

May 29, 1962

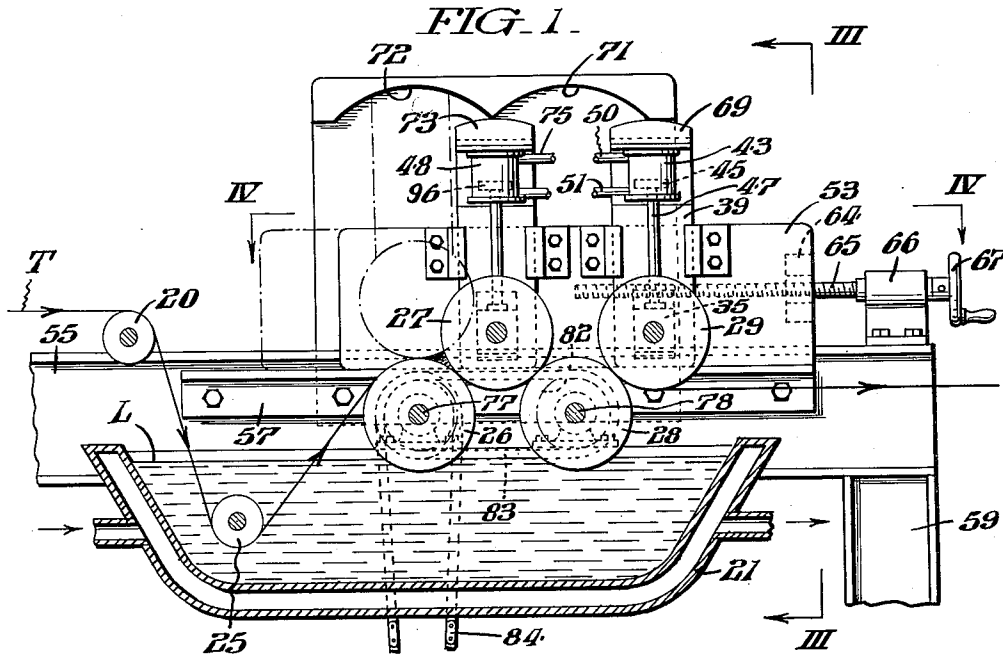
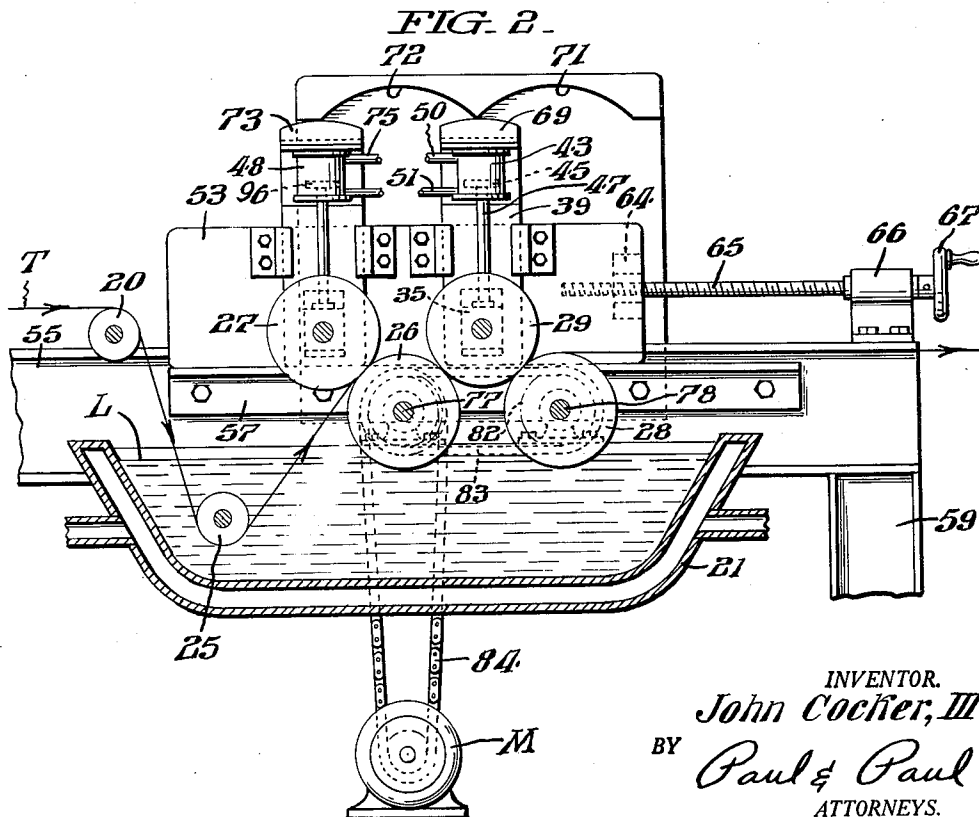
J. COCKER III

