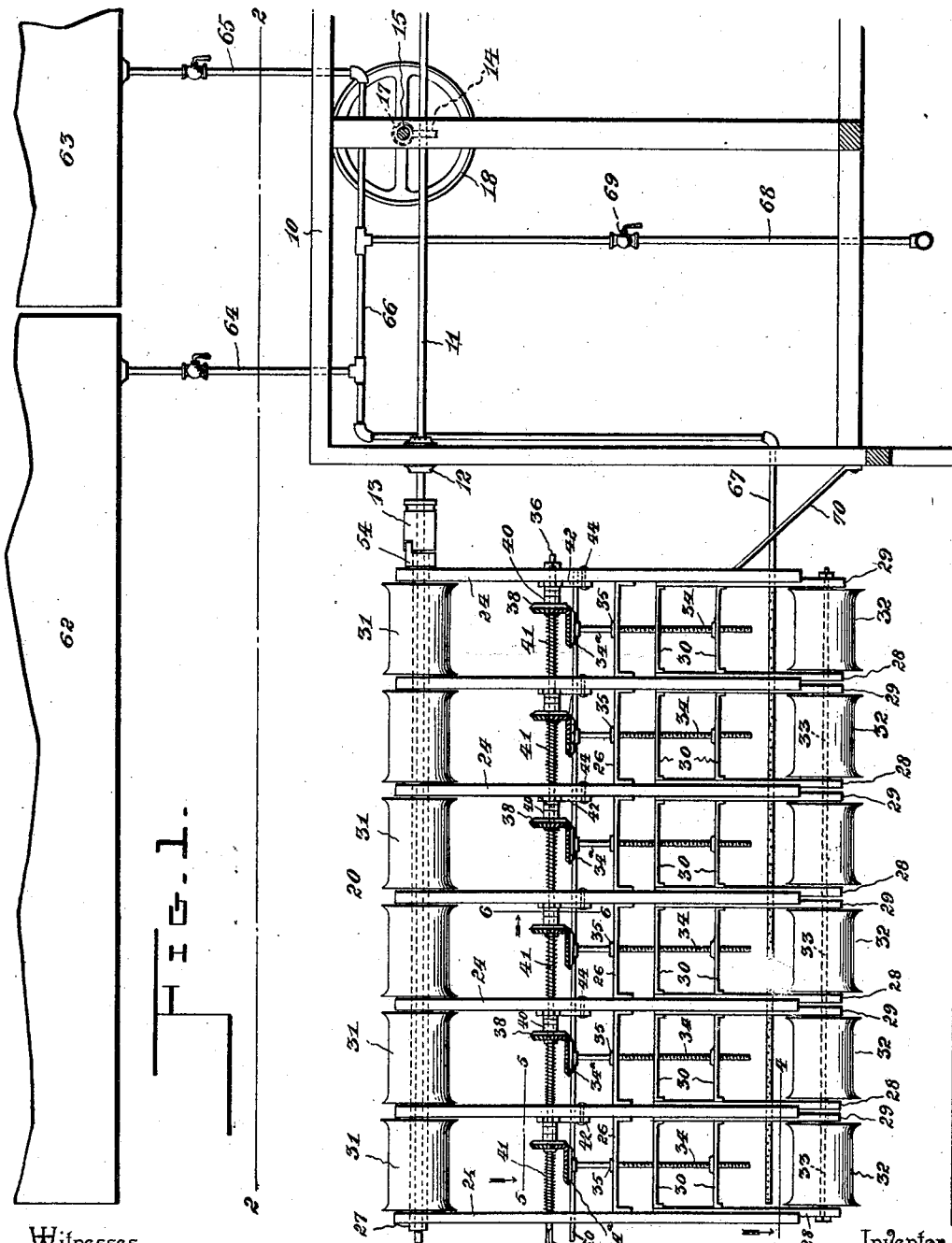
Patented Apr. 24, 1900.

G. W. REMSEN.  
APPARATUS FOR MERCERIZING.

(Application filed June 5, 1899.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses  
John T. Deufferwiel  
H. J. Beuchard

