

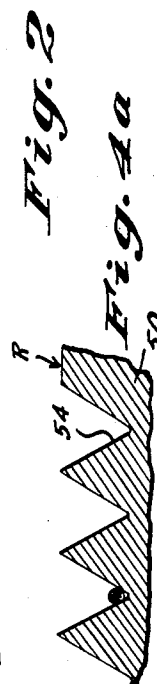
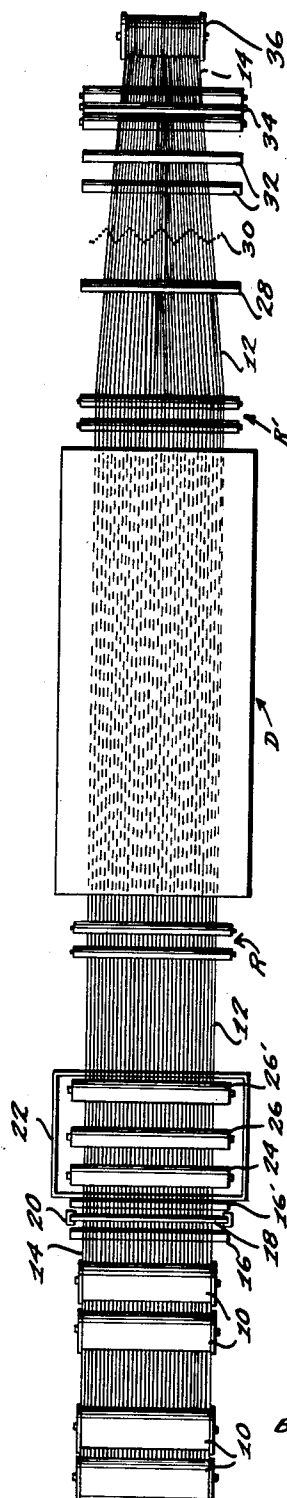
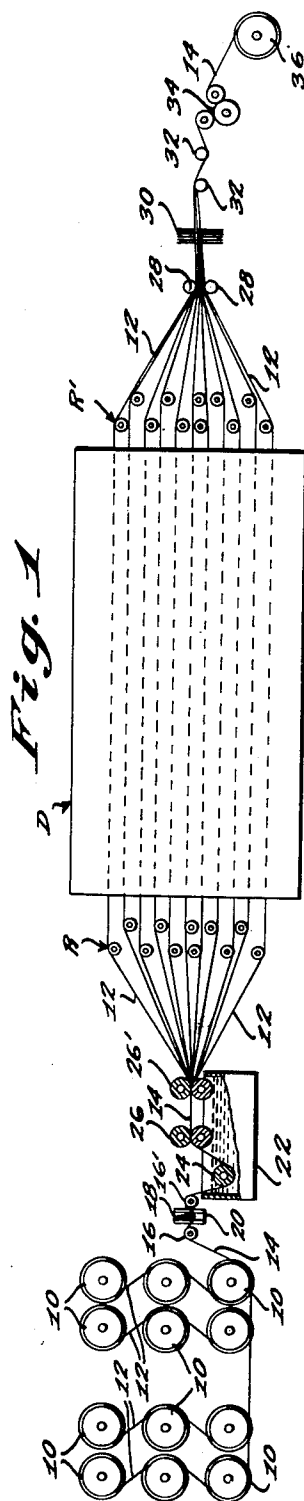
April 20, 1954

