Sept. 24, 1929. J. P. KING 1,729,272

THREAD DRESSING MACHINE

Filed June 15, 1928 5 Sheets-Sheet 1

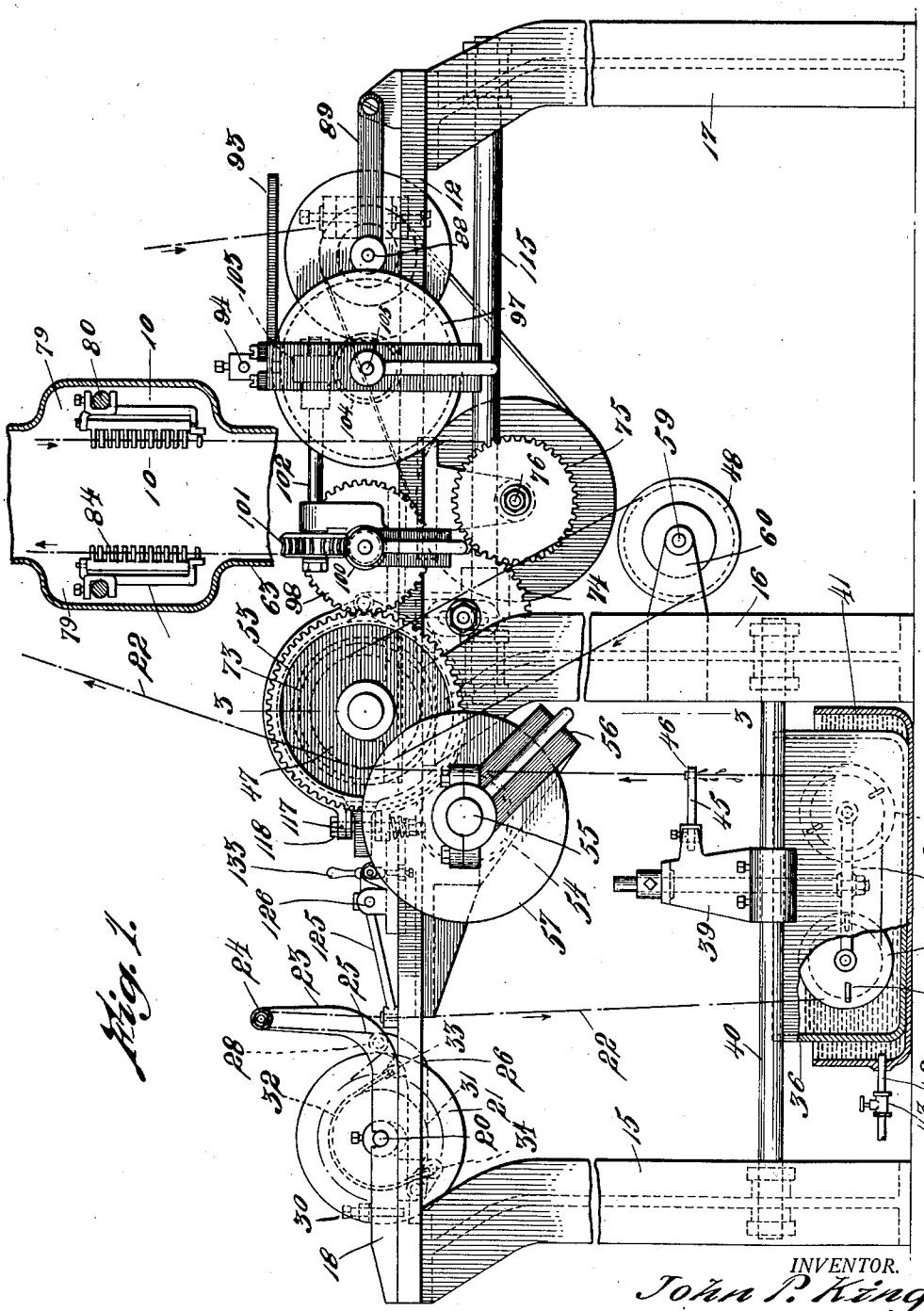


Fig. 1.

