March 23, 1937. I. L. GRIFFIN 2,074,745

METHOD AND MEANS FOR TREATING YARN

Filed Aug. 24, 1936 4 Sheets-Sheet 1

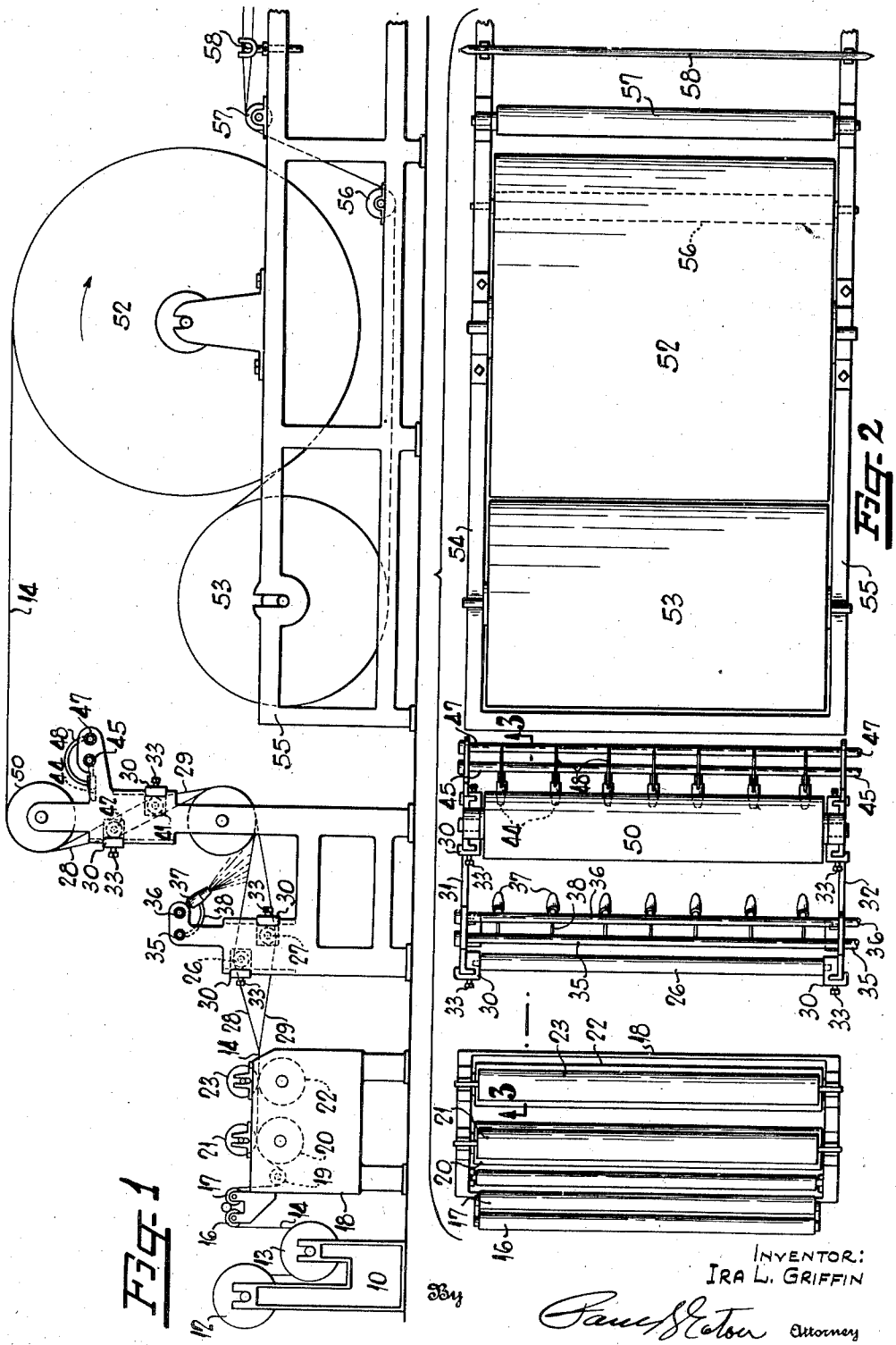


FIG. 1

FIG. 2

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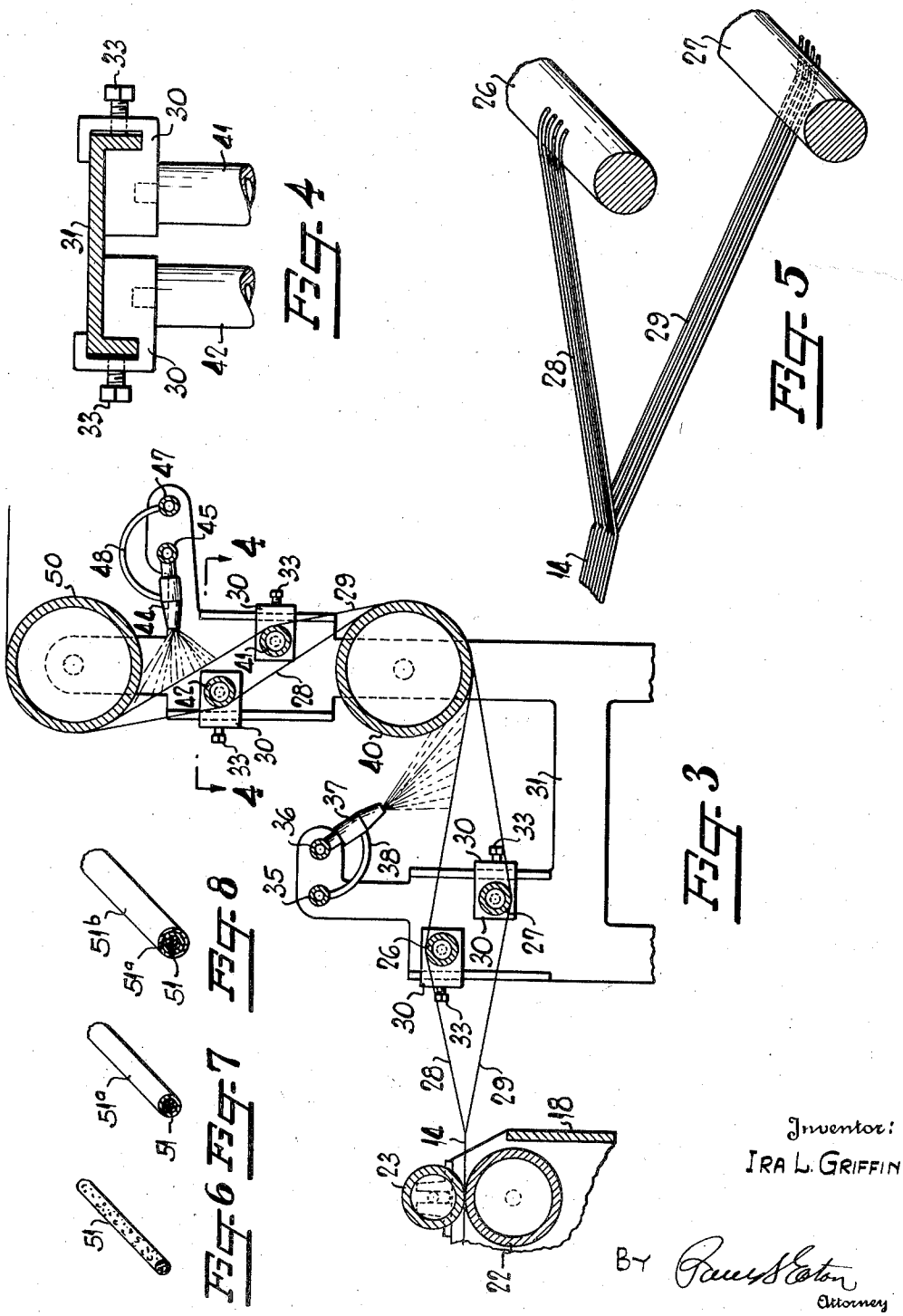


Fig. 3

Fig. 4

Fig. 5

Fig. 6 Fig. 7 Fig. 8

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METHOD AND MEANS FOR TREATING YARN

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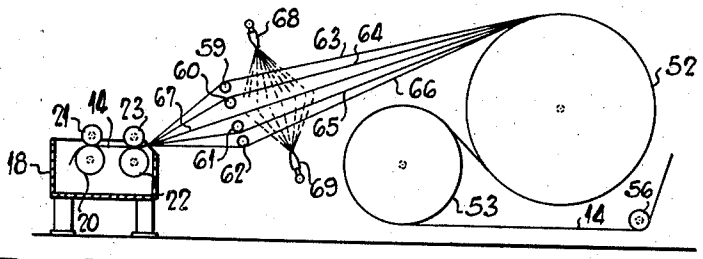