C. L. STILL
METHOD OF PREPARING WARP YARNS

2,675,601

Original Filed Jan. 29, 1949

5 Sheets-Sheet 1



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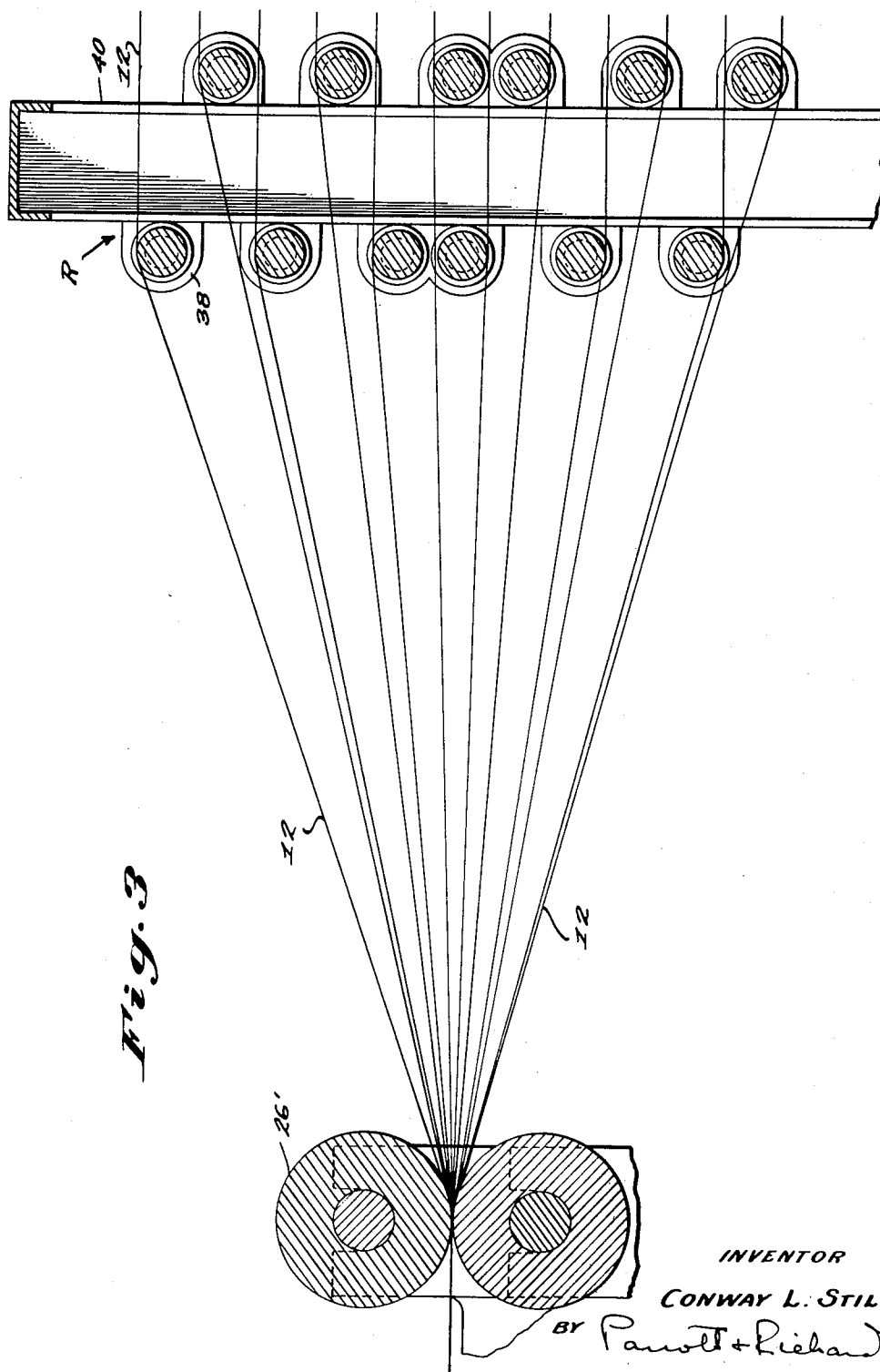
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5 Sheets-Sheet 3