3,036,359

APPARATUS FOR TREATING CONTINUOUS RUNNING MATERIALS

Filed June 12, 1958

3 Sheets-Sheet 1



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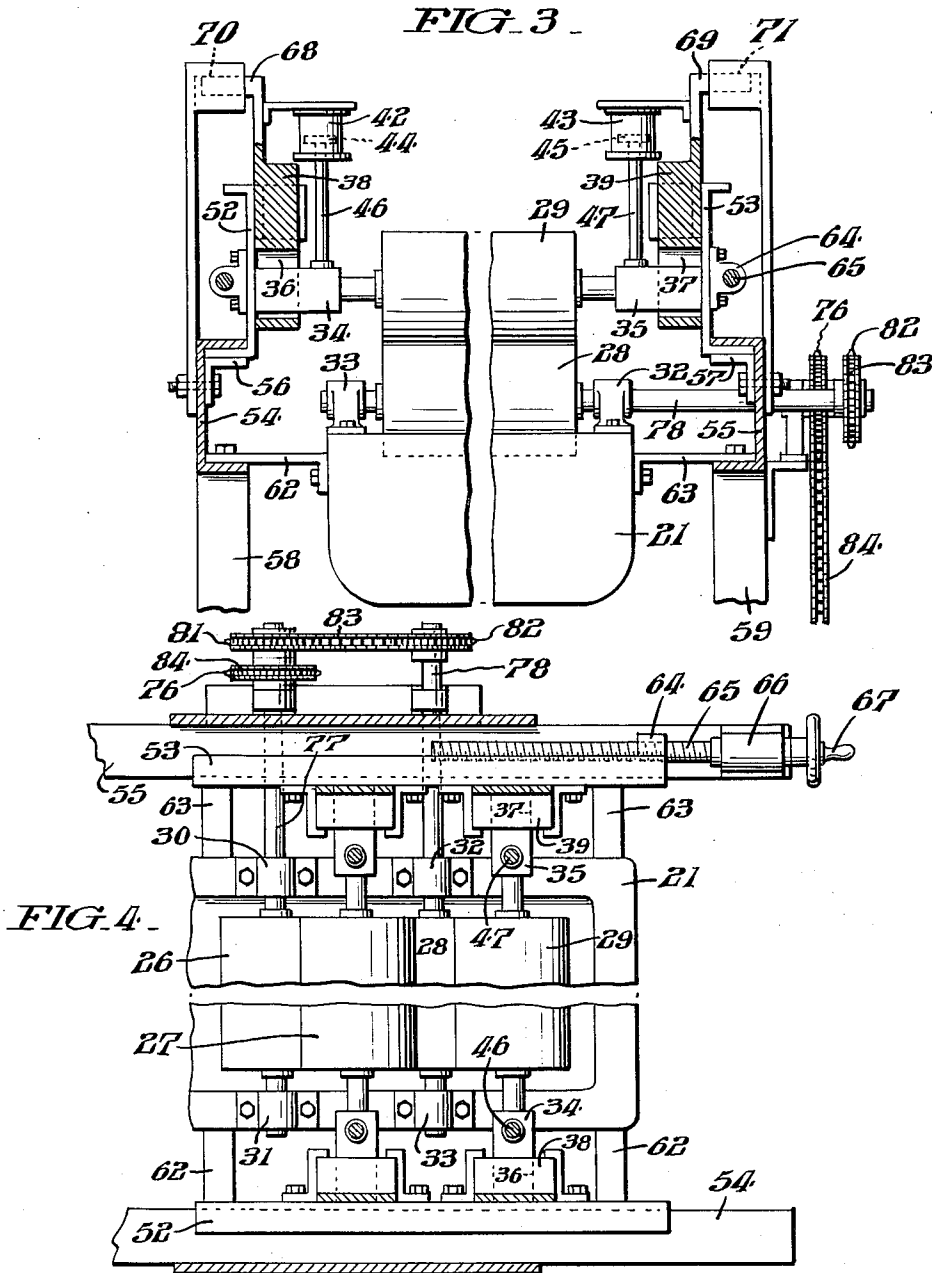
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APPARATUS FOR TREATING CONTINUOUS RUNNING MATERIALS

