Sept. 8, 1931. J. J. SUSSMUTH 1,822,425

MACHINE FOR AND METHOD OF SIZING TEXTILES

Filed July 22, 1929 2 Sheets-Sheet 1

Fig. 1.

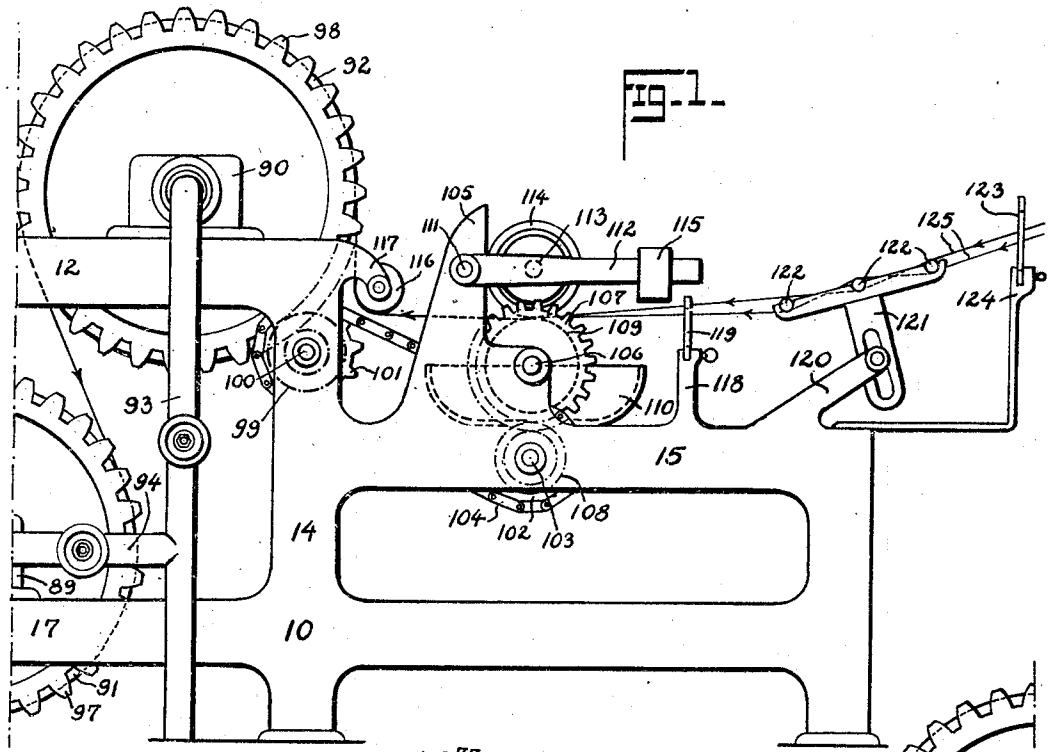
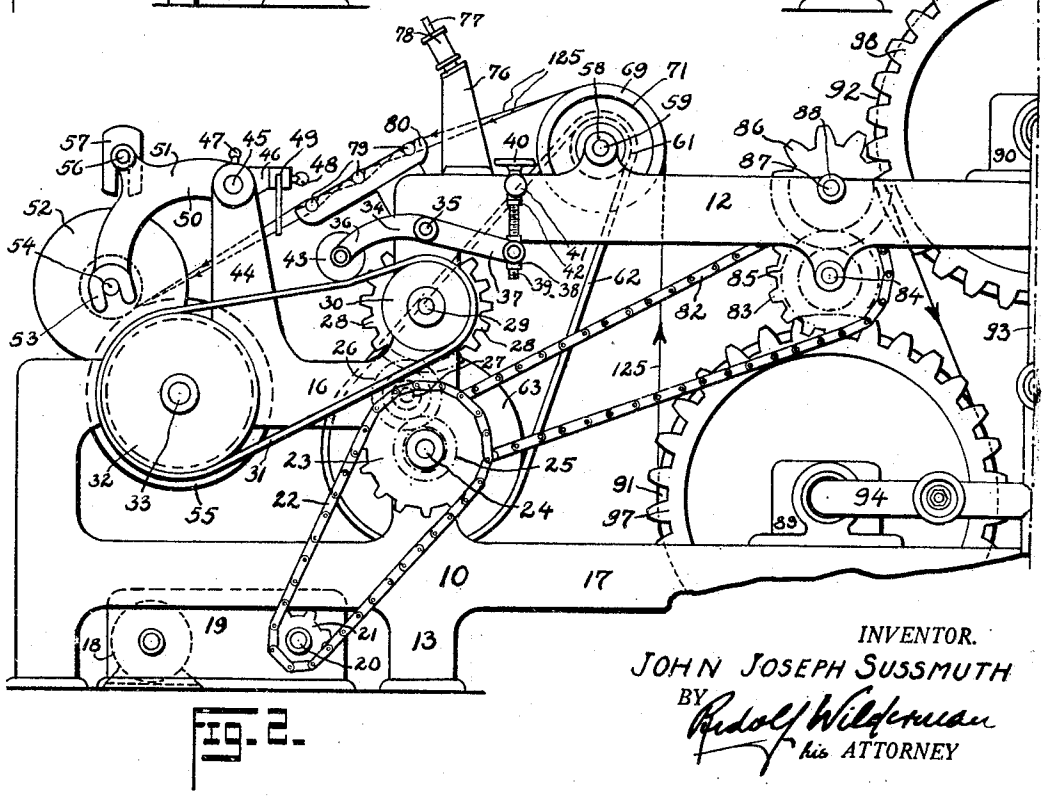