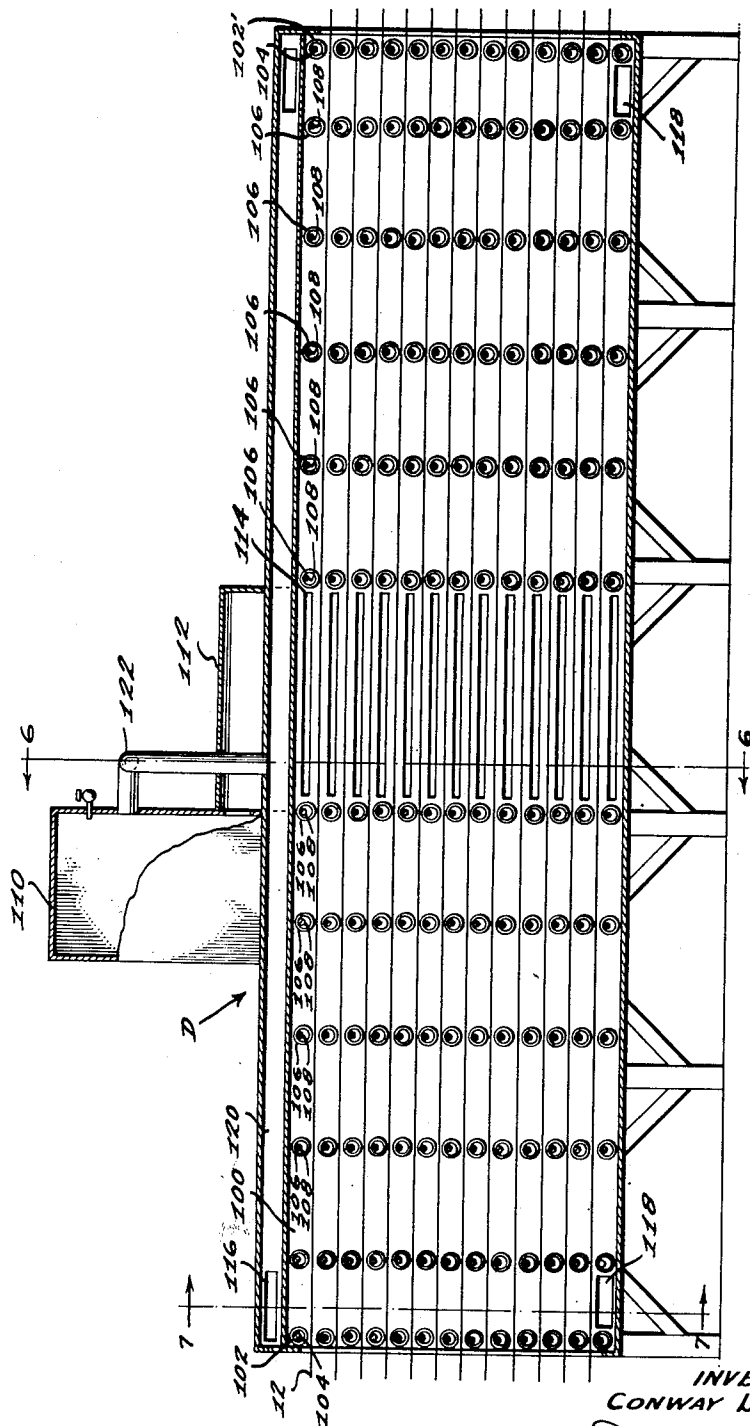


Fig. 5

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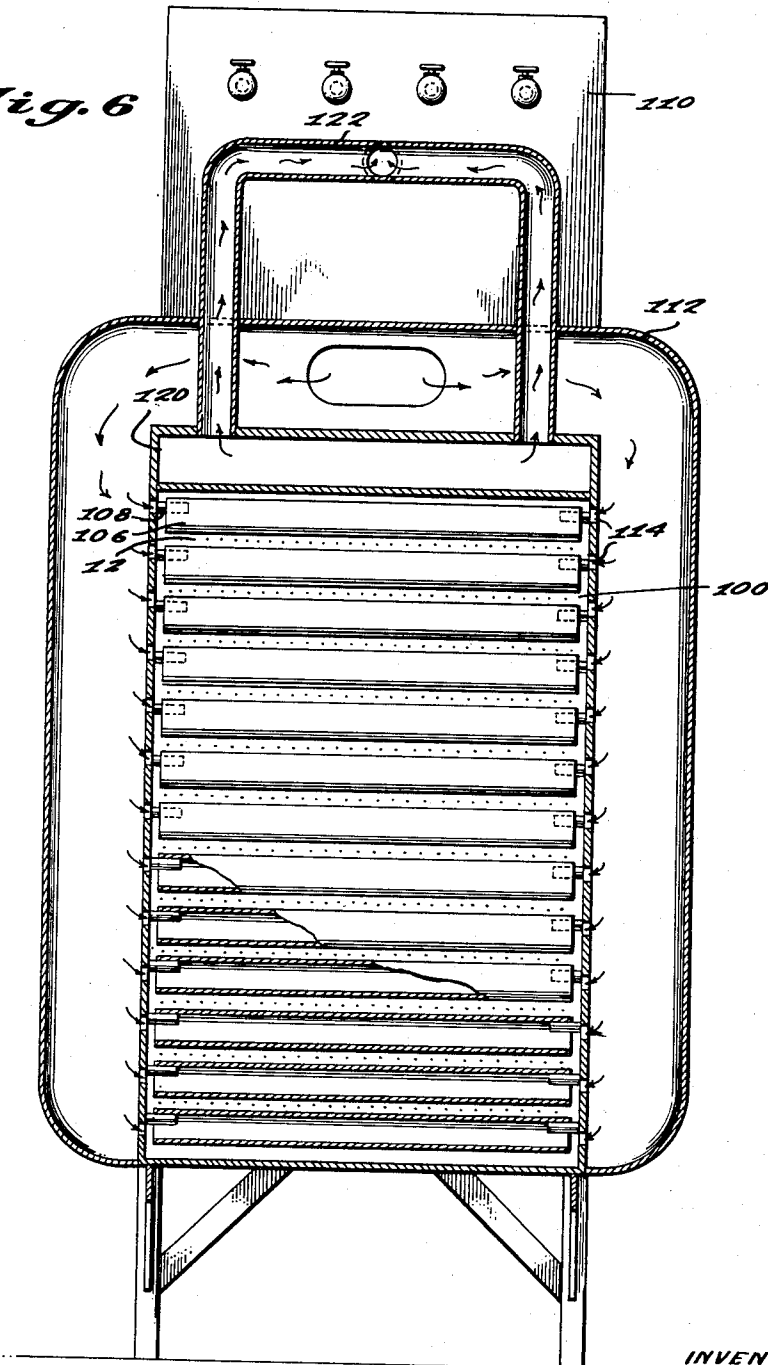
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METHOD OF PREPARING WARP YARNS