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3 Sheets-Sheet 2



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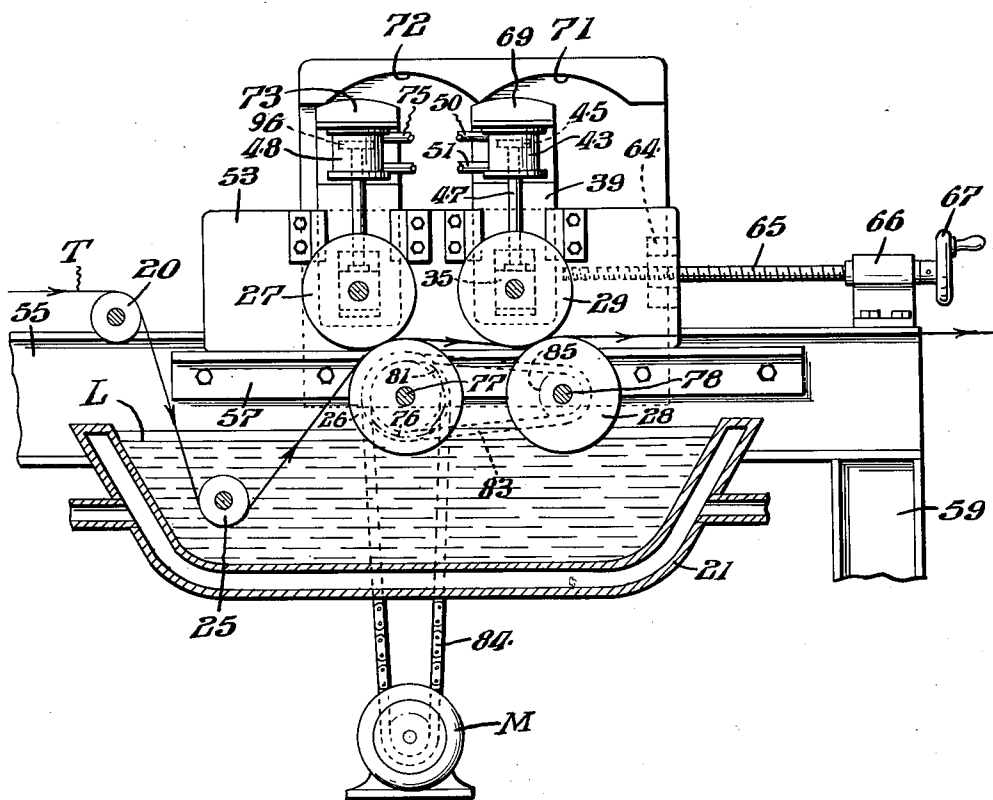
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3 Sheets-Sheet 3

FIG. 5



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APPARATUS FOR TREATING CONTINUOUS RUNNING MATERIALS

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10 Claims. (Cl. 28—28)

This invention relates to apparatus for treating continuous running materials such as yarn, fabrics, and the like, with liquids, such as sizing, dyes, resins, rinses, fixers, etc., and also to method of carrying out such treatment. More particularly this invention relates to a new arrangement of the quetsch rolls of a size box or padder or similar treating apparatus such that their simple adjustment may make possible different kinds of treatment of the textile materials in a variety of forms and sequences.

In the manufacture of woven fabrics for example, preparatory to introducing the yarn into a loom, the yarn is passed through a slasher with many ends in contiguous parallel relation. The yarn is thereby impregnated and coated with size, such as starch or the like, in order to make the yarn sufficiently strong to withstand the strains imposed by the heddle in the loom and resistant to the abrasive action of filler yarns during the weaving operation. The particular kinds of size treatment which it may be desirable to apply to the yarn depends upon the type of textile being treated, weight of the yarn, subsequent use to which the yarn will be put, as well as the physical characteristics of the textile itself. For example, it may be desirable to have a quetsch roll arrangement provide a single nip for rayon yarn, a double nip for a textile such as cotton, or even three or four nips for materials such as stretchable tire cord.

Heretofore the conventional arrangement of quetsch rolls in a slasher apparatus has consisted of two pairs of horizontally aligned quetsch rolls, each quetsch roll consisting of an upper press roll and a lower fixed roll. In such an arrangement, however, it is not possible to vary the treatment beyond an adjustment of the pressure between the quetsch rolls.

Accordingly, it is an object of this invention to provide one apparatus in which the quetsch rolls may be arranged to provide multiple nips in a variety of forms and sequences. It is another object of this invention to provide an apparatus whereby the treated yarns may be stretched or not according to the desired treatment.