Fig. 9

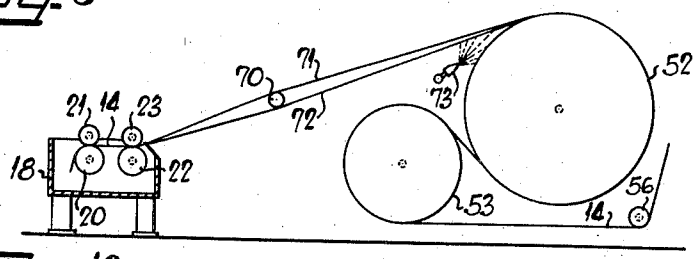


Fig. 10

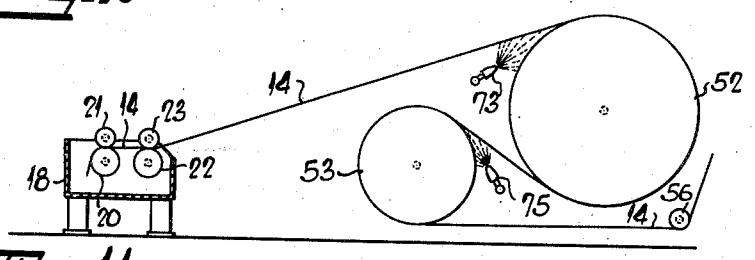


Fig. 11

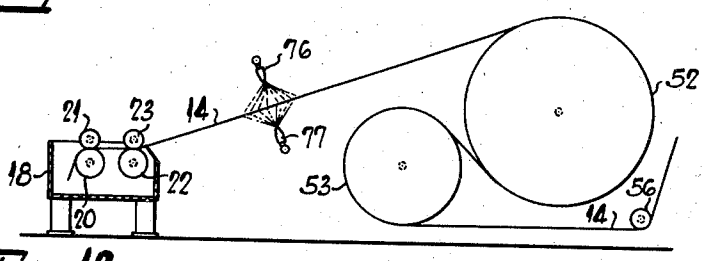


Fig. 12

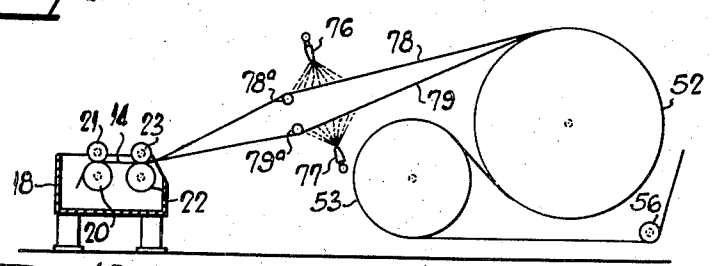


Fig. 13

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METHOD AND MEANS FOR TREATING YARN

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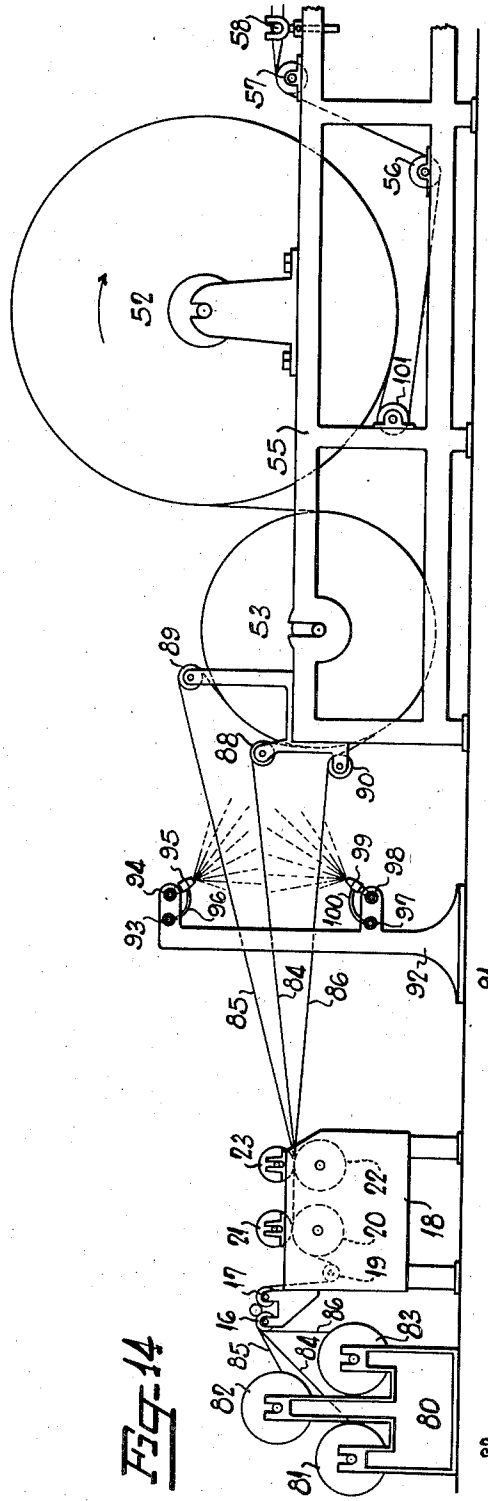


Fig-14

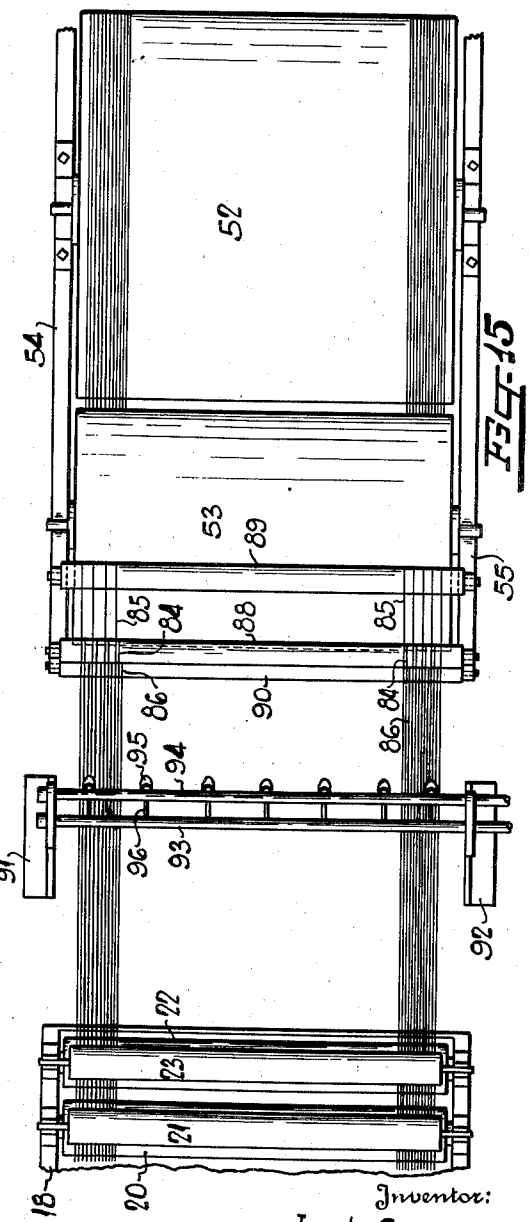


Fig-15

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UNITED STATES PATENT OFFICE

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METHOD AND MEANS FOR TREATING YARN

Ira L. Griffin, Charlotte, N. C.