Fig. 2.



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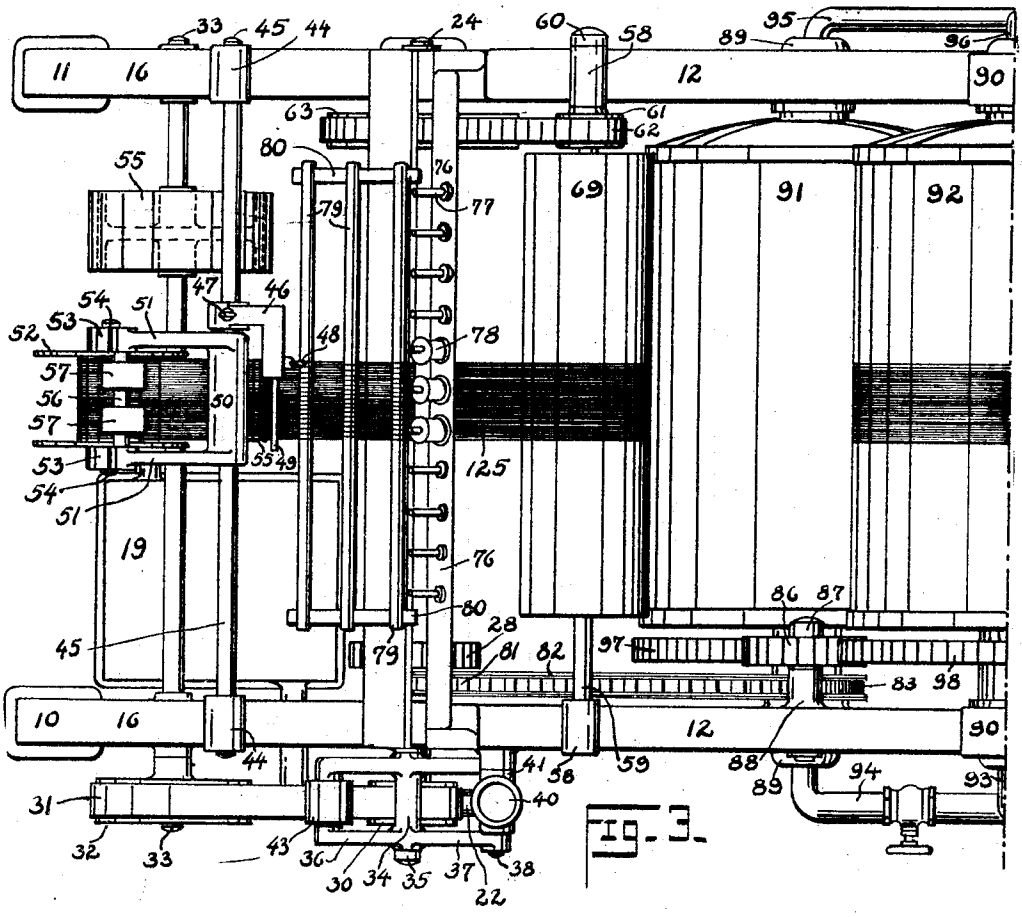

FIG. 3.