Further objects will become apparent from a consideration of the following description and the accompanying drawings, wherein:

FIG. 1 is a side elevational view, with parts in longitudinal section, of a specific embodiment of apparatus in accordance with this invention.

FIG. 2 is a view similar to FIG. 1, showing a different arrangement of parts.

FIG. 3 is a view in cross-section of the apparatus taken as indicated by the lines and arrows III—III which appear in FIG. 1.

FIG. 4 is a plan view of the apparatus taken as indicated by the lines and arrows IV—IV which appear in FIG. 1.

FIG. 5 is a side elevational view with parts in longitudinal section of an apparatus similar to FIG. 1 but provided with a modified form of driving means, and with parts arranged in different relative positions.

The following description is directed to the specific forms of the apparatus and method as shown in the drawing and is not intended to be addressed to the scope of the invention itself which is capable of being practiced in a wide variety of forms and arrangements.

Adverting herewith to the specific form of the appara-

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tus as shown in FIGS. 1–5 of the drawings, a lower rotatable quetsch roll 26 is journaled in suitably packed bearings 30 and 31 mounted on the top of opposite walls of a trough 21. Likewise another lower rotatable quetsch roll 28 is journaled in bearings 32 and 33 similarly mounted. Although lower quetsch rolls 26 and 28 are rotatably mounted they are otherwise journaled in stationary bearings. As best seen in FIG. 3 an upper rotatable quetsch roll 29 is journaled in vertically movable blocks 34 and 35 which are themselves positioned in vertical slots 36 and 37 within the vertically movable bearings 38 and 39 respectively. Movable blocks 34 and 35 are capable of reciprocating movement within the vertical slots 36 and 37, said movement being actuated by the pressure of fluid in the pneumatic cylinders 42 and 43 upon pistons 44 and 45 connected by rods 46 and 47 to the aforesaid movable blocks 34 and 35 respectively. An inlet tube 50 is provided to permit the entry of fluid into pneumatic cylinder 43 under pressure, forcing piston 45 and its connecting rod 47 downwardly and causing quetsch roll 29 to be pressed firmly against its opposing lower quetsch roll.

Movable bearings 38 and 39 are slidably attached to sliding frames 52 and 53 respectively. The aforesaid sliding frames are fitted in position between channel bars 54 and 55 and angle bars 56 and 57 respectively. Channel bars 54 and 55 are supported by posts 58 and 59 respectively to which are also bolted wall frame members 62 and 63 which support trough 21. Bolted to the slidable frame 53 is a fixed block 64 having a threaded hole through which passes screw 65. Screw 65 extends through a threaded hole in another fixed block 66 bolted to the end of channel bar 55. A manual wheel 67 is provided for the turning of the screw 65 to force the movement of slidable frames 52 and 53 backward or forward in a horizontal direction which in turn forces the two upper quetsch rolls 27 and 29 to roll over the two lower quetsch rolls 26 and 28 into a selected position. The horizontal movement of quetsch rolls 27 and 29 is accompanied and facilitated by a vertical movement of the same quetsch rolls which is made possible by the movement of guide members 68 and 69 along curved guide stops such as 70 and a similar curved stop 71 and another guide member not illustrated. In like manner guide member 73 moves along the curved guide stop 72 and another curved guide stop not illustrated, as quetsch roll 27 rolls across the upper periphery of quetsch roll 26, see FIG. 1.

As best seen in FIG. 4 the shafts of quetsch rolls 26 and 28 extend through channel bars 55 and affixed to their ends is a sprocket wheel arrangement in which a chain 84 driven by the motor M is arranged to pass around a sprocket wheel 76 affixed to the end of the shaft 77 of quetsch roll 26. Sprocket wheels 81 and 82 of equal size are affixed respectively to the ends of shafts 77 and 78 of quetsch rolls 26 and 28. Passing around these sprocket wheels is another drive chain 83.

FIG. 5 illustrates a modification of the apparatus according to this invention in which the shaft 78 of quetsch roll 28 has affixed thereto a sprocket wheel 85 of smaller dimension than the sprocket wheel 81 affixed to the shaft 77 of quetsch roll 26. A chain 84 extends from the motor M to pass around sprocket wheel 76 affixed to the shaft 77 of quetsch roll 26 by means of which said roll is rotated in a clockwise direction. Another chain 83 passes around a second sprocket wheel 81 affixed to the end of shaft 77 of quetsch roll 26 and also around a sprocket 85 of smaller diameter which is affixed to the shaft 78 of quetsch roll 28. The revolution of shaft 77 thereby communicates a rotary motion to shaft 78. As a consequence of the fact that sprocket wheel 85 is of smaller dimension than sprocket wheel 81, the rota-

tion of shaft 78 will be more rapid than the rotation of shaft 77.