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THREAD DRESSING MACHINE

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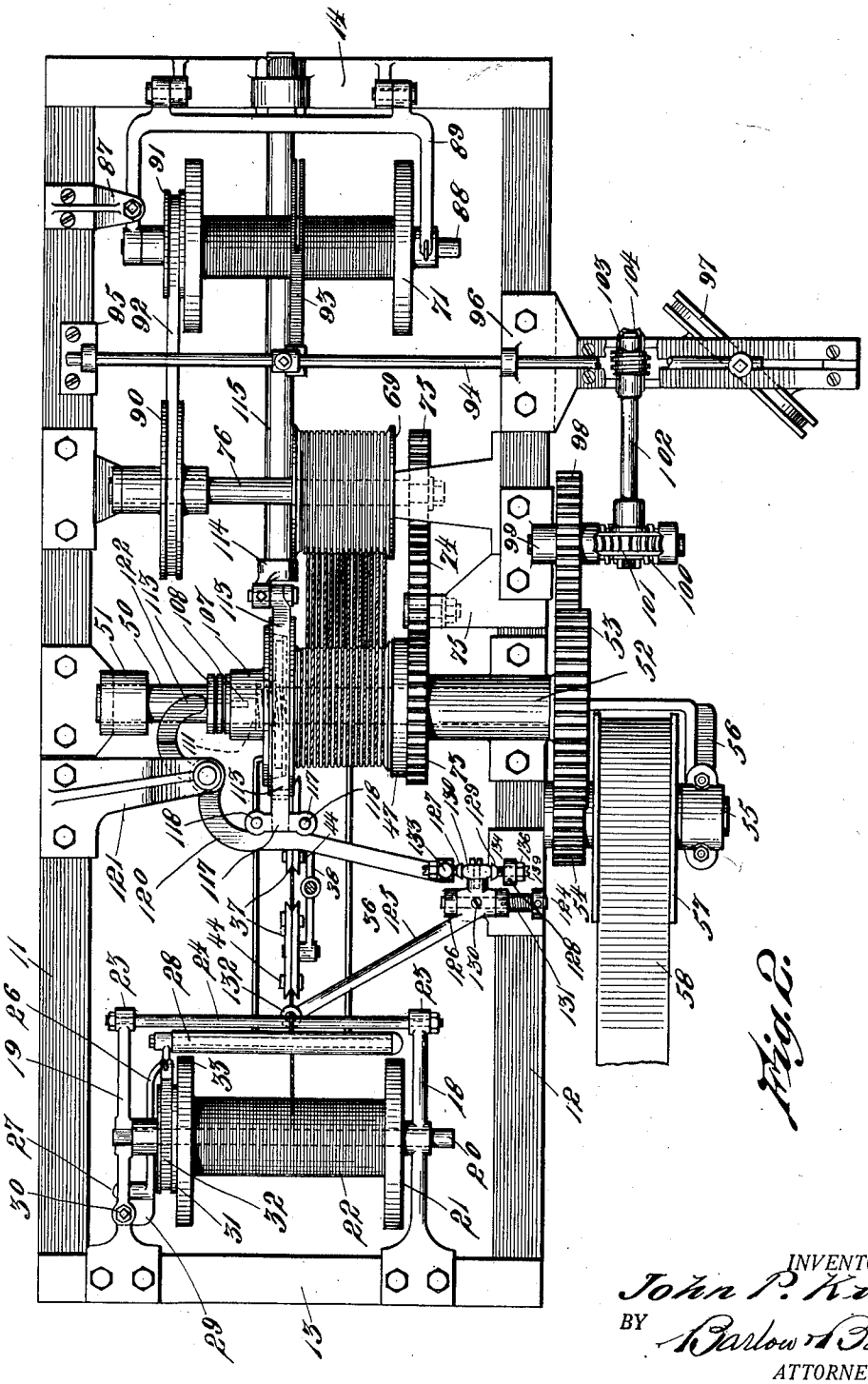


Fig. 2.

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THREAD DRESSING MACHINE

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Fig. 3.