Inventor  
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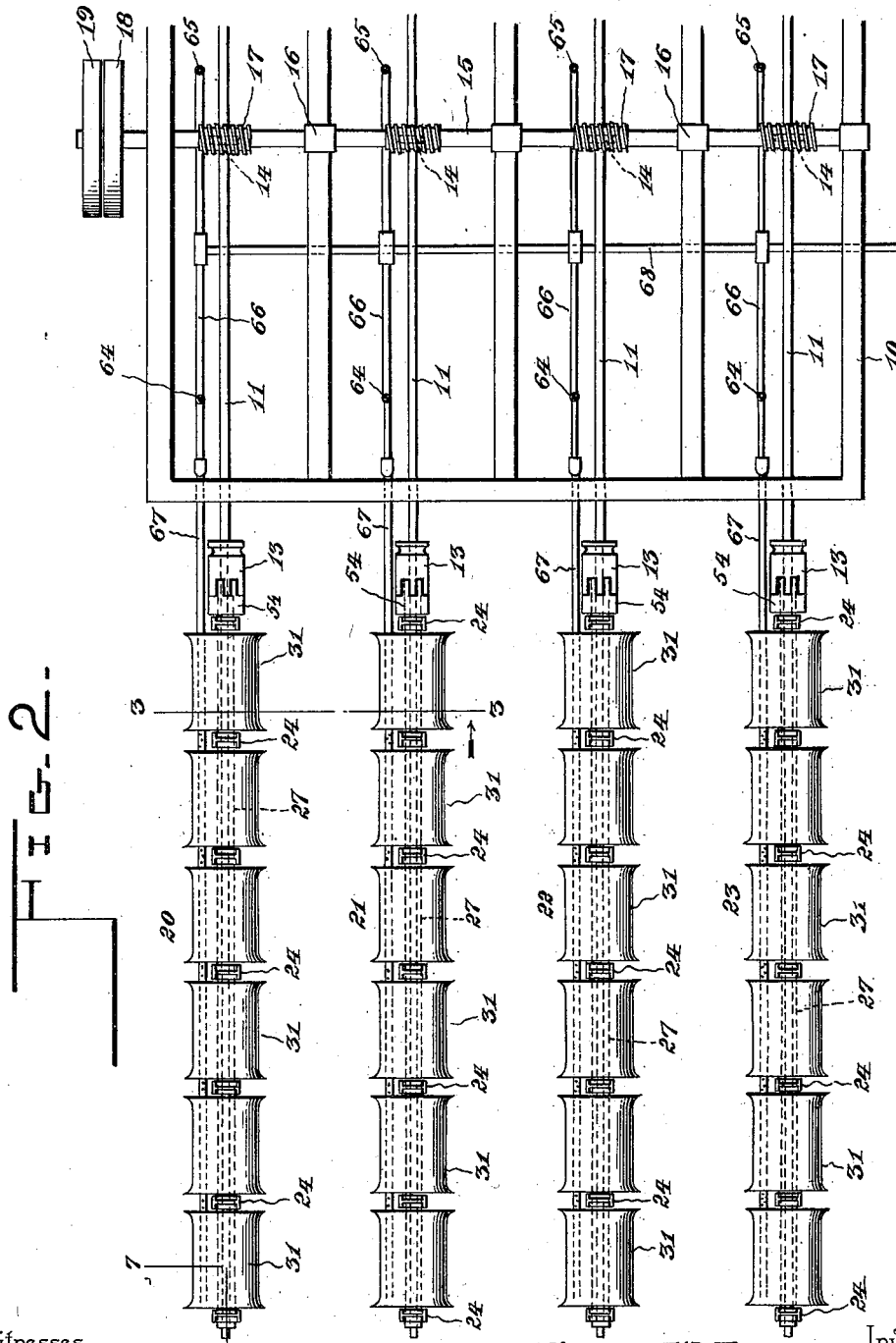


Fig. 2.

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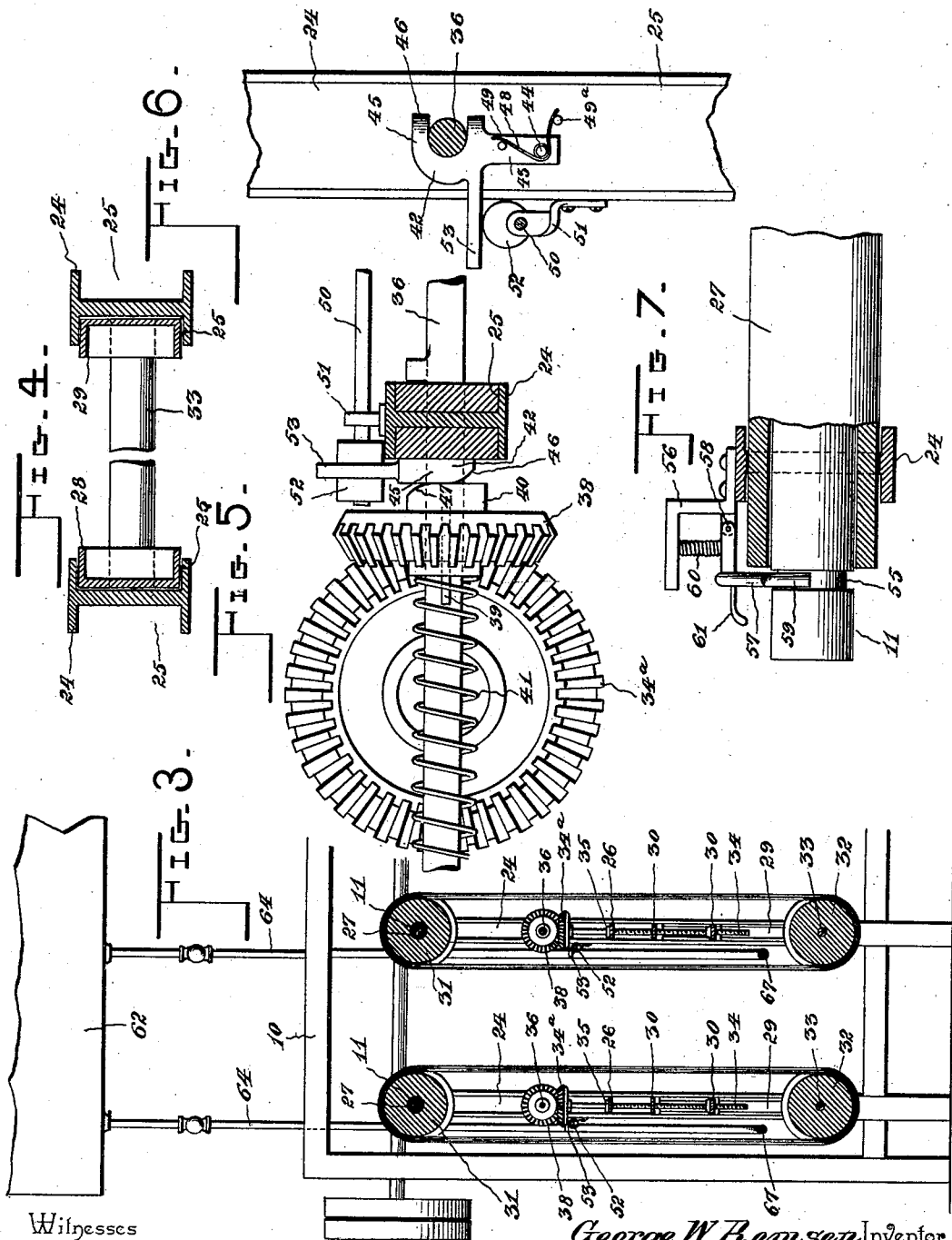
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Witnesses