Application August 24, 1936, Serial No. 97,661

20 Claims. (Cl. 28—28)

This invention relates to the method and process of applying to one or more sheets of sized warp, yarn, oils, fats or other suitable lubricating materials between the size box and the drying equipment, or as an alternate method and process to apply said lubricating materials on the drying equipment during the drying operation and before the sheet or sheets reaches the final drying point on the equipment in preparation for the weaving operation.

Conventional methods and processes now in practice comprise the sizing of a warp on several different types of slashers. Contributing to the warp is a warp beam and generally in practice more than one beam, ranging from one to ten and sometimes even more. The number of ends to the beam and the number of beams governing directly the total number of ends comprising the warp itself. The warp thus comprised is introduced into the size box so as to adequately contact a suitable sizing mixture and is thereafter dressed between suitable rolls prior to the drying operation.

The drying operation in most cases consists of a direct transfer of the sized warp yarn to drying cylinders commonly known as "cans". Other drying measures such as hot air chambers, directing hot air fans on the sized warp, have been and are yet existing in practice.

From the drying equipment the warp progresses in a relatively dry condition in sheet form and the composite sized threads are separated each to each by lease rods affixed to the frame of the slasher. After separation they are then brought to a parallel state each to each and wound tightly in sheet form on the loom beam. This concludes in a general way the present mechanical side of the slashing operation.

A warp sizing mixture is generally composed of starch, starch derivatives such as thin-boiling starches, dextrines and in some cases natural gums and glues are used. These materials are used for the purpose of binding together the fibers comprising the thread and to provide a surface coating necessary to withstand the tension and friction of the yarn during the weaving operation. In addition to the materials mentioned above, various oils, fats, waxes and hygroscopic agents, such as glycerine are used. Oftentimes these materials are combined in various proportions and are known as "compounds".

The object of the use of these fatty materials, oils, waxes and hygroscopic agents is to impart to the starch film a degree of smoothness and flexibility and principally to lessen the adhesiveness of one thread to another so that after the drying operation, they may be separated with the least amount of tearing action and rupture of the size film.

In addition to these reasons, for the use of such fatty materials or compounds, they are considered necessary to prevent the warp sheet from adhering to the drying cylinders in the subsequent drying operation. These fatty materials and compounds are supposed to provide surface lubrication thereby permitting the warp yarn to pass through the loom reed, the harness, and by one another in the shed. Smoothness or lubrication is necessary to permit one thread to pass another during the warp shed which is effected by the raising and lowering of the loom harness to permit the passing of the shuttle inserting the filling.

The proper lubrication of the size film facilitates the passage of the shuttle through the shed. Starches, and starch derivatives, such as thin boiling starches and dextrines, natural gums and glues impart adhesiveness and stiffness. Softening agents or lubricating agents such as oils, fats and waxes counteract to a certain extent adhesiveness and stiffness.

The incorporation of oil or fats, or the oils, fats and lubricting agents in the sizing mixture, has a tendency to give a broken film and lessen the adhesive qualities of such material in respect to binding the fibers together and producing a continuous surface coating.

Most starches, gums or glues produce a colloidal suspension and, while these colloidal particles are capable of uniting each to each on drying and forming a continuous film, the presence of fatty materials has a tendency to insulate, disperse and prevent the formation of a continuous film of size.

The ideal method would be to size the warp with a solution or mixture of adhesive material and water. The elimination of such fatty materials in the mixture provides the maximum degree of adhesion added tensile strength and continuous size film. The purpose is to accomplish this result by either eliminating entirely all fats, lubricating materials and non-adhesive materials in the size mixture, and apply the necessary lubrication to the surface of the size film after it is applied to the yarn and prior to the drying operation or intermediate in the drying operation. This method of surface lubrication of the size film will to a greater degree prevent adhesion to the drying cans or other contacting surfaces such as guide rolls or separating con-

trivances. This surface application may be accomplished by spraying or other means directly to the wet size warp yarn as it travels from the final contact of the dressing rolls in the size box to the drying cylinders. This lubrication may also be applied intermediately in the drying operation. In other words, a portion of the lubricant may be applied before the yarn contacts any of the drying equipment and additional lubrication may be applied at intermediate stages of drying. In some special cases the lubricant may be applied to the yarn and to the surface of the drying cylinders. This lubrication applied to the surface of the drying cylinder is in turn transferred to the sized warp yarn at the points of contact of the two.

A warp sheet of yarn being sized comprises a plurality of yarn ends ranging from a few hundred to several thousand depending upon the density of the fabric to be woven. This sheet of yarn is prepared usually on warp beams which are placed in what is known as a creel. The ends from a single beam are drawn through the sizing box. In the case of more than one beam, the ends from the several beams, each comprising a sheet of yarn, are drawn through the sizing box together and so united pass onto the drying operation.

When dried in combined sheets, the ends must be torn apart and separated one from another by means of lease rods arranged in the frame following the drying operation. When this operation of separating the various ends is effected, the size film which has been placed upon the yarn is ruptured and torn off the yarn in places thereby weakening the strength and protecting properties of the size film. This causes what is known as shedding at the slasher and in the loom.