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5 Sheets-Sheet 4

Fig. 6



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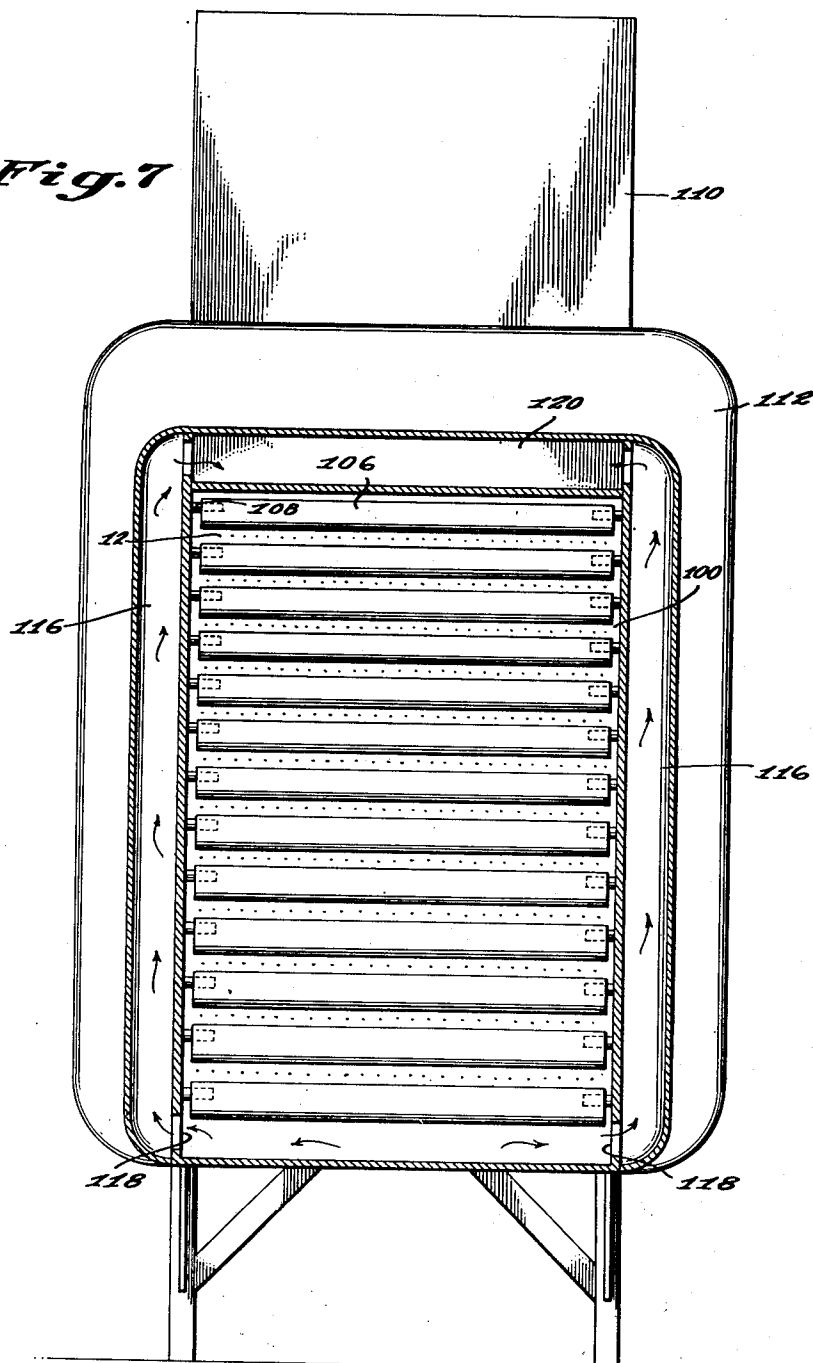
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5 Sheets-Sheet 5