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# UNITED STATES PATENT OFFICE.

GEORGE W. REMSEN, OF WILKES-BARRÉ, PENNSYLVANIA.

## APPARATUS FOR MERCERIZING.

SPECIFICATION forming part of Letters Patent No. 648,115, dated April 24, 1900.

Application filed June 5, 1899. Serial No. 719,435. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. REMSEN, a citizen of the United States, residing at Wilkes-Barré, in the county of Luzerne and State of Pennsylvania, have invented a new and useful Apparatus for Mercerizing Yarn, of which the following is a specification.

My invention relates to improvements in apparatus for mercerizing yarn designed to carry out the treatment according to the well-established processes of first subjecting the yarn to the action of a solution of soda or other alkaline solution, washing the yarn with water, spraying the yarn with an acid solution, and finally again washing the yarn with water.

The prime object of the present invention is to facilitate the interchange of the yarn which has been subjected to treatment with an untreated supply of yarn and without disturbing other yarn which may be contained in the apparatus under various stages of treatment therein, and a further object is to effect a saving in the quantity of the solutions employed for the necessary treatment of the yarn.

It is well known that yarn is mercerized while it is in a condition known as "skeins" or "hanks" and that these skeins vary in length from one-half of an inch to one inch and a half in length. In the ordinary method of and apparatus for mercerizing hanks of yarn it is customary to subject the skeins individually to the stretching action of a pair of rolls, one or both of which are adjustable relatively to the other, so as to strain the hank, while one roll is positively rotated to impart a traveling motion to the yarn.

According to my invention I provide a number of gangs of frames and stretching devices, each gang comprising a series of connected frames and two series of rolls which are arranged in pairs and are carried by the frames for application therewith and removal therefrom to and from one of a series of shafts adapted to impart the necessary rotary motion to one series of the rolls in the gang. Each pair of rolls in the gang of frames has one roll capable of adjustment in relation to the other roll of the pair, and thus the individual pairs of rolls may be moved or adjusted to compensate for variations in the length of the series of skeins which may be applied to each gang

of connected frames and rolls. I also equip my apparatus with means for positively rotating the series of non-adjustable rolls in each gang from a single shaft, with means for confining the connected frames of the gang against displacement on the shaft, with means for adjusting either roll of the series of slidable rolls in each gang from a single adjusting-shaft, and with clutch devices by which either slidable roll may be thrown into or out of gear with the adjusting-shaft while allowing all the clutch devices to be adjusted simultaneously for slackening the tension on the series of skeins or hanks in each gang.

The invention further consists in the novel combinations of mechanisms and in the construction, arrangement, and adaptation of the various parts for service, all as will be hereinafter more fully described and claimed.

To enable others to understand the invention, I have illustrated the best means which I have thus far devised for carrying my invention into practice, the same being shown by the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a sectional elevation of a yarn-mercerizing apparatus embodying the principles of my invention. Fig. 2 is a sectional plan view taken on the plane below the tanks which hold the solutions and illustrating the gangs of connected frames and rolls in plan, together with the driving mechanism therefor, the plane of the section being indicated by the dotted line 2 2 of Fig. 1. Fig. 3 is a vertical transverse sectional elevation through two gangs of connected frames and rolls, illustrating the skeins or hanks of yarn therein, the plane of the section being indicated by the dotted line 3 3 of Fig. 2. Fig. 4 is an enlarged detail horizontal section through two bars forming parts of one connected gang of frames and showing the adjustable slides fitted in the guideways of said bars, the plane of the section being indicated by the dotted line 4 4 of Fig. 1. Fig. 5 is an enlarged detail sectional view showing in plan the gearing by which the slides for one adjustable roll may be actuated from the adjusting-shaft, said view being a sectional plan on the plane indicated by the dotted line 5 5 of Fig. 1. Fig. 6 is an enlarged detail sec-

tional elevation on the plane indicated by the dotted line 6 6 of Fig. 1 looking in the direction indicated by the arrow and showing the clutch device by which the slidable gear element on the adjusting-shaft may be held in position to mesh with the gear on the threaded adjusting-spindle. Fig. 7 is an enlarged detail sectional view on the line 7 7 of Fig. 2, showing the latch for holding the tubular shaft in the gang of connected frames and rolls against endwise displacement on one of the driving-shafts.