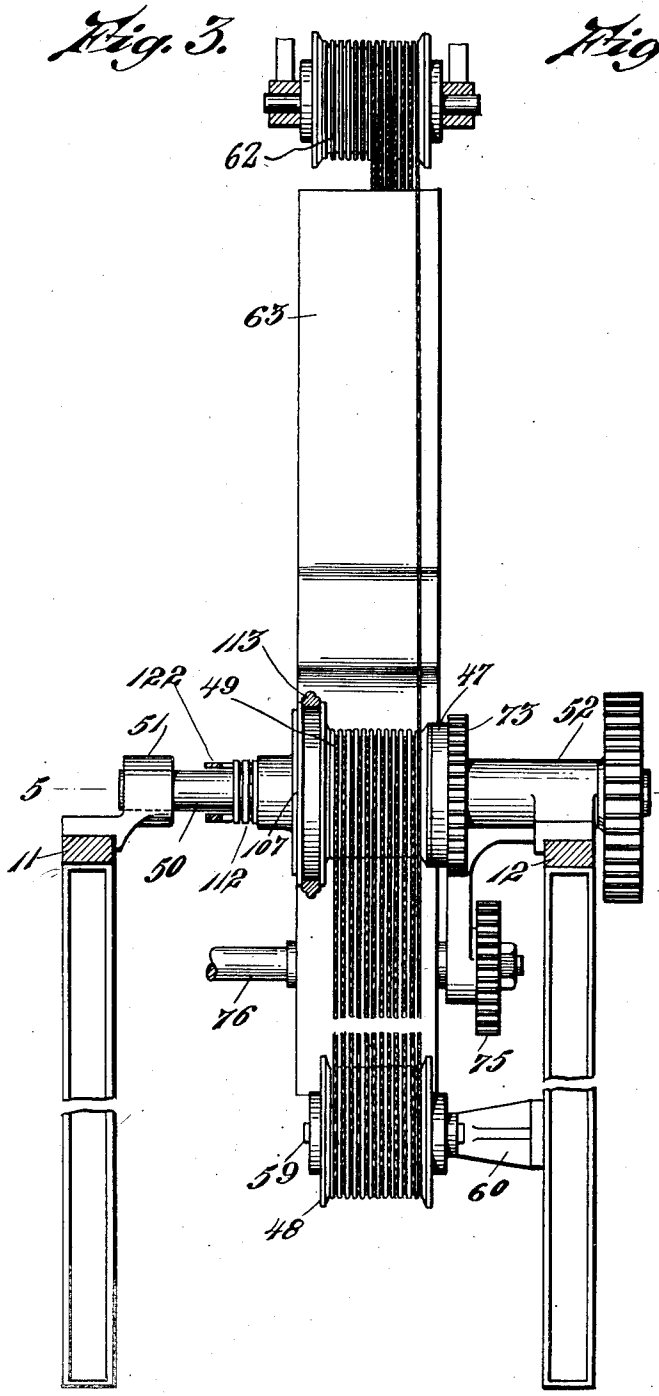
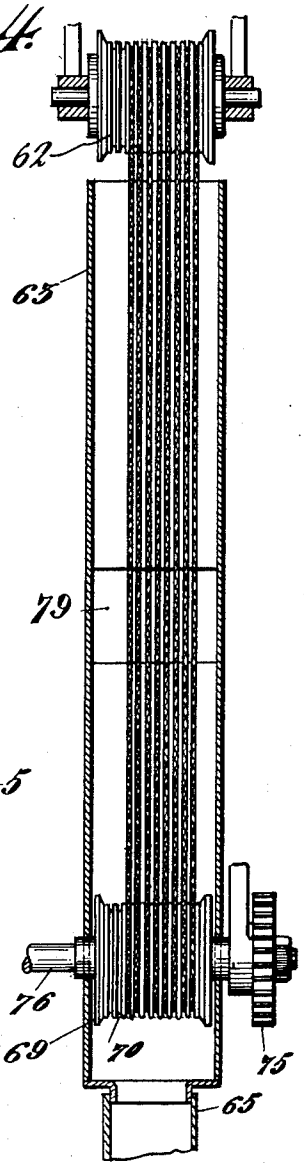


Fig. 4.



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THREAD DRESSING MACHINE

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Fig. 5.

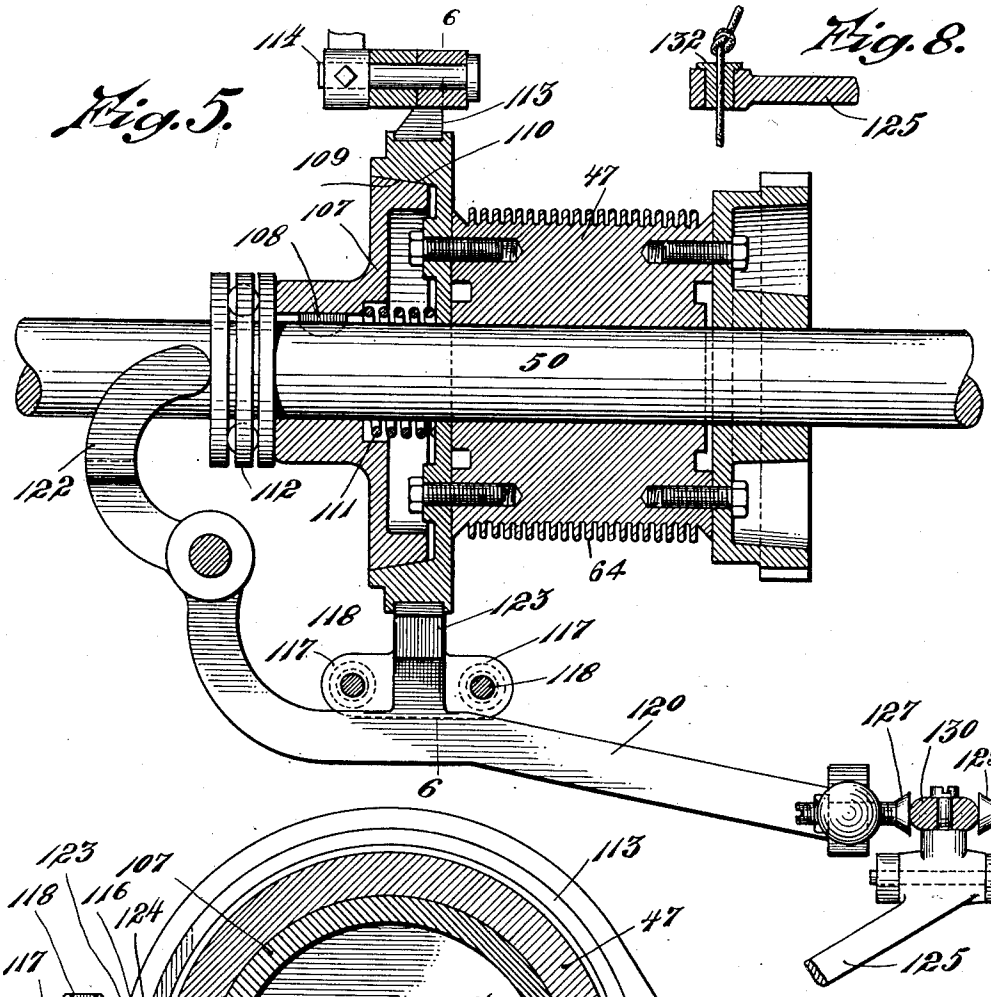


Fig. 8.