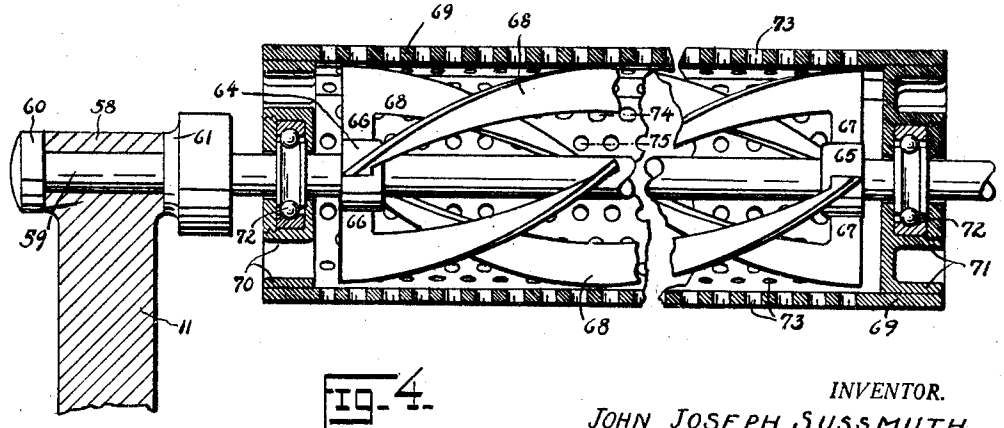

FIG. 4.

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MACHINE FOR AND METHOD OF SIZING TEXTILES

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My invention refers to a machine which serves to size, singly or in ribbons, threads of rayon, spun silk, cotton, or silk and in which the threads are carried from the bobbin to the loom beam. My machine may also be called a warping and slashing machine.

Some of the objects of my invention are, first, to overcome the disadvantages of uneven sizing and of the waste of time and space involved in sizing rayon and similar materials from the skein; second, to perform the sizing in combination with warping and beaming operations; third, to allow, without complicated resetting or rearranging, the warping, sizing and beaming of smaller selvedge warps and of wide ribbon warps on the same machine; fourth, to thoroughly and evenly cool the sized warp after it has been dried by heat; fifth, to cool the sized warp after the drying operation by the direct flow of air thereover; sixth, to perform the sizing at a uniform speed and to provide means for beaming the warp at a corresponding speed of movement of the ribbon.

These and other objects I attain by the mechanism illustrated in the accompanying drawings, in which,

Figure 1 shows the side elevation of the right end of a machine in which my improvements are incorporated.

Figure 2 shows, as a continuation of the apparatus shown in Figure 1, the side elevation of the left end of my sizing machine.

Figure 3 shows in a corresponding plan view, the part of the sizing machine illustrated in Figure 2.

Figure 4 shows a cooling drum in a sectioned, sectional elevation, seen from the rear of the machine.

Similar numerals refer to similar parts throughout the various views.

The machine is mounted between two substantially parallel frames 10 and 11 which, by rods and cross bars, are spaced at a suitable distance apart. The frames 10 and 11 are higher at their centers, where they show the horizontal top levels 12 bridging the space between the risers 13 and 14. At the front and rear ends the machine shows lower levels 15 and 16 and the frames are reenforced by a bottom level 17 which extends throughout their whole lengths.

I therefore call the end at which the warp enters upon the machine, the front, and the end at which the warp is beamed, the rear of the machine. Thus the right end of Figure 1 is the front of the machine and the left end of Figure 2 is the rear of the machine.