Fig. 7



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UNITED STATES PATENT OFFICE

2,675,601

METHOD OF PREPARING WARP YARNS

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Original application January 29, 1949, Serial No. 73,530, now Patent No. 2,565,407, dated August 21, 1951. Divided and this application May 17, 1951, Serial No. 229,921

2 Claims. (Cl. 28—72.6)

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This invention relates to a slasher of the type adapted for sizing yarn strands to condition them for use as warp ends in a weaving operation, and more particularly to an improved arrangement for a slasher by which the yarn strands are maintained in separate spaced relation after sizing for drying and are thereby conditioned for winding directly on a warp beam without any necessity for tearing them apart with lease rods or the like. This is a division of my co-pending application Serial No. 73,530, filed January 29, 1949, and allowed January 29, 1951 and issued into Patent No. 2,565,407 on August 21, 1951.

Heretofore, in sizing yarn strands in a slasher, it has been customary to feed the yarn strands in sheets from a plurality of section beams and pass them as a composite sheet through a size box where the size is applied to the yarn and from which the composite sheet is withdrawn through squeeze rolls. After leaving the size box, this composite sheet of yarn strands is carried, according to conventional methods, around one or more drying cans by which the moisture is evaporated from the yarn. A characteristic effect of the use of drying cans in this manner is that adjacent yarn strands adhere upon drying so that it is necessary to pull or tear them apart with lease rods or the like at the front of the slasher before winding them on a warp beam.

A necessary result of this tearing separation of the yarn strands is disturbance of the yarn structure so that component fibers are caused to stand out on the yarn strands at the point at which they have been pulled apart, and are accordingly disposed so that they are easily rubbed off and lost from the cloth during subsequent weaving operations. It is known, for example, that the sweepings from a weave room amount to about 1%, more or less, of the production of the ordinary textile mill, and that a sizeable portion of these sweepings result from the above noted disturbance of the yarn structure during sizing. It will accordingly be seen that by improving the sizing operation to increase the proportion of these sweepings retained in the cloth, a substantial advantage can be obtained. Also, weaving operations are particularly sensitive to the condition of the warp yarn as it comes from the slasher, and any improved conditioning of the yarn in the slasher results in substantially improved operations in the weave room.

According to the present invention, a slasher arrangement is provided by which the individual

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yarn strands are maintained in separate spaced relation after they are wet with size solution, so that they cannot adhere to each other upon drying, and when dry can be taken directly on to a warp beam without requiring any separation. As a result, the disturbance of the yarn structure characteristic of conventional sizing operations heretofore in use is entirely eliminated, and the sized yarn strands are delivered in excellent condition for weaving.

Briefly described, the improved slasher arrangement of the present invention comprises a plurality of grooved rolls disposed in relation to the nip of the squeeze rolls at the size bath for training the sized yarn strands with each strand of the composite sheet withdrawn from the size bath separated at the nip of the squeeze rolls and maintained in separate spaced relation for drying. Usually it will be advantageous to provide one grooved roll for each section beam used, and a second set of grooved rolls may also be provided for maintaining the separate disposition of the yarn strands positively over a span of sufficient length to carry the strands through a dryer. In this way, the yarn strands may be carried in tiered sheets through a dryer for efficient and rapid drying.

The present invention contemplates particularly the above described arrangement of grooved rolls disposed in relation to the nip of the squeeze rolls; and also the arrangement of such grooved rolls additionally in spaced relation beyond a dryer if desired, as well as a novel form of dryer for use in a slasher system of this sort, together with the method of operating a slasher system arranged in the manner noted above.