The same numerals of reference are used to indicate like and corresponding parts in each of the several figures of the drawings.

For supporting the driving mechanism of my apparatus I employ suitable framework 10, which may be of any suitable construction preferred by the skilled constructor, and a series of driving-shafts 11 are mounted in proper bearings 12 of this framework. These shafts are preferably arranged in the same horizontal plane, and they are extended at both ends for suitable distances beyond the frame, so as to receive the series of gangs of connected frames and rolls, as indicated more clearly by Fig. 2 of the drawings. Each shaft of the series is provided with a slidable clutch 13, which is keyed to the shaft so as to rotate therewith under all conditions of service, and this clutch is adapted to be shifted by a suitable lever or any other equivalent means well known to those skilled in the art. The series of horizontal shafts are provided with worm-gears 14, and across the series of shafts is disposed a horizontal power-shaft 15, said power-shaft being journaled in proper bearings 16 of the machine-frame and provided with worms 17, which mesh individually with the worm-gears 14 on the horizontal driving-shafts 11, whereby all the driving-shafts are driven at slow speed from a single power-shaft. One end of this power-shaft protrudes beyond the side of the framework 10, and thus receives fast and loose pulleys 18 and 19, respectively, for positively rotating the shaft 15 or throwing the latter out of gear.

One gang of connected frames and rolls is indicated by the numeral 20, and other gangs of connected frames and rolls are indicated at 21, 22, and 23. (See Fig. 2.) It will be understood that I employ a plurality of gangs of connected frames and rolls which correspond in number to the horizontal driving-shafts 11, and while I have shown four of such shafts and gangs of connected frames and rolls by Fig. 2 of the drawings I do not desire to limit myself to any particular number of shafts and gangs of frames and rolls, because the number may be varied according to the capacity of the apparatus. It is essential, however, that a series of gangs of connected frames and rolls, with their complementary shafts, be provided in my apparatus in order that one gang containing the skeins of yarn which have been subjected to treatment may be removed from its shaft

without disturbing the remaining gangs of frames and rolls, so that yarn which shall have been fully treated may be removed from the apparatus and replaced by another gang of frames and rolls carrying untreated yarn which it is desired to mercerize in my apparatus.

I will now proceed to describe in detail the construction of one gang of frames and rolls, together with means for adjusting and controlling the slidable rolls, and as all of the gangs of frames and rolls are similar in construction and are operated in a similar manner a description of one gang will answer for each of the others. The framework of the gang consists of a series of bars 24 and a series of bridge-bars 26. The bars 24 are arranged parallel one to the other and at proper intervals apart to accommodate the rolls, presently described, and the spaces between these parallel bars are spanned by the bridge-bars 26, the latter being flanged and united firmly to the parallel bars 24. These parallel bars are provided in their opposite faces with longitudinal channels or guideways 25 (see Figs. 4 and 5) for the reception of slides, which carry the adjustable rolls, as will presently appear. A tubular shaft 27 passes loosely through the series of parallel bars 24, near the upper ends thereof, and the length of this tubular shaft exceeds the length of the gang-frame formed by the spaced bars 24, so that the ends of the shaft 27 protrude beyond the end bars of the gang-frame. A series of slides 28 29 are arranged in pairs within the guideways 25 at the lower parts of the spaced parallel bars 24, and these slides are connected in pairs between adjacent parallel bars 24 by means of the cross-bars 30, which are firmly secured to the pair of slides 28 29, so as to couple them rigidly together and insure simultaneous movement to the slides comprising each pair. The tubular shaft 27 carries a series of non-slidable rolls 31, which are keyed to or made fast with the shaft 27 in any suitable way so as to rotate therewith, and these non-slidable rolls 31 are secured to the shaft 27 in the spaces between the upper ends of the parallel bars 24. It will be recalled that the tubular shaft 27 is fitted loosely in the connected bars 24, so as to rotate freely therein, and the rolls 31 are fixed to this tubular shaft between said bars 24 in a manner to hold the tubular shaft against endwise movement within the bars 24 and so that the rolls 31 will rotate with the shaft when the gang is properly fitted to the driving-shaft 11, and the clutch 13 is engaged with said tubular shaft, as will presently appear. Each gang is, furthermore, equipped with a series of slidable rolls 32, which are supported individually by arbors 33, that are fastened to the pairs of slides 28 29. The slidable rolls 32 are supported by the arbors and the pairs of slides in vertical alinement with the non-slidable rolls 31 on the tubular shaft, so that the skeins or hanks of yarn may

be fitted on the rolls 31, 32 to be stretched by adjustment of the rolls 32 and to be given a traveling motion by the rotation of the rolls 31.