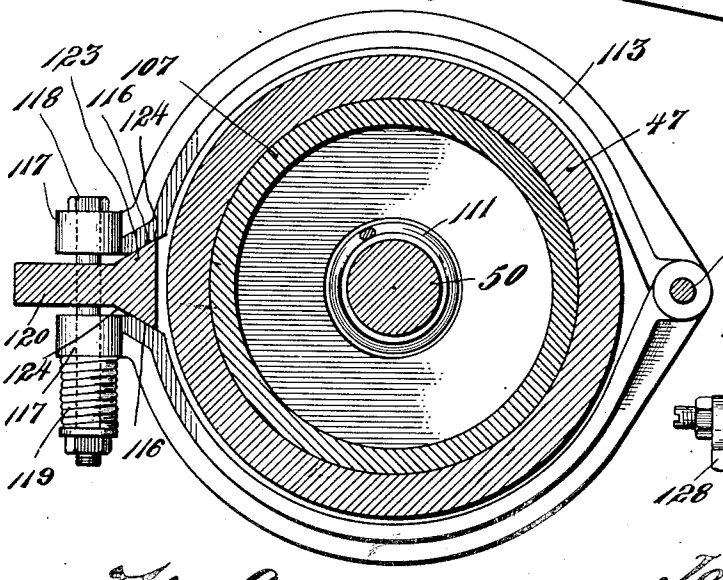
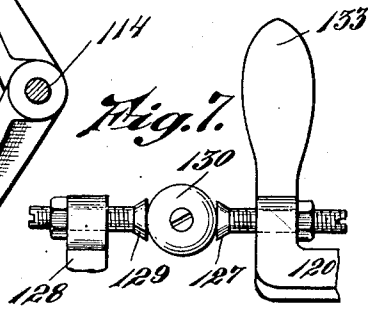


Fig. 6.

Fig. 7.



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THREAD DRESSING MACHINE

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Fig. 10.

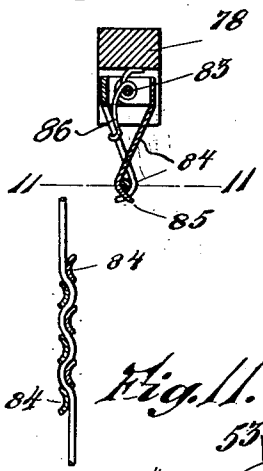


Fig. 11.

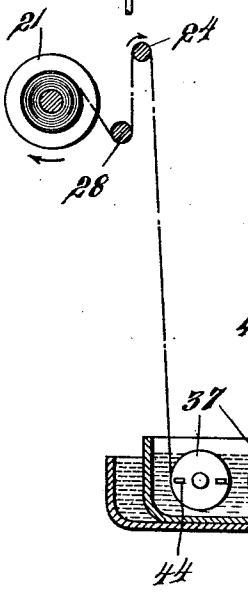


Fig. 12.

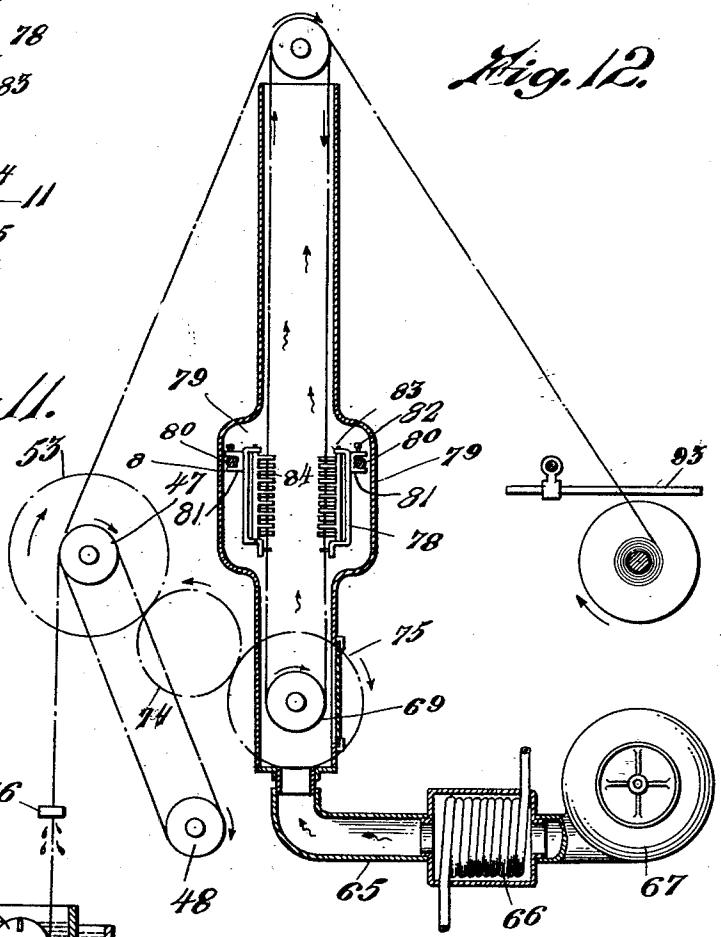
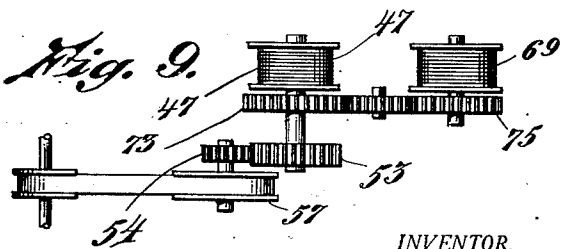