In operation when the quetsch rolls are positioned in FIG. 1 of the drawings, the textile material T is drawn over a lead-in roll 20 to enter the trough 21 in which a treating liquid is normally maintained at level L. After entering the treating liquid in trough 21 at level L the material T rounds immersion roll 25 to travel upward through the treating liquid until it emerges again at level L. Upon emergence the material T rounds lower quetsch roll 26 to travel downwardly between lower quetsch roll 26 and its cooperative upper quetsch roll 27; it then rounds cooperative roll 27 to pass upwardly between upper quetsch roll 27 and its cooperative lower quetsch roll 28; rounding quetsch roll 28 the material passes downwardly once more between lower quetsch roll 28 and its cooperative upper quetsch roll 29, whence the material passes to a dryer, not shown.

When the treating liquid is a size solution the effect of a squeeze between quetsch rolls 26 and 27 is that of a "slop" size, that is, the size material squeezed out of the material collects and forms a small pool just above the point where the quetsch rolls 26 and 27 touch, thus, in effect, treating the material to an additional bath in the size solution and tending to press the size more fully into the textile being treated. When the textile later passes between quetsch rolls 27 and 28 it is afforded a "drain" size so that the sizing liquid pressed from the textile drains back into the trough 21 instead of collecting in a pool between the two rolls. When the textile still later passes between quetsch rolls 28 and 29 the effect is that of a dressing action to smooth out the coating of size material and to make the impregnation more uniform.

In FIG. 2 the material T after emergence from the treating medium passes upwardly between lower quetsch roll 26 and upper quetsch roll 27, around quetsch roll 26 and then downwardly between lower quetsch roll 26 and upper quetsch roll 29; it then passes around quetsch roll 29 to travel upwardly again between upper quetsch roll 29 and lower quetsch roll 28, whence it passes to a dryer not shown.

It will be seen that the effect of the quetsch roll arrangement in FIG. 2 is to afford a "drain size" as the material T passes upwardly between quetsch rolls 26 and 27; a "slop" size is affected upon the textile when it passes downwardly between quetsch rolls 26 and 29, and finally the textile is given an additional drain size when it passes between quetsch rolls 28 and 29 in an upwardly direction.

When the quetsch rolls are arranged as in FIG. 5 the material T after emerging from the treating liquid passes upwardly between quetsch rolls 26 and 27 and then passes again in an upwardly direction between quetsch rolls 28 and 29 at which point it passes on to a dryer not shown. In this arrangement the textile is given first a drain size and is then subjected to another drain size in the nature of a dressing action.

When upper quetsch rolls 27 and 29 have been moved longitudinally by means of manual wheel 67 to a position in which the axes of upper quetsch roll 27 and of upper quetsch roll 29 are directly above the axes of lower quetsch roll 26 and lower quetsch roll 28, respectively, the guide members 69 and 73 have reached their maximum height along the guide stops 71 and 72. When quetsch rolls 27 and 29 have been placed in this position, fluid may then be admitted to pneumatic cylinders 43 and 48 through inlet tubes 50 and 75, forcing downward pistons 45 and 96 to press quetsch rolls 27 and 29 firmly against their cooperative quetsch rolls 26 and 28 respectively. From this position by turning the manual wheel 67 upper quetsch rolls 27 and 29 may be moved in either direction longitudinally across the trough to effect other desired arrangements of the rolls while maintaining a constant pressure by means of the four fluid cylinders as adjusted

in the initial vertical positions described. To release the pressure of the upper quetsch rolls 27 and 29 against the lower quetsch rolls 26 and 28, a valve (not shown) is opened in inlet tube 50 to permit the release of fluid pressure on the top of the piston 45 in cylinder 43 which will serve as an example to illustrate the operation of each of the four cylinders, and another valve associated with inlet tube 51 is opened to admit fluid under pressure into the cylinder forcing the piston in an upward direction.