In view of the variation in the lengths of the skeins or hanks of yarn and the fact that each gang is designed to carry a plurality of the skeins or hanks it is desirable to provide means for adjusting the rolls 32 individually, so that all the skeins or hanks may be placed under the desired tension for stretching the yarn, and this object is attained in my invention by the employment of a series of screw-spindles 34, which are adapted to be actuated individually from a common adjusting-shaft with proper gear appliances. A series of these screw-spindles 34 are arranged in positions parallel to the frame-bars 24 and about midway therebetween, and each of these screw-spindles 34 has a threaded engagement with cross-bars 30 of the adjustable pair of slides 28, 29. Each screw-spindle has a swiveled engagement at 35 with the bridge-bar 26 of the gang-frame, so as to confine the screw-spindle against endwise movement with relation to the adjusting-shaft 36, and to the upper end of each screw-spindle is fixed a beveled gear 34<sup>a</sup>. The adjusting-shaft 36 is journaled in suitable bearings provided in the parallel bars 24 of the gang-frame, so as to lie substantially in the vertical plane of the screw-spindles 34 and below the series of non-adjustable rolls 31 on the tubular shaft. One end of this adjusting-shaft is provided with a squared or polygonal tenon 37, adapted to receive a crank or hand-wheel for its convenient rotation by hand, and on this adjusting-shaft is mounted a series of driving-gears 38, adapted to intermesh individually with the gears 34<sup>a</sup> on the adjusting screw-spindles 34. Each driving-gear 38 is keyed, as at 39, for the slidable adjustment on the shaft, and against this gear acts a coiled spring 41, which loosely encircles the shaft, so as to have one end seated against one bar 24 of the frame, while the other end of the spring acts against the hub 40 of the gear 38 to normally impel the latter in a direction away from the gear 34<sup>a</sup> on the adjusting-spindle 34. It will thus be seen that the gears 38 are connected with the shafts 36 to rotate therewith and that they are pressed by the springs 31 normally free from the gears 34<sup>a</sup> on the screw-spindles; but to adjust the slidable rolls 32 individually I provide means by which the screw-spindles 34 may be operated separately from the adjusting-shaft 36. This end is attained by the employment of a series of clutch devices 42, one of which is arranged for coaction with one slidable gear 38 on the adjusting-shaft. Each clutch-lever 42 is provided with a shank 43, which is pivoted at 44 on one of the frame-bars 24 of the gang, and the upper end of said clutch-lever is yoke-shaped at 45 and provided with a cam-face 46, which is adapted to ride against a cam-face 47 on the hub 40 of the slidable gear 38. The clutch-lever is adjusted for its cam-face 46 to

wedge against the cam-face 47 on the gear-hub in a manner to force the gear 38 along the shaft 36 a limited distance and against the tension of the spring 41, and the gear 38 is thus adapted to be adjusted to a position where its teeth will mesh with the teeth of the gear 34<sup>a</sup> on the screw-spindle 34, thus holding the gears in position to operatively connect the screw-spindle with the adjusting-shaft. By reference to Figs. 5 and 6 it will be noted that the clutch-lever 42 is adapted to wedge itself in position between a frame-bar 24 and the hub 40 of the slidable gear, and the clutch-lever is thus exposed to frictional contact with the frame-bar and gear-hub, so that the tension of the spring 41 will hold the clutch-lever 42 in position during the operation of adjusting the screw-spindle 34 to lower the adjustable roll 32 away from the roll 31 for stretching the skein or hank of yarn on said rolls. The clutch-lever 42 is designed to be thrown out of operative relation to the gear 38 by means of a retracting-spring 48, which is coiled on the pivot 44 of the clutch-lever, and one end of this spring acts against the stud 49 on the shank of said lever 42, while the other end of the spring acts against the stud 49<sup>a</sup> on the frame-bar 24. While this spring has a tendency to throw the clutch-lever out of position, the tension of the spring is overcome when the clutch-lever is engaged with the gear-hub 40 by the tension of the spring 41, and each clutch-lever may thus be adjusted by hand in order that the screw-spindle 34 may be adjusted by the shaft 36, so as to stretch the skein or hank of yarn on a pair of rolls.

As heretofore described, the means for throwing the gear elements 38 into mesh with the series of adjusting-spindles 34 are adapted to be operated individually for the purpose of enabling each pair of rolls to be adjusted separately in order to individually stretch the skeins of yarn which may vary in length; but I have also equipped the gang with means whereby the entire series of clutches may be operated from a single cam-shaft, so that the tension on the whole series of skeins or hanks may be released at one time previous to removing said skeins from the two series of rolls 31, 32, which are mounted in the gang-frame. The cam-shaft 50 is arranged in a horizontal position below the adjusting-shaft 36 and at one side of the vertical plane thereof and of the clutch-levers 42, and this cam-shaft is journaled in suitable brackets 51, which are fixed to proper bars 24 of the gang-frame, as shown by Fig. 6 of the drawings. Said shaft 50 is equipped with a series of cams or eccentrics 52, which are disposed in close relation to the clutch-levers 42 and are adapted to engage with fingers 53 on said clutch-levers. After the rolls 32 shall have been adjusted in each gang the clutch-levers 42 should be manipulated individually to disengage the gears 38 from the screw-spindles 34, and the clutches are held in their free positions by the springs