At the rear the motor 18 and the speed regulating device 19 stand on the floor below the machine. The motor is coupled to the speed regulating device 19 and the driving shaft 20 of the latter carries a sprocket 21, which is connected by a chain 22 to a sprocket 23 on the end of the main shaft 24 of the machine. That shaft is journaled in the risers 13 of the two frames 10 and 11 of the machine and it drives, by a spur pinion 25 fixedly mounted on shaft 24, the spur pinion 26; pinion 26 idles on a stud shaft 27 which extends from frame 10 towards the inside of the machine. The pinion 26 meshes into a gear 28. This gear 28 is mounted on a shaft 29 which is journaled in the risers 13 of the frames.

The shaft 29 carries on its end a pulley 30. By means of belt 31 the pulley 30 drives the pulley 32. That pulley is mounted on the outside of the machine on the end of the shaft 33 which extends through the whole width of the machine and is journaled in the levels 16 on the rear of the machine.

A double lever 34 is fulcrumed at 35 upon the outside of the frame 12; the spaces between the forked ends 36 and 37 of said lever are in vertical alignment with the belt 31. Between the forked ends 37 of lever 34 is rotatably mounted the knuckle 38. A substantially vertical, tapped hole in the knuckle 38 is engaged by the thread of screw 39. The upper end of the screw 39 carries a hand wheel 40 and it is journaled in a lug 41 and is thrustwise retained upon said lug between the hand wheel 40 and the collar 42. The lug 41 is rotatably retained upon the outside of frame 10. If the screw 39 is provided with a right hand thread, clockwise rotation of hand wheel 40 will adjust the lever 35 in counterclockwise direction and counter clockwise rotation of the hand wheel 40 will swing

the lever 35 in clockwise direction. Screw 39 serves for the adjustment of the idler pulley 43 which is journaled between the forked ends 36 of lever 35. The idler pulley 43 rests upon the top stretch of belt 31, extending between pulleys 30 and 32; by the manipulation of hand wheel 40 the tension of belt 31 may thus be adjusted.

From the level 16 at the rear end of the machine extend upwards the brackets 44 which are connected at their upper ends by a rod 45 solidly extending from one side of the machine to the other. Upon this rod are adjustably fastened the reed holders 46. The thumb screws 47 serve to set these reed holders in the desired position, and, by thumb screws 48 on the sides of the reed holders 46, the reed 49 is held in the reed holder 46.

The swing bracket 50 is journaled upon shaft 45 next to the reed holder 46. It carries two substantially parallel curved arms 51 which are spaced apart at a distance substantially clearing the outside width of the beaming roll 52. The free ends 53 of arms 51 are slotted so that the shaft 54 of the beaming roll 52 may be slipped into those slots. Below the beaming roll 52 a pulley 55 which is covered on its periphery with a cylindrical rubber tire, is solidly mounted upon shaft 33. The pulley 55 has a width substantially equal to the distance between the flanges of the beaming roll 52 so that the hub of the beaming roll rests upon the periphery of pulley 55 and is retained in that position by the weight of the arms 51 between which the roll is suspended. When shaft 33 is driven, the rubber periphery of pulley 55 frictionally engages the hub of the beaming roll 52, and tends to rotate it. When the ends of the warp are tied and wound onto the hub of the beaming roll 52 they are frictionally engaged by the pulley 55 and thus, indirectly, the beaming roll is rotated and the warp is wound onto it. The arms 51 are connected at their highest points by a rod 56 onto which are hung, by means of suitable slots therein, the weights 57. The number of weights used may be increased or decreased and controls the degree of frictional engagement caused thereby between the pulley 55 and the beaming roll 52. The pulley 55 is driven from the operating mechanism by means of the belt 31. The ratio of gearing is arranged in such a way that the circumferential speed of pulley 55 is slightly greater than the linear speed at which the warp passes through the machine. This provides the necessary tension in winding the warp onto the roll 52. Of course slipping means have to be provided for, by means of which the actual speed at which the warp is wound onto roll 52 is reduced to the speed at which the warp passes through the machine. This slipping is provided for in the belt drive 31, and the tension of belt 31 is accordingly regulated by means of the adjustable idler pulley 43. Whereas the amount which the shaft 33 has to slip remains substantially the same at all times, the tightening and the slackening of belt 31 increases or decreases the tension on the warp; this tension has to be overcome by slipping to reduce the speed of winding the warp onto the beaming roll to the speed at which the warp passes through my machine.