For example where it is desired to change the quetsch roll arrangement from that in FIG. 1 to that in FIG. 2 the pressure in the four fluid cylinders attached to the movable blocks bearing the shafts of quetsch rolls 27 and 29 may be reversed by opening the inlet tubes in the tops of the cylinders and admitting fluid under pressure through the inlet tubes in the bottom of the cylinders effecting a lifting motion on the pistons in the cylinders and thereby releasing the pressure of quetsch rolls 27 and 29 against quetsch rolls 26 and 28. By means of manual wheel 67 the movable frame 53 is cranked forward and quetsch rolls 27 and 29 roll over the tops of quetsch rolls 26 and 28 which motion is permitted in a vertical direction by the vertical movement of the bearings in which the movable blocks are positioned. When the guide members 69 and 73 reach the opposite side of the guide stops 71 and 72 the rolls have then been positioned as in FIG. 2. Pressure may then again be reversed in the cylinders to force quetsch rolls 27 and 29 down firmly against the peripheries of quetsch rolls 26 and 28.

Lower quetsch roll 26 is driven from its shaft by the chain drive 84 which is connected to the motor M and passes around sprocket wheel 76. Lower quetsch roll 28 is similarly driven by a chain 83 which passes around sprocket wheels 81 and 82 affixed to the shafts 77 and 78 of quetsch rolls 26 and 28 respectively. Quetsch rolls 26 and 28 rotate at the same speed therefore, since sprocket wheels 81 and 82 are of equal size.

Since the fluid pressure in the four pneumatic cylinders associated with the upper quetsch rolls 27 and 29 acts to press said quetsch rolls down firmly upon the peripheries of lower quetsch rolls 26 and 28 the rotation of the two latter quetsch rolls also causes the rotation of quetsch rolls 27 and 29 by frictional contact. It will be noted that in FIG. 1, since both quetsch rolls 26 and 28 rotate in a clockwise direction the effect of said rotation is to impart a counter-clockwise rotation to quetsch roll 27 which is in contact with both quetsch rolls 26 and 28, and a similar rotation to quetsch roll 29 which is in contact with quetsch roll 28 alone.

In the modification illustrated in FIG. 5 when the quetsch roll 26 is rotated by the chain drive 84 passing around the sprocket 76 affixed to the shaft 77, its clockwise rotation imparts a counter-clockwise rotation to the quetsch roll 27 by means of frictional contact. Likewise the clockwise rotation of the chain driven lower quetsch roll 28 imparts a counter-clockwise rotation to upper quetsch roll 29 by peripheral contact. Since as hereinbefore described the sprocket 85 affixed to the shaft 78 of quetsch roll 28 is of smaller diameter than the sprocket 81 affixed to the shaft 77 of quetsch roll 26, quetsch roll 28 is driven at a rate of speed greater than that of quetsch roll 26, and, of course, the rotation of upper quetsch roll 29 is more rapid than that of upper quetsch roll 27. The modification as described is useful in those cases where it is desirable to effect a stretching of the textile during the sizing operation.

It will be apparent that an important advantage of the quetsch roll arrangement constructed in accordance with this invention lies in the number and varieties of treatment which may be effected on different kinds of textiles using a single apparatus.

Moreover the adjustment of the quetsch rolls from one position to another to affect different treatments can be made speedily and with a minimum of shut-down

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time of the slasher apparatus, thereby greatly enhancing the economy of its operation.

Although this invention has been disclosed with reference to specific forms and embodiments thereof, it should be evident that a great number of variations may be made without departing from the spirit and the scope of this invention. For example, parts may be reversed, equivalent elements may be substituted for those specifically disclosed and certain features of the invention may be used independently from other features, all without departing from the spirit and scope of this invention as defined in the appended claims.

Having thus described my invention, I claim:

1. A size box comprising means forming a container for a liquid sizing material, an immersion roll in said container means below the liquid level therein, a pair of lower quetsch rolls having substantially parallel axes and spaced apart from one another at a location at least partly above the level of said liquid, a pair of upper quetsch rolls arranged to contact said lower quetsch rolls, said upper quetsch rolls having axes which are spaced apart from one another at a distance substantially equal to the spacing between said lower quetsch rolls, means for moving said upper quetsch rolls as a unit in a direction substantially perpendicular to the axes of said lower quetsch rolls while maintaining the axes of said upper quetsch rolls at substantially equal spacing from one another, and means connected to said upper quetsch rolls for moving said upper quetsch rolls up and down relative to the axes of said lower quetsch rolls.