48, while the gears 38 are held from engagement with the gears on the screw-spindles. The screw-spindles have swiveled engagement with the bridge-bars 26 and threaded engagement with the stay-bars 30 of the pair of slides, and the spindles are thus adapted to lock the rolls 32 in their lowered positions, so as to strain the hanks or skeins on the slidable and non-slidable pairs of rolls. It is desirable, however, to simultaneously adjust the series of clutch-levers 42 in order to make the gears 38 engage with the gears on the screw-spindles, so that the shaft 36 may be rotated in the proper direction to raise the entire series of rolls 32 in order to slacken the tension on the entire series of skeins or hanks, and this end may be attained by turning the shaft 50 for the eccentrics 52 thereon to ride against the fingers 53 and lift the latches 42 into engagement with the shaft 36, as represented by Fig. 6.

As the gang-frame and the devices supported thereby are adapted to have the tubular shaft 27 fit removably on the driving-shaft 11, I find it advisable to employ means which will prevent accidental endwise displacement of the tubular shaft and the gang-frame on the shaft 11. One end of this shaft is provided with an annular groove 55, adapted to receive a latch 57, which is pivoted to a bracket-arm 56. Said bracket-arm is fast with the bar 24 at one end of the gang-frame, and the latch 57 is pivoted to said bracket at 58. (See Fig. 7.) The latch is formed with a yoke-shaped jaw 59, adapted to loosely fit in the annular groove 55 of the shaft 11, and this latch is held in proper position by means of a spring 60, which is seated against the bracket 56 and the latch. The latch is also provided with a lifting-finger 61, by which said latch may be raised conveniently against the tension of its spring, so as to disengage the jaw from the grooved shaft 11. This latch thus holds the gang-frame and the tubular shaft against endwise movement on the driving-shaft, and the latch may be conveniently released from the grooved shaft 11 when it is desired to remove the gang-frame and rolls therefrom by slipping the tubular shaft 27 endwise on said shaft 11.

The end of the tubular shaft 27 which lies contiguous to the clutch 13 is provided with a clutch-face 54, with which the clutch 13 is adapted to engage when the said clutch is slipped endwise of the shaft 11, and as the clutch rotates with the shaft 11 and has interlocking engagement with one end of the tubular shaft 27 the latter is positively driven through the clutch from the shaft 11 in order to rotate therewith for positively driving the series of non-slidable rolls 31, which are keyed to said tubular shaft 27, whereby the rolls 31 are adapted to impart traveling motion to the hanks or skeins of yarn which are fitted to the two series of rolls 31 32.

The tank which contains the soda or other alkaline solution is indicated by the numeral

62 as arranged in an elevated or overhead position above the horizontal plane of the frame 10 and the gangs of connected yarn frames and rolls, and the tank for the acid solution is indicated at 63 as occupying the corresponding relation to the frame and gangs of yarn-frames. From these overhead tanks lead the valved pipes 64 65, which are connected, respectively, to the alkali-tank and the acid-tank, and these pipes are coupled to a common supply-main 66. With this supply-main communicates a series of perforated distributing-pipes 67, each of which occupies a horizontal position below one shaft 11, substantially in the vertical plane thereof. The perforated distributing-pipes lie parallel to the driving-shafts 11, nearly in the vertical plane thereof, and these pipes are designed to lie close to the gang of connected yarn-frames, so as to lie between the upper and lower rolls 31 32 and to spray the hanks or skeins of yarn with either of the solutions or with water. To the supply-main 66 is coupled a water-pipe 68, having a cock or valve 69, which remains closed when the solution is drawn from either of the tanks for treating the yarn on the rollers of the gang-frames.

The operation is as follows: Each gang-frame is removed from its driving-shaft 11 for conveniently placing the hanks or skeins of yarn on the pairs of rollers, and in this operation the rollers 32 should be raised a proper distance for conveniently placing the skeins thereon. This adjustment of the rolls 32 may be effected simultaneously and conveniently by moving the cam-shaft 50 to throw the clutch-levers 42 into engagement with the gears 38 to make the latter mesh with the gears of the screw-spindles, after which the adjusting-shaft 36 may be rotated in a direction to cause the screw-spindles to raise the pairs of slides, and thereby move the rolls 32 toward the rolls 31. The skeins of yarn may readily be slipped onto the vertically-alined pairs of rolls, the operator adjusting each pair of slides individually in order to lower the rolls 32 away from the rolls 31 for the purpose of stretching the hanks or skeins of yarn. This may be effected conveniently by throwing the clutch-levers by hand into engagement with the hubs of the gears 38, and the shaft 36 may then be rotated to drive either of the screws 34 in order to lower the slides 28 29 and move the roll 32 away from the roll 31. It will be understood that each roll 32 is lowered independently of either of the other rolls, and the clutch-levers 32 should then be disengaged to allow the adjusting-spindles 34 to lock the rollers 32 in their adjusted positions, and when the gang-frame is properly loaded with yarn it may be carried to the apparatus for adjustment therein. The gang-frame loaded with the skeins of yarn is fitted to one of the driving-shafts 11 until its clutch-face 54 is contiguous to the clutch 13, and the latch 57 engages with the groove 55 in the shaft 11,