Fig. 9.



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Patented Sept. 24, 1929 1,729,272

UNITED STATES PATENT OFFICE

JOHN P. KING, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO WALLING & WALLING, OF PROVIDENCE, RHODE ISLAND, A FIRM COMPOSED OF EVERETT L. WALLING AND LESTER S. WALLING

THREAD-DRESSING MACHINE

Application filed June 15, 1928. Serial No. 285,757.

This invention relates to machines of the type adapted to finish textiles after the same have been woven, spun, twisted, braided, or otherwise manufactured, and more particularly to machines for coating, stretching and otherwise finishing threads, yarns, and the like.

An object of this invention is to provide a single machine wherein cotton yarns, threads, and the like, are dressed, stretched, and otherwise finished more satisfactorily, quicker and cheaper than has heretofore been possible with the known machines and methods.

Another object is to provide means for impregnating the materials with a dressing containing stiffening, moisture-proofing and adhesive properties.

Another object is to provide means for partially drying the material, while the same is in motion.

Another object is to provide means for stretching the material, while the same is still damp.

Another object is to provide means for drying the material, while the same is stretched.

Another object is to provide means for compressing the fibers of the material during the drying operation so as to impart a linen-like finish to the material, and greatly increase the tensile stress thereof.

Another object is to provide a machine wherein the material is partially dried, after being impregnated with a suitable dressing solution, by means of a pair of grooved drums driven at a constant speed and carrying a multiplicity of loops of the material.

Another object is to provide a dressing machine wherein the material is stretched by means of two pairs of grooved drums, the material being looped around one pair of drums, and then looped around the second pair of drums, and the latter drums being revolved at a speed greater than the speed at which the first pair of drums are rotated.

Another object is to provide a dressing machine wherein the mechanism is automatically stopped when an imperfection is detected in the thread.

Another object is to produce an efficient, strong and durable dressing machine, which is simple in construction and inexpensive to manufacture.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

The views of the drawings are as follows:

Figure 1 is a side elevation of a dressing machine constructed according to my invention, parts being in section and parts being omitted to show the underlying structure.

Figure 2 is a plan of the machine shown in Figure 1, the upper portion being omitted for sake of clearness.

Figure 3 is a vertical transverse section as seen from the line 3—3 of Figure 1.

Figure 4 is a vertical section through the dryer, parts being omitted.

Figure 5 is an enlarged horizontal section taken on the line 5—5 of Figure 3.

Figure 6 is a vertical section as seen from the line 6—6 of Figure 5, the brake band being shown in elevation.

Figure 7 is a detail elevation of the locking means between the detector arm and the means for arresting the operation of the driving drum.

Figure 8 is a vertical section of the eye in the outer end of the detector arm.

Figure 9 is a detail plan of a portion of the driving means.

Figure 10 is a detail section taken on the line 10—10 of Figure 1.

Figure 11 is a vertical section taken on the line 11—11 of Figure 10; and

Figure 12 is a diagrammatic view illustrating the travel of the thread through the machine.

It is of advantage in the manufacture of textiles, such for instance as cotton yarns, threads, and the like, to eliminate some of the elasticity in the material and to otherwise finish the same, and with particular reference to the threads used for securing the parts of shoes, it is of advantage that these threads be impregnated with a suitable sizing, or otherwise treated, to give them a strong body. It is also of advantage to stretch the threads

during the dressing operation so as to reduce the elasticity of the cotton to a minimum, and while the fabric is being stretched it is of advantage to iron the same so as to impart a linen-like finish thereto, which greatly increases the tensile strength of the threads. Further, it is also of advantage, in order to reduce the cost to a minimum, to utilize a single machine in which the thread is first taken from a reel and immersed in a heated liquid solution which is kept agitated and at substantially uniform temperature, such solution being of any suitable composition for the purpose of stiffening, moisture-proofing and otherwise sizing the fibers of the thread.