2. A size box comprising means forming a container for a liquid sizing material, an immersion roll extending across said container means below the liquid level therein, a pair of lower quetsch rolls having substantially parallel axial shafts, said shafts of said lower quetsch rolls being spaced apart from one another above the level of said liquid, a pair of upper quetsch rolls having substantially parallel axial shafts and arranged to contact said lower quetsch rolls, a pair of slidable frame members having bearings for the support of said shafts of said upper quetsch rolls journaled therein; said bearings being arranged to support said shafts of said quetsch rolls at a distance from each other substantially equal to the distance between said shafts of said lower quetsch rolls, said frame members being movable across said container means in the direction substantially perpendicular to the axes of said lower quetsch rolls, crank means for the movement of said frame members, and means connected to said upper quetsch rolls for moving said upper quetsch rolls up and down relative to the axes of said lower quetsch rolls.

3. A size box comprising means forming a container for a liquid sizing material, an immersion roll extending across said container means below the liquid level therein, a pair of lower quetsch rolls having substantially parallel axial shafts, said shafts of said lower quetsch rolls being spaced apart from one another above the level of said liquid, a pair of upper quetsch rolls arranged to contact said lower quetsch rolls, said upper quetsch rolls having parallel axial shafts spaced apart from one another at a distance substantially equal to the spacing between said shafts of said lower quetsch rolls, a pair of horizontally slidable frame members having vertically movable bearings for the support of said shafts of said upper quetsch rolls journaled therein, said frame members being movable across said container means in the direction substantially perpendicular to the axes of said lower quetsch rolls, said bearings being arranged to provide an accommodating vertical movement along said frame members proportional to the vertical movement of said shafts of said upper quetsch rolls as said frame members move across said container means, crank means for the movement of said frame members, and pressure producing means for forcing said upper quetsch rolls downwardly against said lower quetsch rolls.

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4. A size box comprising means forming a container for a liquid sizing material, an immersion roll extending across said container means below the liquid level therein, a pair of lower quetsch rolls having substantially parallel axes and spaced apart from one another at a location at least partly above the level of said liquid, a pair of upper quetsch rolls arranged to contact said lower quetsch rolls, said upper quetsch rolls having substantially parallel axial shafts spaced apart from one another at a distance substantially equal to the spacing between said axes of said lower quetsch rolls, said shafts of said upper quetsch rolls being disposed at their distal ends in movable blocks, a pair of horizontally slidable frame members having bearings for the support of said shafts of said upper quetsch rolls, and arranged to be movable across said container in the direction substantially perpendicular to the axes of said lower quetsch rolls, said bearings having a vertical slot greater than the height of said movable blocks, said movable blocks being positioned in said vertical slots and arranged for vertical movement proportional to the vertical movement of said shafts of said upper quetsch rolls as said frame members move across said container means, and pressure producing means connected with said movable blocks for forcing said upper quetsch rolls downwardly against said lower quetsch rolls.

5. A size box comprising means forming a container for a liquid sizing material, an immersion roll extending across said container means below the liquid level therein, a pair of lower quetsch rolls having substantially parallel axes and spaced apart from one another at a location at least partly above the level of said liquid, a pair of upper quetsch rolls arranged to contact said lower quetsch rolls, said upper quetsch rolls having substantially parallel axial shafts spaced apart from one another at a distance substantially equal to the spacing between said axes of said lower quetsch rolls, said shafts of said upper quetsch rolls being disposed at their distal ends in movable blocks, a pair of horizontally slidable frame members having bearings for the support of said shafts of said upper quetsch rolls, and arranged to be movable across said container means in the direction substantially perpendicular to the axes of said lower quetsch rolls, said bearing having a vertical slot greater than the height of said movable blocks, said movable blocks being positioned in said vertical slots and arranged for vertical movement proportioned to the vertical movement of said shafts of said upper quetsch rolls as said frame members move across said container means, pneumatic cylinders connected with said movable blocks and arranged to provide a vertical pressure against said blocks, and drive means for the rotation of said lower quetsch rolls.

6. A size box comprising means forming a container for a liquid sizing material, an immersion roll extending across said container means below the liquid level therein, a pair of lower quetsch rolls having substantially parallel axes and spaced apart from one another at a location at least partly above the level of said liquid, a pair of upper quetsch rolls arranged to contact said lower quetsch rolls, said upper quetsch rolls having substantially parallel axial shafts spaced apart from one another at a distance substantially equal to the spacing between said axes of said lower quetsch rolls, said shafts of said upper quetsch rolls being disposed at their distal ends in movable blocks, a pair of horizontally slidable frame members having vertically movable bearings for the support of said shafts of said upper quetsch rolls, and arranged to be movable across said container means in the direction substantially perpendicular to the axes of said lower quetsch rolls, said bearings having a vertical slot greater than the height of said movable blocks and arranged to move vertically along said frame members, said movable blocks being positioned in said vertical slots and arranged for cooperative vertical movement with said bearings proportional to the vertical movement of said

shafts of said upper quetsch rolls as said frame members move across said container, and pressure producing means connected with said movable blocks for forcing said upper quetsch rolls downwardly against said lower quetsch rolls.