and this gang-frame is prevented from swaying on the shaft by means of a stay 70, (see Fig. 1,) which has its ends fastened, respectively, to the gang-frame and the machine-frame 10 in any suitable and detachable manner. The adjustment of the gang-frame on the shaft causes the perforated pipe 67 to lie within the leads of the hanks or skeins of yarn on the series of rolls 31 32. The clutch 13 may now be thrown into gear with the tubular shaft 27 for rotating the rollers 31, which give the traveling movement to the hanks or skeins of yarn, and the tanks 62 63 having been charged with the proper solutions the first step in the treatment of the yarns may be carried into effect by opening the valve in the pipe 64, the valves in the pipes 65 68 being closed. The alkaline or mercerizing solution is conveyed by the pipes 20 64 66 to the distributing-pipes, and this solution is sprayed on the stretched moving hanks or skeins of yarn on the gang-frame. After the skeins of yarn shall have been subjected to the treatment for the desired length 25 of time the valves in the pipes 64 may be closed, and the valve 69 in the pipe 68 may then be opened to admit water to the main 66 and the distributing-pipe for washing the skeins. The valve in the pipe 65 should be 30 opened after the valve 69 is closed to shut off the water, and thus the acid solution is admitted to the distributing-pipe to be sprayed on the skeins of yarn. The valve in the pipe 65 may then be closed and the valve 69 again 35 opened for the main 66 and distributing-pipe to again convey water to the skeins of yarn for finally washing the same. Of course the distributing-pipes 67 should be provided with stop-cocks, so that either of these pipes may 40 be cut out of service during the interchange of a frame with treated yarn with another frame bearing a load of untreated yarn. After the yarn shall have been subjected to the desired treatment the gang-frame and its 45 load may easily be removed by releasing the latch 57 to free the gang-frame from the grooved shaft 11, and the entire frame may be withdrawn, so as to be replaced by another frame loaded with untreated yarn. It will 50 be observed that each gang-frame may be removed from the apparatus without affecting the operation of either of the remaining gangs of frames and rolls, and thus the operation of mercerizing yarn is materially facilitated and 55 the capacity of the apparatus is increased. The quantity of solution employed in the treatment of the yarn is minimized by reason of the fact that the solution is sprayed directly into or upon the moving hanks or skeins 60 instead of allowing said skeins to be immersed in a bath of liquid.

Changes may be made in the form and proportion of some of the parts while their essential features are retained and the spirit of the 65 invention embodied. Hence I do not desire to be limited to the precise form of all the

parts as shown, reserving the right to vary therefrom.

Having thus described the invention, what I claim is—

1. In an apparatus for mercerizing yarn, the combination with a series of shafts, of a plurality of gang-frames fitted to said shafts and removable individually therefrom, each gang of frames carrying two series of rolls, and 75 means for adjusting the rolls of one series relatively to the rolls of the other series, substantially as described.

2. In an apparatus for mercerizing yarn, the combination of a series of shafts, a plurality 80 of gang-frames fitted to said shafts and removable individually therefrom, each gang of frames carrying two series of rolls, and means for individually adjusting the rolls of one series with relation to the other series of 85 rolls, and means for confining each gang-frame against displacement on the shaft to which it is fitted, substantially as described.

3. In an apparatus for mercerizing yarn, the combination with a series of shafts, a plurality 90 of gang-frames each having a tubular shaft adapted to be fitted to one of the first-named shafts and removable therefrom, each gang of frames carrying two series of rollers and having means for individually adjusting 95 rollers of one series with relation to the rollers of the other series which are revoluble with the tubular shaft, and means for making the tubular shaft of each gang-frame revoluble with the driving-shaft on which it is 100 fitted, substantially as described.

4. In an apparatus for mercerizing yarn, the combination with a series of driving-shafts, a plurality of gang-frames fitted individually 105 to said shafts and removable therefrom, each gang of frames carrying two series of rollers and means for adjusting the rollers of one series individually with relation to the rollers of the other series, and a latch device carried 110 by each gang of frames and engaging operatively with the driving-shaft for confining the gang-frames against displacement thereon, substantially as described.

5. In an apparatus for mercerizing yarn, the combination of a series of driving-shafts, a 115 plurality of gang-frames each having a tubular shaft which is fitted on one driving-shaft and is removable therefrom with the gang-frame independently of the other gang-frames, each gang-frame carrying two series 120 of rollers and means for adjusting the rollers of one series independently of each other, and clutch devices between each driving-shaft and the tubular shaft fitted thereon, substantially as described. 125

6. In an apparatus for mercerizing yarn, the combination of a series of driving-shafts, a power-shaft common to all of the driving-shafts and geared thereto individually for imparting 130 slow motion thereto, a series of gang-frames each fitted to one of the driving-shafts and removable individually therefrom, each gang



of frames carrying two series of rollers with means for adjusting the rollers of one series individually with respect to the rollers of the other series, a supply-main, tanks having  
5 valved connections with said supply-main, and distributing-pipes connected with the supply-main and each disposed in operative relation to the load on the series of rollers of one gang of frames, substantially as described.  
10