It is also of advantage to provide means for removing excess liquid from the thread after the same emerges from the dressing solution, and to then pass the thread around a pair of spaced drums, both of which are so formed as to carry a multiplicity of spaced loops of the thread, so that some of the liquid dressing will evaporate. After the thread is partially dry, it is also of advantage to pass the same over a second pair of drums, which drums should also be so formed as to carry a multiplicity of spaced loops. In order that the elasticity of the thread can be reduced to a minimum, it is also of advantage to provide means for revolving the second set of drums at a speed greater than the first-named set of drums, so that the thread will be stretched as it is drawn onto the second set of drums from the first set of drums.

It is also of advantage to provide means for drying and ironing the thread during the stretching operation. It is also of advantage to provide means for rewinding the thread after it has been stretched and dried. Furthermore, it is also of advantage to provide suitable driving means for simultaneously actuating the several parts of the machine, together with means for automatically arresting the operation of the machine when defects appear in the thread; and the following is a description of one construction of mechanism by which these advantageous results may be accomplished:—

Referring to the drawings, the machine includes a frame consisting of side bars 11 and 12, and end bars 13 and 14, these bars being supported by a plurality of standards 15, 16 and 17 of any suitable construction. Preferably the frame is rectangular in form, to best receive and support the several parts of the machine, as will be hereinafter more fully described.

The end bar 13 of the frame has a pair of brackets 18 and 19 fixed thereto and extending inwardly therefrom. These brackets are adapted to receive a spindle 20 on which is revolably mounted a reel 21 containing the thread, yarn, and the like, to be finished. While the machine may be used for dressing threads, yarns, and the like formed of any fibrous material, in the present instance, for illustrative purpose only, braided cotton thread 22 of the type used for stitching the welts of shoes, is shown.

The brackets 18 and 19 are extended to provide upright arms 23 which support a cross-bar 24, over which the thread 22 passes. As shown, the bar 24 should be disposed above, and slightly in advance of the reel 21.

The bracket 19 has an arm 26 pivotally connected thereto, as indicated at 27. This arm is extended to a point in front of the reel 21, and carries a roller 28. The thread is passed, in the form of a loop 25, under the roller 28 and over the cross-bar 24. In this way the roller will be supported by the loop 25 and the weight of the arm 26 and the roller 28 tends to tighten the loop and draw the same downwardly. For the purpose of limiting the downward swinging movement of the roller 28, the inner end of the arm 26 is formed with a foot 29 adapted to engage a set-screw 30 threaded through the bracket 19.

For the purpose of retarding the rotation of the reel 21, as well as the delivery of the thread therefrom, one end of the reel 21 has a circular disk 31 fixed thereto. This disk may be positioned on the end of the reel adjacent to the arm 26, and such disk is partially encircled by a band 32. One end of the band is fixed to the arm 26, as indicated at 33, while the opposite end of the band is secured to a fixed portion of the machine, as indicated at 34.

The tension of the thread being unwound from the reel 21 is such, during the operation of the machine, that the roller 28 will be lifted sufficiently by the loop 25 to relieve the pressure of the band 32 on the disk 31 so that the reel is free to rotate at a speed substantially equal to the speed at which the thread is travelling through the machine. However, as soon as the speed of the thread is retarded, the loop 25 will lengthen, thereby permitting the roller 28 to fall sufficiently to draw the band 32 into engagement with the periphery of the disk, and thus retard the rotation of the reel so as to prevent the thread from being delivered from the reel faster than the same is drawn through the machine. In this way, over-running of the reel is prevented, and the thread will be delivered therefrom at a speed equivalent to the speed at which the thread travels through the machine.

It will also be understood, that should the thread break after leaving the reel, the tension of the thread in the loop 25 will be released, thereby permitting the arm 26 to swing downwardly on its pivot whereby the band 32 will be applied to the periphery of the disk with sufficient force to immediately prevent further rotation of the reel.

In this way a simple and effective brake has been provided for controlling the delivery of the thread from the spool to the machine,

and, as will be hereinafter fully described, mechanism is provided for automatically actuating this braking means, as well as for automatically stopping the machine, when any imperfections are detected in the thread delivered to the machines.

The thread is immersed in a suitable liquid solution contained in a tank 36 located in the bottom of the machine. Disposed within the tank is a pair of spaced grooved wheels 37 revolvably mounted in a frame 38. The frame 38 may be adjustably suspended from a bracket 39 carried by a bar 40 supported by the standards 15 and 16.

For the purpose of maintaining the liquid in the tank 36 at a desired temperature, the tank may be surrounded by a jacket 41 containing water that is heated by steam from a supply pipe 42, the amount of steam admitted to the water being controlled through a valve 43. The thread is passed around the wheels 37, in the manner shown in Figure 1, and in order to enable the revolving wheels to agitate the liquid in the tank, I provide a plurality of fingers or paddles 44 on the opposite sides of each wheel. In order to remove excess liquid from the thread, the bracket 39 has a wiper arm 45 adjustably connected thereto, this arm 45 terminating in an eye 46 of a size to pinch the thread slightly and thereby squeeze the liquid therefrom.