On the top level 12 of the machine two bearings 58 extend upwards from the two frames 10 and 11. In these bearings is journaled the fan shaft 59. That shaft is thrustwise retained in the bearing 58 on frame 11 by a shoulder 60 on one side and by the pulley 61 on the other side of said bearing. The pulley is connected by belt 62 to the driving pulley 63 on the main shaft 24. Whereas the fan shaft 59 and the parts pertaining thereto and mounted thereon are merely indicated in Figures 2 and 3, they are detailed in the enlarged view of Figure 4. From hubs 64 and 65, which form part of fan shaft 59, radially extend the blades 66 and 67, respectively. These blades are spaced apart at regular intervals so as to form a polygonal figure and the outer ends of the blades 66 on hub 65 are connected to the outer ends of the blades 67 on hub 64 by curved blades 68, which helically extend therebetween and which are twisted in a left hand direction. The helix, made up of these blades, is enclosed in a cylindrical tube 69 the inner wall of which extends, in close proximity, around the outer edges of the blades 68. The cylindrical tube 69 is supported on one end by the spoked wheel 70, on the other end by the flange 71. The wheel 70 and the flange 71 are mounted on fan shaft 59 by means of ball bearings 72, so that the cylindrical tube 69 is journaled upon the fan shaft 59 in concentricity therewith. A multiplicity of perforations 73 (not shown in Figure 3) are provided in the outside of the cylindrical tube 69. The constellation of these holes 73 is such that longitudinally adjoining rows of such holes are offset in respect to each other. Thus the holes of one such row 74 are located between the holes of the row 75.

Between the tube 69 and the left ends of the top levels 12 a rack 76 bridges the two frames 10 and 11. Upon the top of the rack a multiplicity of pins are aligned in a row extending across the machine. These pins 77 serve as arbors for the bobbins 78. Next to the rack 76, substantially in line with a tangent to the upper periphery of the pulleys 55 and the tube 69, are arranged the lease rods 79 which are rotatably supported by the frame 80.

A sprocket 81 is mounted upon the main shaft 24 between the inside of frame 10 and the pinion 25. This sprocket 81 is connected by chain 82 to a sprocket 83 mounted on a shaft 84 journaled in brackets, which extend

downward from the top level 12 of the frames 10 and 11. The spur pinion 85 is mounted on shaft 84 next to the sprocket 83. That pinion 85 meshes into an idler pinion 86 which is rotatable upon a stub shaft 87 mounted in a hub 88 extending inwards from the top level 12 of frame 10. Above and next to the pinions 85 and 86 are journaled the steam drums 91 and 92 in bearings 89 and 90, which are mounted on the levels 17 and 12 of the frames, respectively. The hollow shafts upon which these drums are mounted are connected through stuffing boxes, which are accommodated in the bearings 89 and 90, to steam inlet lines 93 and 94, respectively, on one side of the machine, and to steam outlet lines 95 and 96, respectively, on the other side of the machine. The inlet lines 93 and 94 are provided with control valves and connect to a boiler. Automatic devices for the control of the flow of the steam may be provided for in the steam lines. Such devices are known to the art and are therefore not shown. They may be regulated by direct connection to the starting and stopping means of my apparatus; or they may be operated by a thermostatic device reacting upon the temperatures to which the steam drums 91 and 92 are heated.

Next to the steam drums 91 and 92, between said drums and the bearings 89 and 90 on frame 10, are mounted on the shafts of said drums the spur gears 97 and 98, respectively. These gears form one chain of connecting gears with the pinions 85 and 86 so that they are positively driven from the main shaft 24 by the chain 82.