7. A size box comprising means forming a container for a liquid sizing material, an immersion roll extending across said container means below the liquid level therein, a pair of lower quetsch rolls having substantially parallel axes and spaced apart from one another at a location at least partly above the level of said liquid, a pair of upper quetsch rolls arranged to contact said lower quetsch rolls, said upper quetsch rolls having substantially parallel axial shafts spaced apart from one another at a distance substantially equal to the spacing between said axes of said lower quetsch rolls, said shafts of said upper quetsch rolls being disposed at their distal ends in movable blocks, a pair of horizontally slidable frame members having vertically movable bearings for the support of said shafts of said upper quetsch rolls, and arranged to be movable across said container means in the direction substantially perpendicular to the axes of said lower quetsch rolls, said bearings having a vertical slot greater than the height of said movable blocks and arranged to move vertically along said frame members, said movable blocks being positioned in said vertical slots and arranged for cooperative vertical movement with said bearings proportional to the vertical movement of said shafts of said upper quetsch rolls as said frame members move across said container means, pneumatic cylinders connected with said movable blocks and arranged to provide a vertical pressure against said blocks, and drive means connected with said lower quetsch rolls for their rotation.

8. A size box comprising means forming a container for a liquid sizing material, an immersion roll extending across said container means below the liquid level therein, a pair of lower quetsch rolls having substantially parallel axial shafts, said shafts of said lower quetsch rolls being spaced apart from one another above the level of said liquid, a pair of upper quetsch rolls arranged to contact said lower quetsch rolls, said upper quetsch rolls having parallel axial shafts spaced apart from one another at a distance substantially equal to the spacing between said shafts of said lower quetsch rolls, said shafts of said upper quetsch rolls being disposed at their distal ends in movable blocks, a pair of horizontally slidable frame members having vertically movable bearings for the support of said shafts of said upper quetsch rolls and arranged to be movable across said container means in the direction substantially perpendicular to the axes of said lower quetsch rolls, said bearings having a vertical slot greater than the height of said movable blocks, and arranged to move vertically along said frame members, said movable blocks being positioned in said vertical slots and arranged for cooperative vertical movement with said bearings proportional to the vertical movement of said shafts of said upper quetsch rolls as said frame members move across said container means, pneu-

matic cylinders connected with said movable blocks and arranged to provide a vertical pressure against said blocks, and drive means connected with said lower quetsch rolls for their rotation at different speeds.

9. A size box comprising means forming a container for a liquid sizing material, an immersion roll extending across said container means below the liquid level therein, a pair of lower quetsch rolls having substantially parallel axial shafts, said shafts of said lower quetsch rolls being spaced apart from one another above the level of said liquid, a pair of upper quetsch rolls arranged to contact said lower quetsch rolls, said upper quetsch rolls having parallel axial shafts spaced apart from one another at a distance substantially equal to the spacing between said lower quetsch rolls, said shafts of said upper quetsch rolls being disposed at their distal ends in movable blocks, a pair of horizontally slidable frame members having vertically movable bearings for the support of said shafts of said upper quetsch rolls and arranged to be movable across said container means in the direction substantially perpendicular to the axes of said lower quetsch rolls, said bearings having a vertical slot greater than the height of said movable blocks and arranged to move vertically along said frame members, said movable blocks being positioned in said vertical slots and arranged for cooperative vertical movement with said bearings proportional to the vertical movement of said shafts of said upper quetsch rolls as said frame members move across said container means, a guide stop arranged to limit the upward movement of said bearings, crank means for the movement of said frame members, pressure producing means for forcing said upper quetsch rolls downwardly against said lower quetsch rolls, and drive means connected with said lower quetsch rolls for their rotation.

10. A size box comprising means forming a container for a liquid sizing material, an immersion roll in said container below the liquid level therein, a pair of lower quetsch rolls having substantially parallel axes and spaced apart from one another at a location at least partly above the level of said liquid, a pair of upper quetsch rolls arranged to contact said lower quetsch rolls, said upper quetsch rolls having axes which are spaced apart from one another at a distance substantially equal to the spacing between said lower quetsch rolls, and means for moving said upper quetsch rolls as a unit in a direction substantially perpendicular to the axes of said lower quetsch rolls while maintaining the axes of said upper quetsch rolls at substantially equal spacing from one another.

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