In the particular type of machine herein shown the thread, after it has been immersed in the solution, is passed a number of times around a pair of spaced drums 47 and 48. Each of these drums have a multiplicity of grooves 49 so as to guide the thread and separate the loops.

The drum 47 is loosely mounted on a shaft 50 journalled in bearings 51 and 52, the former being fixed to the side bar 11, while the latter is fixed to the side bar 12 of the frame. One end of the shaft 50 carries a gear 53 which meshes with a gear 54 on a drive shaft 55 supported by a bracket 56 mounted on the side bar 12. The shaft 55 also carries a pulley 57 which may be connected to an electric motor or other suitable source of power (not shown) by means of a belt 58. However, in lieu of the driving means for the drum 47, just described, any other suitable drive may be employed, as will be readily understood.

The drum 48 has a spindle 59 journalled in a bracket 60, and when the drum 47 is revolved, the drum 48 will also be revolved by the travelling thread which is propelled by the drum 47, the loops of the thread serving as means for transmitting the power from the drum 47 to the drum 48, as will be readily understood.

The drums 47 and 48 preferably should be of the same diameter and have the same number of grooves 49, and the thread, which is first passed over the drum 47, is then looped around the drum 48 and returned to the drum 47, this looping of the thread around the drums continuing until a multiplicity of parallel loops are formed. In this way a considerable length of thread will be exposed to the atmosphere between the two drums, thus permitting some of the solution to evaporate before the thread is further treated.

The thread is led from the drum 47 upwardly to a drum 62 at the top of a dryer 63, the drum 62 also being of substantially the same diameter as the drums 47 and 48 and having a plurality of grooves 64 therein.

The dryer 63 comprises an elongated body, preferably formed from sheet metal and having an open top to permit the escape of the heat, and its bottom connected to a pipe 65 containing a heating element 66, of any approved type. The circulation of the heat through the dryer may be effected through a blower unit 67, also of any approved type. However, it should be noted that I do not wish to be limited to the precise form of dryer or heating means therefor illustrated, as any approved means may be employed, in lieu of that shown.

Near the bottom of the dryer there is another drum 69, similar in construction to the drum 62 and having a plurality of grooves 70 thereon. The thread is passed around the drums 62 and 69 a multiplicity of turns, in the manner shown by Figure 4, and is led from the drum 62 to a reel 71 on the end of the machine opposite to the reel 21.

For the purpose of moving the thread through the dryer 63 and also for the purpose of reducing the elasticity in the thread, the drums 62 and 69 are adapted to be rotated at a speed faster than the speed of the drums 47 and 48, so that the thread will be drawn from the drum 47 faster than it is delivered thereto.

In the present instance I have employed a direct drive from the drum 47 to the drum 69, such drive comprising a gear 73 mounted on one end of the drum 47, which gear meshes with an idler gear 74 revolvably mounted in a bracket fixed to the side bar 12. The gear 74 meshes with a gear 75 fixed to the spindle 76 of the drum 69. The gear 75 is provided with a less number of teeth than either of the gears 73 and 74, and the construction and arrangement of the parts should be such that the drums 47 and 69 are both rotated in the same direction with the speed of the drum 69 slightly faster than that of the drum 47.

Inasmuch as the drum 62 will be rotated at the same speed as is the drum 69, the tendency will be for the drum 69 to draw the thread 22 upwardly from the drum 47 and over the drum 62 at a speed slightly greater than the speed at which the thread travels around the drums 47 and 48, and in this way the thread will be stretched. In actual prac-

tice it has been found that there is a slight slippage in the initial loops of thread around the drums 62 and 69, after which, the length of the thread having been substantially increased, the remaining loops of the thread will travel around the drums 62 and 69 with the same tautness. It has also been found that the stretching of the thread in the manner herein described also serves to compress the projecting fibres of the thread down on to the body thereof, as the thread passes around the drums.

It is desirable that the thread in the dryer be smoothed so as to impart a linen-like finish thereto. Any suitable means may be employed for this purpose, such for instance as the pair of devices 78, shown in Figures 1 and 12, and in detail by Figures 10 and 11. As each of these devices is similarly constructed, a description of one, will suffice for the two.

The opposite walls of the dryer 63 are formed with pockets 79. A pin 80 is mounted transversely of each pocket for receiving a bifurcated end 81 projecting from the body of the device 78, which end is fastened to the pin 80 by means of a set-screw 82. The body of the ironing device is U-shaped and spanning the ends of the arms thereof is a rod 83 that carries a plurality of fingers 84. These fingers are formed from sheet metal, bent to the form shown in Figures 10 and 11, and have their outer ends formed with hooks 85. The fingers are alternately disposed on the rod 83, so that, as seen from above, their extremities cross, thus providing eyes through which the thread passes in the manner shown by Figure 10. Alternate fingers 84 may be fixed while the remaining fingers may be resiliently mounted on the rod 83 and urged away from the fixed fingers through the action of a spring 86.

When the thread is inserted between the fingers in the manner shown by Figure 11, the spring pressed arms will press the thread against the adjoining fixed arms and thus impart a highly finished surface to the thread as it moves in the serpentine manner shown, through the devices 78. This action will also compress all the surface fibres of the thread and hence provide for better machine sewing, as will be readily understood.