The spur gear 98 drives the small spur pinion 99 which is mounted upon the shaft 100. This shaft is journaled in the risers 14 of the frames 10 and 11 and a sprocket 101 is mounted upon it, between the pinion 99 and the frame 10. A similar sprocket 102 is mounted, in alignment with sprocket 101, upon a shaft 103 journaled in the levels 15 of the frames 10 and 11. The sprockets 101 and 102 are connected by the chain 104. From the levels 15 of the two frames of my machine extend upwards the brackets 105. In these brackets is journaled the shaft 106. A gear 107 is mounted upon shaft 106 and is driven from shaft 103 by gear 108 which is mounted on shaft 103 next to sprocket 102. Between the gear 107 and the frame 11 a cloth covered brass drum 109 is mounted on shaft 106. The lower half of that drum 109 is submerged in the sizing liquid contained in a vat 110, which is mounted between the frames 10 and 11 below the shaft 106. A shaft 111 is journaled in the brackets 105, near their upper ends. On this shaft are fixedly mounted the levers 112 between which is journaled a shaft 113 carrying the rubber covered roller 114. The weights 115 are adjustably mounted upon the free ends of the levers 112.

Between the steam drum 92 and the bracket 105, an idler roller 116 is journaled between brackets 117 extending frontward from the top level 12 of the frames 10 and 11 of the machine. In front of the vat 110 there is a stand 118 in which is adjustably mounted the section reed 119. Further frontward a bracket 120 extends upward from the level 15 upon which is adjustably mounted the lease-rod support 121 which carries the lease rods 122. Another reed 123 is adjustably mounted upon a bracket 124 extending frontwards from the frame of the machine.

In the operation of my invention I proceed as follows:

A creel with a hundred or more bobbins, according to the number of ribbons and to the number of threads per ribbon to be warped is arranged to the right in Figure 1, in front of my machine and the ribbon is fed from the creel to my machine through the reed 123 at the right end thereof. The ribbon or warp, generally, follows the lines 125, which are indicated in Figures 1 and 2 of the drawings, while passing through the machine. The arrows shown on those lines indicate the direction of travel of the ribbon through my machine. After the ribbon has passed over and under the lease rods, it passes through the second reed 119 in between the two rollers 109 and 114. The lower cloth covered one of these rollers is driven in counterclockwise direction and the rubber covered roller 114 frictionally follows the rotation of said roller. The sizing fluid is carried up by the roller 119 and applied to the ribbon as it enters between the rollers 109 and 114. But by the pressure exerted upon the upper roller 114 by means of the weight 115 the liquid which has been applied to the ribbon is squeezed thereinto and the surplus of the liquid is retained at the point at which the two rollers engage and that surplus flows back into the tank 110. From this liquid applying apparatus, which is commonly called the "quetsch", the ribbon passes around the idler roller 116 onto and over the top of the steam drum 92 and from there onto and around the bottom of steam drum 91. By means of the gearing the two steam drums 91 and 92 are driven at the same circumferential speed as the lower roller 107 of the "quetsch". They rotate in counterclockwise and in clockwise direction, respectively, in the direction in which the ribbon is fed around them. The application and exhaust of steam to and from the steam drums has been described above. The heat regulation is controlled carefully so as to supply heat, which is sufficient for drying the ribbon, but not sufficient to bake or burn the threads. From the steam drum 91 the ribbon passes up and around the tube 69 to the left. The tube 69 is engaged and rotated by the ribbon; it is not rotated by the driving gears, but a slight rotational momentum is given to it by the shaft 59 upon which

it rotates by means of the ball bearings 72. Shaft 59 is driven by belt 62 at comparatively high speed in counterclockwise direction. (Fig. 2.) Owing to the high speed of rotation of the shaft 59 the helix, consisting of the various blades 68, sucks air into the tube 69 from the left end, (Fig. 4), through the openings between the spokes of the wheel 70. Since the right end of the tube 69 is closed by the flange 71, the air thus sucked into the tube is forced out of it through the holes 73 which are arranged upon the surfaces of the tube 69. This air cools off the ribbon passing over the tube and at the same time cools off the tube itself, absorbing and carrying away the heat dissipated into said tube from the hot ribbon running thereover. The flow of air into the tube from its left end and out of the holes in its circumference can readily be controlled according to the requirements by the speed at which the shaft 59 is driven, by the pitch of the helix which is made up of the blades 69 and by the angle at which the blades are disposed in reference to a radius extending from the shaft 59 towards said blades. The angle at which these blades are disposed may be made such that the air is not only driven out of the holes by the reaction of its impact upon the flange at the closed end of the tube 69 but also, directly, by the pressure of the blades, driving the air outwardly through the holes of the tube.