The procedure for dividing the composite sheet into sheets or layers of a lesser number of sized warp ends is to begin at the creel prior to the passage of the yarn through the size box and in contact with the size. This may be done by placing a lease string between the sheets of yarn from the several respective beams and maintaining an identity through the size box and then contact the divided sheets or layers of yarn on the drying cylinders at different points. This number of divided sheets may be the same as the number of beam sheets originally comprising the composite warp or they may be combined in groups of two or more.

As an example, if we have six beams in the creel composed of 500 ends each there would be a total of 3,000 ends comprising the composite warp. A three way division may be made maintaining three sheets of 1,000 ends each and contacting the drying cylinder at three different points with intervals of 18 inches or 2 feet apart. This I propose to do by the attachment of guide rolls properly spaced in an arc parallel to the curvature of the cylinder. This procedure of division and identification of sheets commences at the point of the last contact of the yarn to the final dressing rolls of the size box.

This arrangement minimizes the disturbance of the size film applied to the yarn at the size box, and places in contact with the cylinder a minimum number of warp ends at one time and permits partial drying of the divided sheets before again forming a composite sheet.

This method of division permits the most advantageous application of the lubricating agent to the surface of the wet size film.

It is, therefore, an object of this invention to provide means disposed between the size box which is the point of application of the size and the drying operation for dividing the composite sized warp sheet into a plurality of layers or sheets. This separating before drying minimizes the binding together of one end to another and preserves the continuity of the size film. Likewise, the division manner which I propose permits the most complete surface coverage with the lubricating agent.

It is another object of this invention to provide in a slasher, means disposed between the size box and the drying cans for separating the ends of the yarn and providing means for applying a lubricant to said yarn while the ends are separated. By applying the lubricant to the wet yarn while the ends are separated, the various ends do not become united in a solid form when the same are dried, consequently a uniform coating of sizing is provided over the entire periphery of each end of yarn so that the coat of sizing will not be cracked or torn off and the lubricant will not be allowed to gain access to the interior thereof. In this manner, the strength of the yarn is preserved, and at the same time, the necessary lubricant to insure easier processing of the yarn is provided on the exterior surface thereof.

It is still another object of the invention to provide in a slasher means for sizing a sheet or sheets of yarn, then applying a lubricant to the yarn, then partially drying the yarn and then applying more lubricant to the yarn and then completing the drying operation, said sheets being, if desired, separated into a plurality of layers while the lubricant is being applied thereto.

It is a further object of this invention to provide a sizing apparatus with means for simultaneously passing a plurality of warp yarn through said sizing apparatus, means for applying a spray of lubricant onto said sheets after passing through said sizing apparatus and means for passing the various sheets successively over the same drying means to dry the sizing and the lubricant which has been sprayed on the yarn.

It is still a further object of the invention to size a sheet of yarn composed of a plurality of strands and dividing the sheet into several layers by contacting it near the drying drum of a slasher with spaced rollers so the yarn will be divided shortly after it leaves the sizing box but will not be contacted until it has traveled an appreciable distance to the rollers dividing the sheet and therefore will have partially dried and therefore the size film will not be disturbed as it would be should it contact lease rods or rollers immediately after leaving the size box, and while the layers are travelling towards the drying drum, I may apply a suitable lubricant to the yarn.

It is yet another object of the invention to size a sheet of yarn and divide the sheet into several layers by contacting it near the drying drum of a slasher at spaced points, so one layer will be partially dried on the cylinder before the next layer is deposited on the cylinder.

It is yet a further object of the invention to provide means for lubricating yarn while being passed through a slasher in which several creels are formed into one sheet and passed through the size box and then the layers of yarn are divided into the same number of layers as introduced into the size box or a different number of layers, and these layers are then led to the drying cylinder of the slasher and caused to contact the drying cylinder at spaced points, so

the cylinder will partially dry one layer before the next applied layer comes in contact with the cylinder and the sheet already thereon, said layers having applied thereto while travelling from the size box to the cylinder, a suitable lubricant.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which:

Figure 1 is a side elevation of a sizing apparatus with my invention applied thereto;

Figure 2 is a top plan view of the right-hand portion of Figure 1;

Figure 3 is an enlarged vertical sectional view taken along line 3—3 in Figure 2;

Figure 4 is a sectional, detail, plan view taken along line 4—4 in Figure 3;

Figure 5 is an isometric view showing the manner in which ends of the warp may be separated;

Figure 6 is an isometric view, greatly enlarged, showing a portion of a strand of yarn prior to passing the same through a sizing solution;

Figure 7 is an isometric view, greatly enlarged, of a portion of a strand of yarn after it has passed through the sizing solution;

Figure 8 is an isometric view, greatly enlarged, of this same strand showing a coating of sizing and a coat of oil placed thereon;

Figure 9 is a schematic view showing another form of separating the ends in the warp;

Figure 10 is a schematic diagram showing still another form of separating the warp ends and also showing means for applying oil simultaneously to the warp and to the drying can;

Figure 11 is a schematic view showing means for applying oil to the drying can and also to a single sheet of warp, the ends of which have not been separated;

Figure 12 is a schematic diagram showing an undivided warp sheet with means for applying oil to the upper and lower surfaces thereof;

Figure 13 is a schematic diagram of still another form showing means for separating the warp ends and also means for applying a spray of oil thereto;

Figure 14 is a side elevation of still another modified form showing means for simultaneously passing a plurality of warp sheets through a sizing box and means for oiling these warp ends after they have passed therethrough;

Figure 15 is a top plan view of the central portion of Figure 14.