These and other features of the present invention are described further below in connection with the accompanying drawing in which:

Fig. 1 is a schematic elevation of a slasher system arranged according to the present invention;

Fig. 2 is a schematic plan view corresponding generally to Fig. 1;

Fig. 3 is an enlarged detail illustrating the arrangement of the grooved rolls in relation to the squeeze rolls;

Fig. 4 is a further detail showing the form of the individual grooved rolls used;

Fig. 4a is a fragmentary sectional detail taken substantially on the line 4a—4a in Fig. 4;

Fig. 5 is a sectional detail of the form of dryer used according to the present invention;

Fig. 6 is a sectional detail on the line 6—6 in Fig. 5; and

Fig. 7 is a sectional detail on the line 7--7 in Fig. 5.

Referring now to the drawings in detail, the arrangement of a slasher system according to the present invention is illustrated schematically in Figs. 1 and 2, and as shown comprises a plurality of section beams 10 arranged in any usual manner to allow the yarn strands which they carry to be withdrawn as sheets (i. e., weftless sheets), as indicated at 12, and aggregated as a composite sheet 14 for sizing.

The composite sheet 14 obtained in this manner is lead over spaced rolls 16, between which a floating tension bar 18 is arranged in guide-ways 20 to tension the sheet 14 and maintain it relatively smooth and evenly distributed over the rolls 16, for passage through a size box 22 containing a suitable sizing solution which will usually consist of a starch composition. Passage of the composite sheet 14 through the sizing bath is effected by taking it under an immersion roll 24, and the sheet 14 is then withdrawn from the sizing bath through one or more pairs of squeeze rolls 26, adapted to return to the sizing bath any excess sizing carried by the yarn strands forming the sheet 14.

As previously mentioned, it has heretofore been customary to lead the composite sheet 14 over drying cans to dry it completely before separating the individual yarn strands prior to final winding on a warp beam. According to the present invention, this treatment is entirely avoided, and the individual yarn strands are instead separated while still wet at the nip of the last pair of squeeze rolls 26' and maintained in this separate spaced relation until completely dry, so that they cannot adhere to each other, and consequently can be wound directly on a warp beam without the necessity for any final separation.

For this purpose, a plurality of circumferentially grooved rolls R are disposed for training each sized yarn of the composite sheet 14 directly and separately from the nip of the last pair of squeeze rolls 26'. The number of grooved rolls used may be selected as desired or necessary under particular circumstances, explained more in detail below in connection with the further description of the form and arrangement of the grooved rolls R, but in the usual case it will be found most convenient to provide the grooved rolls R in a number corresponding to the number of section beams 10 from which the yarn strands are withdrawn in sheets 12 to form the composite sheet 14, so as to facilitate separation of the composite sheet 14 after sizing by allowing it to be divided again into the component sheets 12, each of which may be lead over a grooved roll R.

From the grooved rolls R the component sheets 12 are trained through a dryer D in spaced horizontal flights, with each yarn strand of each sheet 12 in separate spaced relation, as indicated generally in Figs. 1 and 2 of the drawing and described in further detail below, to a second stand of grooved rolls R' from which the component sheets 12 may then be condensed by leading them through spaced guide rolls 28 for passage through the usual comb 30, tensioning rolls 32, and a group of winding rolls 34 for delivery onto a warp beam 36. Usually the warp beam 36 will not be as wide as the section beams 10, so that the yarn strands forming the component sheets 12 must be condensed laterally for winding onto the warp beam 36, as illustrated

best in Fig. 2. When the width of the warp beam 36 is appreciably less than that of the section beams 10, this lateral condensation of the yarn threads may extend back for a substantial distance into the dryer D and may in fact bring the yarn strands into contact before they are completely dried despite the separation effected by the grooved rolls R. To avoid this condition, the second stand of rolls R' beyond the dryer D may be provided in a form substantially identical with the first stand of circumferentially grooved rolls R, so that the separation of the individual yarn strands will be positively maintained through the dryer D, and lateral condensing of the yarn strands for winding on the warp beam 36 will be allowed only beyond the second strand of the rolls R'.