After having passed over the tube 69 and thus having been reduced to normal temperature, the threads are parted again by the lease rods 79 and from there they are carried in alignment through the reed 49 and then pass onto the warp beam 52. The action of the friction drive on the warp beam has been discussed in detail above; the pulley 55 is driven at a circumferential speed slightly exceeding the speed at which the ribbon passes through the machine, but the ribbon passes onto the warp, under tension, at the same speed at which it passes through the machine, the excess speed of the pulley 55 being lost by slippage of belt 31. In case any of the threads break while the warps pass through my machine, broken ends may readily be tied by momentarily stopping the machine, the automatic steam control preventing an excess application of heat to the ribbon extending thereover during this interval. The bobbins mounted on the racks 76 may be used to supply reserve threads for tying in ends. Since various kinds of ribbon to be sized in this machine may require different times for the different operations, a variable drive 19 is coupled between the motor 18 and the main shaft 24, allowing the operations in the machine to be performed at any speed desired.

The exchange of beam rolls may be brought about in a very short time. The swing bracket 50 is lifted up, swung in clockwise direction and the shaft on the beaming roll 52 slides out of the slots at the end of the forked arms 51 of said bracket.

These facilities for quickly exchanging the beam roll are of importance. They allow a continuous use of the machine without extended interruptions. Whereas this enhances the value of my improvements I like to dwell again upon the other parts and steps of procedure which in particular represent my invention. It is novel to take the warp directly from a creel, to pass it through a quetsch, to dry it thoroughly by running it over heated drums rotating in opposite directions, to cool it, and then to beam it directly on beam rolls. The cooling drum is an important part of my invention which allows the last enumerated rotation of operations to be carried through in quick succession. A quick cooling of the warp, preferably with air, is of great value in the sizing and finishing operations of silk. Exposing a series of threads, which make up a warp to a current of air, over which they pass, is apt to harm and derange the warp, if it is not held tightly and positively. In my improvements the threads run under tension over the cooling tube and, while tightly extending over the surface of said cooling tube, all the threads are exposed to the cooling influence of the air sucked into said tube and driven out of it through the perforations in its wall, due to the peculiar arrangement of said perforations. It is of course not necessary to rotate the cooling tube but it may be replaced by a stationary convex surface which is cooled by air and perforations which allow the air to play over and through the threads passing over said surface. These means of cooling threads may also be used in other processing and finishing apparatus for textiles.

Although I have shown and described one form of embodiment of my invention in detail, yet I do not wish to be limited thereby, except as the state of the art and the appended claims may require, for it is obvious that various modifications and changes may be made in the form of embodiment of my invention, without departing from the spirit and scope thereof.

I claim:

1. In a machine for sizing a warp, a frame, a perforated smooth tube over which said warp passes, rotatably supported upon said frame, said tube being closed at one, and open at the other end, and means sucking air into said tube from its open end.

2. In a machine for sizing a warp, a frame, a shaft journaled in said frame, means for rotating said shaft, a tube rotatably mounted upon said shaft, a perforated wall on said tube, and helically arranged fan members mounted upon said shaft inside of said tube adapted to compress air in said tube and to drive air through said perforated wall of said tube.

3. In combination with a sizing machine, an apparatus for cooling the ends of a warp, comprising a smooth, perforated and rotatably mounted tube over the cylindrical surface of which said ends are adapted to be carried intermittently extending over the perforations in said tube, a flange closing one end of said tube, and fluid propelling means compressing a cooling fluid taken in from the open end of said tube against the closed end thereof, and forcing said compressed fluid to flow over the inner cylindrical surface of said tube from where it escapes through the perforations in said tube.

Signed at West New York in the county of Hudson and State of New Jersey this 18th day of July A. D. 1929.

JOHN JOSEPH SUSSMUTH.