Referring more particularly to the drawings, the numeral 10 denotes a suitable support which cooperates with a similar support on the other side, not shown, for rotatably supporting the ends of warp beams 12 and 13 around which yarn is wound. When it is desired to treat the yarn with a sizing solution the beams are placed in the supports and the warp 14 is drawn therefrom over rolls 16 and 17, which rolls are rotatably secured to sizing vat 18. The warp is then drawn beneath immersion roll 19 and between squeeze rolls 20 and 21, and also between another pair of dressing rolls 22 and 23, all of said rolls being rotatably mounted in sizing vat 18. The warp is then divided by rollers 26 and 27 into two layers 28 and 29, the layer 28 passing over roller 26 and the layer 29 passing beneath roller 27. Rollers 26 and 27 have their ends rotatably mounted in suitable blocks such as 30, said blocks 30 being adjustably secured to side frames 31 and 32 by any suitable means such as set screws 33, (Figs. 2, 3 and 4). By manipulating the set screws 33, it is quite evident that the blocks or bearings 30 which rotatably support the rollers, may be moved up or down to vary the amount of separation of the warp layers 28 and 29.

Mounted in the upper end of side frames 31 and 32 is a lubricant supply pipe 35 and an air supply pipe 36, said lubricant supply pipe 35 having a plurality of nozzles 37 for spraying lubricant onto the top side of layer 28. Each of the nozzles 37 is supplied with air by providing a flexible tube 38 which communicates with air supply pipe 35 and with nozzle 37. By making this tube 38 flexible, it is possible to vary the angularity or the direction of spray from nozzle 37.

A heated drum 40 is rotatably mounted in side frames 31 and 32 and is heated by any suitable means (not shown). The combined layers 28 and 29 pass over this drum and thence upwardly. The layers 28 and 29 are again separated by suitable rollers 41 and 42, the layer 29 passing to the right of roller 41 and layer 28 passing to the left of roller 42. These rollers are rotatably mounted between side frames 31 and 32 in identically the same manner as the mounting of rollers 26 and 27 which has been previously described. The adjustment of positions to vary the spread of layers 28 and 29 is also identical to the adjustment provided in the preceding rollers 26 and 27.

Nozzles 44 are provided, having their outlet in close proximity to the layer 29 for directing a spray of lubricant to this layer. These nozzles are secured at spaced intervals to the lubricant supply pipe 45 which pipe is mounted between side frames 31 and 32. An air supply pipe 47 is also mounted between these same frames and a flexible tube 48 communicates with pipe 47 and with each of said nozzles 44 to supply the necessary compressed air to atomize the lubricant which is being sprayed upon the yarn. The layers of yarn are then passed over another heated drum 50, which is heated by any suitable means (not shown), said drum being rotatably mounted in the upper end of side frames 31 and 32 and from this point the yarn assumes the form of a single sheet. The layers 28 and 29 are then passed over drying drum 52 and also another drying drum 53, said drums having their ends rotatably mounted in side frames 54 and 55. After passing over drying drums or cans 52 and 53 the yarn is dried and it is then directed beneath roller 56 and upwardly over roller 57, both of said rollers having their ends rotatably mounted in side frames 54 and 55. If desired, suitable lease rods 58 may be provided for properly separating the ends of yarn in the desired manner. However, where the lubricant has been applied in the manner shown, the lease rods do not perform such an important part since the lubricant has been applied to the yarn before the sizing solution has dried; consequently, the ends will not adhere to the adjacent ends during the drying operation. Instead, the sizing will be dried on each individual end with an oil coat on the exterior surface thereof.

If the warp is dried prior to the application of the lubricant to the yarn, it is necessary to separate the various ends by some means such as lease rods 58 before applying oil; consequently, during this separation, the crystallized cover produced by the sizing which has been applied to the yarn, is shattered or broken and when the lubricant is applied thereto it is allowed to impregnate the yarn and materially decrease the

strength thereof. It is therefore, seen wherein the application of the lubricants to a wet sizing has its advantage, since this hardened crystallized covering of each individual end produced by placing the sizing thereon, is maintained so that the lubricant cannot impregnate the strand and gain access to the interior thereof.

Figure 5 is an enlarged detail view showing the warp 14 being separated into the individual layers 28 and 29. It is here seen that each end in layers 28 and 29 has a slight space there-between in order to allow the lubricant to be applied to all portions of the exterior surface thereof prior to the drying of the yarn.

Figure 6 shows a single end of yarn 51 prior to treatment with a sizing solution. Figure 7 shows this same end after a coat of sizing 51*a* has been applied thereto, whereas Figure 8 shows the strand with a coat of sizing 51*a* and a coat of lubricant 51*b* applied on the outside of the sizing.

The separation of this warp into layers so that the lubricant may be properly applied to all portions of the exterior surfaces thereof, may be accomplished in various ways. Figures 9 to 13 show several methods of dividing the warps into individual layers for the application of the lubricant.

In Figure 9 rollers 59, 60, 61 and 62 are shown separating the warp into layers 63, 64, 65, 66 and 67. Nozzles 68 are provided for applying lubricant to the upper surface of the layers, whereas nozzles 69 apply lubricant to the lower surface.