The arrangement of the circumferentially grooved rolls R for training the component sized yarn sheets 12 from the nip of the last pair of squeeze rolls 26' is illustrated further in Fig. 3 of the drawing, in which the grooved rolls R are shown carried in suitable pillow blocks 38 mounted on a support column 40. As illustrated, the spacing of the grooved rolls R on the support column 40 is preferably varied to provide for evenly spaced flights of the component sheets 12 through the dryer D. Also, the grooved rolls R are most advantageously spaced in equal numbers above and below the level of the nip of the squeeze rolls 26' so that the least possible circumferential contact of the yarn strands with the squeeze rolls 26' is obtained. By arranging the grooved rolls R in this manner, and by mounting them alternately on either side of the support column 40, as illustrated in Fig. 3, a spacing for the horizontal flights of the component sheets 12 of 2", with grooved rolls R having a diameter of 1½", can be conveniently obtained which provides an advantageous and efficient disposition of the component sheets 12 for training through the dryer D. The grooved rolls R may be driven by any suitable connection with the main drive (not shown) for the slasher system to rotate at operating speed, in either direction desired; and are preferably also provided with an auxiliary slow speed drive (not shown) arranged to maintain rotation of the rolls R at a slow rate, and thereby prevent fouling of the yarn strands on the rolls R, whenever operation of the slasher system is interrupted for any reason.

The particular form and arrangement of the circumferentially grooved rolls R is shown in Fig. 4 of the drawing in which the rolls R are illustrated as comprising a main roll body 50 formed with journal portions 52, adapted to be carried in the previously mentioned pillow blocks 38. The main roll body 50 is further formed throughout substantially its entire length with regularly spaced circumferential grooves 54. These circumferential grooves should be formed in a depth of about 3 to 4 times the diameter of the largest yarn strand they will be expected to handle (compare Fig. 4a), with the bottom of the grooves rounded to a smooth radius corresponding approximately to the diameter of the yarn strands to be handled, and the top edges sharpened acutely to the greatest practical extent.

The grooved rolls R should further be formed of some corrosive resistant material such as stainless steel, or with a comparable protective coating such as chromium, and be ground or polished to a high finish. This latter factor is

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important to avoid fouling of the yarn strands on the rolls R through the building up of deposits of size material adjacent the outer edges of the grooves 54. If the rolls R are provided with a high finish as noted above, they tend to clear themselves of any excess size material by throwing this material off centrifugally during operation. In certain instances where a particular sizing composition may be found to build up in the grooves 54 of the rolls R despite a high finish on the rolls, felt wipers or the like (not shown) may be mounted on the column support 40 in the nature of doctor blades for clearing the rolls R.

The extent of the circumferential grooves 54 on the main roll body 50 of the grooved rolls R should be arranged to correspond generally in width with the width of the section beams from which the component yarn strand sheets 12 are withdrawn, and the grooves 54 should be arranged with a spacing so that they exceed in number by at least about 25% the number of yarn strands withdrawn from each of the section beams 10 in a comparable spacing. For example, section beams are commonly wound to contain from about 300 to 400 yarn strands, so that when these yarns strands are withdrawn in a component sheet 12 they will be spaced at least $\frac{1}{8}$ of an inch apart, and the circumferential grooves 54 in the rolls R should accordingly be arranged with a spacing of about 10 to the inch.

The reason for this spacing arrangement is to allow the component sheets 12 to be easily trained over the grooved rolls R when the slasher system is threaded up for operation. With an excess of circumferential grooves 54 in proportion to the yarn strands forming the component sheets 12 as indicated above, the component sheets 12 can be easily disposed on the grooved rolls R after threading them through the slasher system by manually manipulating a smooth lease rod, or the like, so as to elevate a component sheet 12 clear of the grooved roll R which is to carry it, and then after smoothing the sheet 12 over the lease rod with a fairly even distribution, releasing it onto the grooved roll R again. When this is done, the sharp top edges of the grooves 54 in the roll R tend to separate the yarn strands forming the component sheet 12 so that each yarn strand finds a separate groove 54. In some instances, more than one yarn strand may collect in a single groove 54, but because of the excess number of grooves 54 in proportion to yarn strands forming the component sheet 12, when this happens there will necessarily be an empty groove 54 closely adjacent, and it is accordingly only necessary to manipulate several strands at the most to space each yarn strand in a separate groove 54. When this condition is obtained the individual separation of the yarn strands will extend directly from the nip of the squeeze rolls 26' where separation of the yarn strands while they are still wet is easily effected without disturbing the yarn structure.

The form of dryer D used according to the present invention for accommodating the component sheets 12 as they are trained in spaced horizontal flights between the first stand of grooved rolls R following the last pair of squeeze rolls 26', and the second stand of rolls R' beyond the dryer D, is illustrated in Figs. 5, 6 and 7 of the drawing. An essential feature of this dryer D is an arrangement for drying effectively the

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yarn strands forming the component sheets 12 without disturbing the horizontal flight and individual spacing of these component sheets 12 or the yarn strands of which they are formed.