7. In an apparatus for mercerizing yarn, a gang of frames comprising the connected bars, a shaft fitted therein and carrying a series of non-adjustable rolls, other rolls each mounted  
15 slidably on said bars, in alinement with the rolls on said shaft, and adjustable individually with respect thereto, and means for adjusting the individually-supported rolls with relation to the rolls on the shaft, substantially as described.  
20

8. In an apparatus for mercerizing yarn, a gang-frame comprising a series of connected bars, pairs of slides fitted in series to said bars, rolls journaled individually in each pair  
25 of said slides and each roll adjustable with its pair of slides independently of the other individual rolls and their slides, a shaft supported on the bars and carrying rolls which are disposed in alinement with the adjustable rolls, screw-spindles mounted in the gang-  
30 frame and connected respectively with the pairs of slides for adjusting the latter and the rolls therein individually, an adjusting-shaft common to all the screw-spindles of the series, and gears between said shaft and  
35 the screw-spindles, substantially as described.

9. In an apparatus for mercerizing yarn, a gang-frame comprising a series of bars, a shaft journaled therein and carrying the spaced  
40 non-adjustable rolls, slides confined movably in the bars and carrying the slidable rolls which are disposed in the same plane as the non-slidable rolls, screw-spindles mounted in the gang-frame and connected with the slides,  
45 an adjusting-shaft mounted in the gang-frame, and clutch-controlled gearing between the adjusting-shaft and the screw-spindles for connecting the latter individually with said adjusting-shaft, substantially as described.  
50

10. In an apparatus for mercerizing yarn, the combination with a pair of rolls and a screw-spindle for adjusting one roll with relation to the other roll, of an adjusting-shaft, a spring-controlled gear keyed to said shaft  
55 and normally free from engagement with the screw-spindle, and a clutch adapted to engage with the gear for holding the latter in position to operatively connect the screw-spindle with the adjusting-shaft, substantially  
60 as described.

11. In an apparatus for mercerizing yarn, the combination of a gang-frame carrying a series of non-slidable rolls, a series of slidable rolls mounted on said gang-frame for adjust-  
65 ment with relation to the first-named rolls, a series of screw-spindles for adjusting the slidable rolls individually, an adjusting-shaft, a

series of gears keyed thereto, springs acting individually on said gears, and independently-operative clutches for moving each gear  
70 against the tension of its spring and holding said gear in position to operatively connect the screw-spindle with the adjusting-shaft, substantially as described.

12. In an apparatus for mercerizing yarn, 75 the combination of a gang-frame carrying a series of non-slidable rolls, adjustable rolls slidably confined on the frames, screw-spindles for said adjustable rolls, a single adjusting-shaft, spring-actuated gears keyed to said  
80 shaft, clutch devices for engagement with said gears, and means for simultaneously adjusting said clutch devices, substantially as described.

13. In an apparatus for mercerizing yarn, 85 the combination of a gang-frame carrying a series of non-slidable rolls, a series of adjustable rolls, screw-spindles for said adjustable rolls, an adjusting-shaft, spring-actuated gears keyed to said shaft and each having a  
90 cam-formed hub, and a series of clutch-levers pivoted on the gang-frame and each having a cam-face adapted to impinge against the hub of one gear, substantially as described.

14. In an apparatus for mercerizing yarn, 95 the combination of a gang-frame carrying a series of non-adjustable rolls, adjustable rolls slidably confined thereon, screw-spindles for said adjustable rolls, an adjusting-shaft, clutch-controlled gearing between said shaft  
100 and the screw-spindles, and a cam-shaft contiguous to the clutch devices and adapted to engage simultaneously therewith for holding the entire series of gears in positions to operatively connect the screw-spindles with said  
105 adjusting-shaft, substantially as described.

15. In an apparatus for mercerizing yarn, the combination of a gang-frame carrying the non-adjustable rolls, the slides connected in  
110 pairs and movably confined on said gang-frame, adjustable rolls mounted individually in said slides, the screw-spindles, an adjusting-shaft carrying slidable gears, the clutch-levers mounted on a gang-frame for engagement with said gears and having the fingers,  
115 a spring for each clutch member, and a cam-shaft adapted to engage with the fingers of the clutch members, substantially as described.

16. In an apparatus for mercerizing yarn, the combination of a series of driving-shafts, 120 a plurality of gang-frames each having a tubular shaft which is fitted removably to one of the driving-shafts, a clutch on each driving-shaft to engage with the tubular shaft, a latch device on the gang-frame and engaging  
125 with the driving-shaft, and two series of rolls mounted in each gang-frame and having means for adjusting the rolls of one series individually with respect to the rolls of the other series, substantially as described.  
130

17. In an apparatus for mercerizing yarn, the combination of a driving-shaft, a gang of connected frames fitted removably to said shaft and carrying two series of rolls, the

rolls of one series being revoluble with said driving-shaft and the rolls of the other series being adjustable individually with respect to the first-named series of rolls, and a perforated distributing-pipe arranged between two series of rolls and substantially parallel to the driving-shaft for spraying the hanks or skeins on the rolls, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

GEORGE W. REMSEN.

Witnesses:

P. R. ROBINSON,  
FRANK A. MILLER,