Figure 10 shows another modified form of splitting the warp in which the warp 14 is divided into two layers 71 and 72, by suitable means such as a single rod 70. In this form a plurality of nozzles such as 73 are located in close proximity to the drying can 52 and also to the lower side of the layers. It is evident that lubricant will be simultaneously applied to the surface of the drying can 52 and also to the yarn which will prevent the yarn from sticking to the can while it is being dried.

Figure 11 shows another form in which the warp 14 is not split but oil is applied to the underside thereof and also to can 52 by nozzles such as 73 which has been previously described. A plurality of other nozzles such as 75 are located in the corresponding position relative to drying can 53. In this form the nozzle 73 sprays lubricant on one side of the warp 14 and on can 52, whereas the nozzle 75 sprays lubricant on the opposed side of the warp as well as upon the drying can 53.

Figure 12 shows still another form of applying the lubricant in which the undivided warp 14 has lubricant applied to the upper and lower sides thereof by suitable means such as nozzles 76 and 77, said nozzles being located between the size box and drying can.

Figure 13 shows another modified form in which the nozzles 76 and 77 are located in the same position as in Figure 12 but in this form warp 14 is divided into two layers 78 and 79 by suitable rolls such as 78*a* and 79*a* respectively, so that the spray from nozzles 76 and 77 will apply lubricant to the entire periphery of each end of yarn in the layers.

Figures 14 and 15 show still another modified form of the invention in which lubricant is applied to a plurality of warp sheets intermediate the size box and the drying can. This is broadly defined as multiple sheet sizing. In this form suitable supports such as 80 have rotatably mounted therein warp beams 81, 82 and 83 from which is drawn warps 84, 85 and 86 respectively. The ends on the warps 84, 85 and 86 are spaced apart sufficiently to allow the lubricant to contact all parts of their exteriors after it has been sized. These three warp sheets pass over the rolls 16, 17 and beneath immersion roll 19 and then between squeeze rolls 20, 21, 22 and 23 as in the previous case, but when these various warps pass through the size box they again are separated into separate sheets. From the size box 18 the warps 84, 85 and 86 pass directly onto rolls 88, 89 and 90 respectively, and onto drying can 53.

It is quite an advantage to have the rollers mounted in spaced relation near the drying cylinder 53, for this serves the double purpose of causing the sheet to split into several layers immediately after it comes out of the size box, due to the separation of the rollers 88, 89 and 90 and therefore the warp is not contacted until it has travelled from the dressing rollers to a point ready to be applied to the drying cylinder. This prevents the size film from being disrupted while it is extremely wet and allows it to become partially dried before it is contacted by the rollers forming the warp into layers. This feature also causes one layer to be applied to the drying cylinder 53 and to become further dried before the next succeeding layer is deposited onto the drying cylinder in forming the layers again into one sheet. This prevents the ends from sticking together.

Disposed intermediate the sizing box and the drying can are supports 91 and 92 which have mounted there-between pipes 93 and 94, said pipe 93 supplying compressed air to the nozzles 95 by suitable means such as tubes 96. From nozzles 95 spray is directed downwardly onto the warps therebeneath. Also disposed between supports 91 and 92 are pipes 97 and 98 similar in all respects to pipes 93 and 94. Pipe 98 has a plurality of spaced nozzles 99 connected thereto for spraying lubricant upon the lower side of warps 84, 85 and 86. Air is supplied to the nozzles 99 from the air supply pipe 97 by suitable means such as tubes 100.

Since the warp 85 contacts the can 53 some time before the warp 84 contacts this can, it has an opportunity to be dried a certain amount before warp 84 makes contacts, consequently, warp 84 will not stick to the warp 85. In like manner, warp 86 will not stick or adhere to the warp 84 since the warp 84 contacts the can some time prior to warp 86 and this warp 84 will likewise have an opportunity to partially dry before the warp 86 is deposited on the drying cylinder along with warp 84. All three of warps 84, 85 and 86 pass beneath the can 53 and thence around the drying can 52. A roller 101 is rotatably mounted between the frames 54 and 55 and serves as a guide for the warps after they have passed around the can 52. The warp is then drawn beneath roller 56 as in the previous cases and thence on top of rollers 57. In this form suitable lease rods may be provided but since the sheets have maintained their individuality and the ends have remained separate during the application of the lubricant, the lease rods may be omitted because the various ends have not adhered together due to the lubricant being applied to all surfaces thereof prior to the drying operation.

In the drawings and specification there have been set forth preferred embodiments of the

vention, and although specific terms are employed, they are used in a generic and descriptive sense only, and not for purposes of limitation, the scope of the invention being set forth in the appended claims.

I claim:

1. That method of applying a controlled amount of treating lubricant to a sheet of yarn which comprises passing the sheet of yarn through a sizing box and then applying a controlled amount of the lubricant to the yarn before the yarn is dried.

2. Apparatus for treating warp yarn comprising a sizing machine having a size box and a series of heated drums for drying the warp yarn after it has passed through the size box, means for spraying lubricant on the yarn after it has passed through the size box and before it reaches the heated drums.

3. In combination, a slasher having a sizing box and at least one drying drum and having means for supporting a plurality of warp beams, the warp yarn on which beams is adapted to be passed through the sizing box, means for dividing the warp into a plurality of layers after it has passed through the sizing box and before it reaches the drying drum, and means for applying a lubricant to the layers of warp before the layers reach the drying drum and are again re-united into one layer of warp yarn.