For this purpose, the dryer D is arranged with a tunnel chamber 100 through which the component sheets 12 are passed for drying. An entrance for the component sheets 12 to the tunnel chamber 100 is provided by a plurality of tubular members 102 supported horizontally in closely spaced relation across the entrance end of the tunnel chamber 100 of pins 104 of relatively small diameter carried in the side walls of the tunnel chamber 100. This arrangement disposes the tubular members 102 so that they normally present relatively narrow slits to allow passage of the component sheets 12 into the tunnel chamber 100, while at the same time closing the entrance end of the drying chamber against undue heat loss; and also allows the tubular members 102 to be shifted or displaced easily on the pins 104 so that the spacing between any two of them can be increased sufficiently to provide clearance as needed in threading the component sheets through the dryer D. A similar arrangement of tubular members 102' arranged on pins 104' is arranged at the exit end of the tunnel chamber 100. Also substantially similar arrangements of tubular members 106 on pins 108 are arranged at spaced intervals in the tunnel chamber 100 to provide transverse partitions which are adapted to direct the drying atmosphere as it circulates in the tunnel chamber successively, and at an increased velocity, in close contact with each individual yarn strand forming the component sheets 12.

The drying atmosphere may consist of any suitable or usual medium for this purpose, such as steam or hot air, although in operating a slasher system arranged in accordance with the present invention, it has been found that air heated and circulated from a gas-fired furnace can be used most effectively. Such a furnace, which may be of any conventional type, is indicated generally in Fig. 5 of the drawing by the reference numeral 110, arranged to deliver heated air into a manifold 112. This manifold 112 is disposed to direct the heated air into the tunnel chamber 100 substantially midway of its length through a plurality of slots 114 arranged in the side walls of the tunnel chamber 100, and spaced so that they are interposed vertically between the horizontal flights of the component sheets 12 for distribution of the drying medium uniformly among the sheets 12 being dried.

From this point, circulation of the drying medium proceeds towards each end of the tunnel chamber 100 through the transverse partitions formed by the horizontal tubular members 106 and is recovered by return manifolds 116 arranged adjacent each end of the tunnel chamber 100 and leading from recovery opening 118 at the bottom of the chamber 100 to a return duct 120 which may suitably be arranged over the tunnel chamber 100 for returning the air or other drying medium to the furnace for reheating through lines 122 as indicated in Figs. 5 and 6.

A slasher system arranged according to the present invention as just described above is readily adapted for use in conventional textile manufacturing operations, and requires no modification whatever in the standard procedures employed in preceding or succeeding operations. Also, in addition to the substantial improvement in the condition of the sized yarn obtained with

a slasher system of this sort, it should be noted that the operating speed is not limited by the necessity for maintaining a speed slow enough to avoid breaking of the yarn strands during the tearing separation before winding which has been characteristic of prior methods, so that greatly increased production can be obtained with the slasher system of the present invention.

I claim:

1. A method of sizing warp yarns to adapt them for weaving comprising training the yarns in a composite, weftless, sheet form through a bath of sizing composition, passing the sheet of wet sized yarns between squeezing elements to remove the excess sizing composition from the yarns, immediately separating the composite sheet into a plurality of sheets, training each of the sheets of wet, squeezed yarns over separating members so as to separate the yarns of each sheet into individual yarns, subjecting the plurality of sheets of individually separated yarns to heating to effect drying while maintaining the yarns in individual separated positions to prevent adhering to each other, recombining the plurality of sheets of dried yarns to form a composite sheet, and winding up the composite sheet of sized dried yarns.

2. A method of sizing warp yarns to adapt them for weaving comprising training the yarns in a composite, weftless, sheet form through a bath of sizing composition, passing the sheet of wet sized yarns between squeezing elements to remove the excess sizing composition from the yarns, immediately separating the composite sheet into a plurality of sheets, training each of the sheets of wet, squeezed yarns over separating members so as to separate the yarns of each sheet into individual yarns, passing the plurality of sheets of individually separated yarns through an enclosure, circulating hot air through the enclosure to effect drying while maintaining the yarns in individual, separated positions to prevent adhering to each other, recombining the plurality of sheets of dried yarns to form a composite sheet, and winding up the composite sheet of sized dried yarns.

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