4. In combination, a slasher having a sizing box and a drying drum, means for passing warp yarn from a plurality of packages through the sizing box, means for dividing the warp yarn into a plurality of spaced layers after it has passed through the sizing box, means for applying a lubricant to the yarn while held in a plurality of layers, means for at least partially drying the yarn, means for again projecting a lubricant onto the yarn, and means for then directing the yarn onto the drying cylinder for completing the drying operation.

5. The combination of a slasher having a size box and a drying cylinder, of a plurality of spaced rollers disposed near the periphery of the drying cylinder for forming the sheet of sized warp into a plurality of layers, and depositing the layers one at a time onto the drying cylinder so that one sheet will be partially dried by the cylinder before the next sheet is applied onto the cylinder, and means for applying a lubricant to the several layers of warp while the warp is moving from the size box to the drying cylinder.

6. The combination of a slasher having a size box and a drying cylinder and means for supporting a plurality of creels for passing their warps through the size box, in a composite sheet, means for dividing the composite sheet after it is sized into a plurality of spaced layers, means for applying a lubricant to the warp while in divided form, and means for applying the layers to the drying cylinder at spaced points so that an applied layer will become partially dried before the adjacent layer is applied to the cylinder.

7. That method of sizing warp yarn and applying a lubricant to the warp which comprises passing a plurality of warps through a sizing operation, then dividing the warps, then applying a lubricant to the divided warps and then subjecting the warps to a drying operation to partially dry the warps before forming the same into one composite warp.

8. That method of sizing warp yarn and applying lubricant thereto which comprises subjecting the yarn to a sizing operation, then dividing the yarn into a plurality of layers, applying a lubricant to the yarn while divided into a plurality of layers, then converging the yarn into one layer and partially drying the same, then again dividing the warp into a plurality of layers and applying a lubricant thereto, then converging the yarn into one composite sheet and then finishing the drying operation.

9. A machine for applying a coating to a warp yarn comprising a sizing box through which the yarn is passed to coat the same and having drying cylinders over which the coated yarn is drawn to dry the same, means for dividing the web and means for spraying a lubricant on opposed sides of the divided yarn.

10. Apparatus for treating yarn in sheet form which comprises a sizing box through which the sheet of yarn is passed to apply a coating of sizing thereto, a pair of rollers forming a shed in the warp after it has been sized, a heated roller over which the yarn is passed to partially dry the same, a pair of other rollers for forming another shed in the warp, a second heated roller over which the yarn is passed, and a plurality of heated rollers for further drying the yarn, means for spraying a lubricant onto the top portions of the sheds of yarn immediately before they reach the first heated roller and other means for spraying lubricant onto the other side of the said sheds before the yarn reaches the second heated roller.

11. Apparatus for treating warp yarn comprising means for holding a plurality of rolls of warp yarn, a sizing box through which the warp yarn from said rolls is passed to apply a coating of sizing thereto a drying cylinder over which the yarn is passed, means for separating the yarn after it has been sized, and means disposed above and below the yarn for applying a lubricant thereto immediately before the layers of yarn are converged into one sheet on the drying cylinder.

12. Apparatus for treating warp yarn which comprises a sizing box through which the yarn is passed to apply a coating thereto, a drying cylinder over which the yarn is passed to dry the coating thereon, means disposed between the sizing box and the drying cylinder for splitting the yarn into a plurality of layers and means for spraying a lubricant on the upper and lower sides of said layers before they reach the drying cylinder.

13. Apparatus for treating warp yarn which comprises a sizing box through which yarn in sheet form is passed to apply a coating of sizing thereto, a plurality of drying cylinders over which the yarn is passed to dry the coating thereon, and means for spraying a lubricant onto the surface of the cylinders which, in turn, is transferred to the yarn while the yarn is in contact with the cylinders.

14. Apparatus for treating yarn which comprises a sizing machine having a sizing box through which a sheet of yarn is passed to apply a coating of sizing thereto and having a drying cylinder over which the coated yarn is passed to dry the same, means disposed between the sizing box and the cylinder for spraying a lubricant onto the yarn before it reaches the drying cylinder.

15. In a machine for sizing yarn and having a sizing box through which the yarn is passed to size the same and having a drying cylinder over which the yarn is passed to dry the same, means for dividing the warp into a plurality of layers at a point between the sizing box and the drying

cylinder, and means for projecting a lubricant from opposed directions onto said layers of yarn.

16. That method of treating yarn which comprises sizing the yarn, splitting the web into a plurality of layers and projecting a lubricant onto the layers and then drying the layers of yarn.

17. That method of applying a lubricant to sized yarn which comprises applying sizing to the yarn, then dividing the yarn into a plurality of layers and then spraying a lubricant onto the layers of yarn while they are still wet with the sizing and then drying the yarn with the sizing and lubricant thereon.

18. That method of treating yarn in web form which comprises applying sizing to a moving web, then forming a shed in the web of sized yarn, then applying a lubricant to the yarn while the sizing is wet thereon and then converging the yarn into one web and drying the yarn.

19. That method of sizing yarn which comprises passing the yarn in web form through a sizing machine, splitting the web into several layers in the machine and projecting a lubricant onto the several layers and then drying the several layers.

20. That method of treating a web of yarn which comprises applying sizing to the web, then splitting the web into a plurality of layers, then spraying a lubricant onto the plurality of layers and then converging all of the layers into one web and drying the web with the sizing and lubricant thereon.

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