The reel 71 is mounted on a spindle 88 carried by a bracket 89 pivotally mounted on the end bar 14 of the frame.

Obviously, the reel 71 may be rotated in any suitable manner, so that it will take up the thread from the dryer 63. One means is shown in the drawings, wherein the spindle 76 has a pulley 90 mounted theron, which pulley is connected to a pulley 91 carried by the reel 71, by a belt 92. The bracket 89 may be retained in a fixed position by a suitable adjustable arm 87 fixed to the side bar 11 and engaging one of the sides of the bracket, in the manner shown.

For the purpose of laying the thread evenly on the reel 71, use is made of a slotted arm 93, which is carried by a rod 94, slidably mounted in brackets 95 and 96. The rod 94 is reciprocated by a cam 97, mounted in the bracket 96. The cam is adapted to be driven from the gear 53, and as shown, the drive includes a spur gear 98 revolvably mounted in a bearing 99 fixed to the side bar 12, the hub of this gear having a worm 100 meshing with a worm 101 on one end of a counter-shaft 102. The opposite end of the shaft 102 has a worm 103 which meshes with a worm 104 on the shaft 105 of the cam 97. The construction should be such that one revolution of the cam will move the arm 93 forward and backward over the reel, as will be readily understood.

In machines of the type falling within the scope of the present invention, it is of advantage to provide means for automatically arresting the operation of such machines when imperfections appear in the thread, so that the imperfections can be removed before the thread is finished. Therefore, the shaft 50 has means including a clutch 107 that is normally in engagement with the drum 47, and this clutch is adapted to be disengaged from the drum either automatically or manually by mechanisms to be hereinafter fully described.

The clutch 107 is slidably mounted on the shaft 50, and is connected to the shaft by means of a key 108. The periphery of the clutch 107 is bevelled, as indicated at 109, and this surface is adapted to engage with a correspondingly beveled face 110 formed in the end of the drum 47. The clutch is recessed to receive an expansible coil spring 111 which encircles the shaft 50 and bears against the end of the drum and the clutch. The purpose of this spring is to force the clutch 107 away from the drum.

For the purpose of retaining the clutch 107 in operative engagement with the end of the drum 47, I have provided means, including a lever 120 which is fulcrumed in a bracket 121 carried by the side bar 11. The end of the lever adjacent to its fulcrum point is bifurcated, as indicated at 122, to provide two arms for straddling the shaft 50. These arms of the lever are so formed that the ends thereof bear against a thrust bearing 112 on the outer portion of the clutch 107 and force the clutch inwardly towards the drum (see Figure 5).

The end of the drum 47 adjacent to the clutch 107 is encircled by a band 113 composed of two semi-circular sections pivotally mounted to a bracket 114. The bracket 114 is carried by a rod 115 supported by the standards 16 and 17. The free ends of the sections of the band 113 are provided with beveled faces 116, and beyond these beveled faces, the extremities of each of the sections of the band are formed with oppositely extending bosses 117 which are disposed transversely of the band, such bosses being formed

with alined openings through which bolts 118, or the like, are passed. Springs 119 are mounted on each of these bolts in the manner shown in Figure 6 so that the free ends of the band 113 will be drawn together to cause the band to frictionally engage the periphery of the end of the drum, and thus prevent rotation of the drum. However, inasmuch as the drum should be normally free to rotate, the lever 120 is provided with a laterally extending lug 123 having upper and lower bended faces 124 for engaging with the faces 116 of the band 113. In this way the lug 123 constitutes a wedge, and the construction of the parts should be such that when the clutch 107 is engaged with the drum, the lug 123 will be so disposed between the ends of the band 113 as to force the sections of the band from the periphery of the drum in the manner clearly shown by Figure 6, and when the lever is swung towards the drum the lug 123 will be moved inwardly a sufficient distance to permit the springs 119 to draw the sections of the band 113 tightly against the periphery of the drum.

The end of the lever 120 opposite to the end 122 thereof is adapted to be releasably connected to a detector member, in the form of a lever 125 fulcrumed in a bracket 126 carried by the side bar 12. The outer end of the lever 120 has a socket member 127 adjustably mounted therein, while the bracket 126 is provided with an ear 128 carrying a similarly formed socket member 129, also adjustably mounted therein. The members 127 and 129 are disposed in alinement with each other when the lever 120 is in normal position, so as to receive an annular head 130 on the end of the short arm of the lever 125 (see Figures 5 and 7).

The lever 125 is pivotally mounted to swing vertically, while the lever 120 is adapted to be swung in a plane at right angles thereto, or horizontally. As shown clearly in Figure 2, the pivotal mounting of the lever 125 includes tension means comprising a coil spring 131 adapted to force the end of the long arm of the lever upwardly. The outer end of the lever 125 is provided with an eye 132 through which the thread 22 passes. The disposition of the eye 132 should be such that it is directly beneath the cross-bar 24, and the opening in this eye should be of such size as to ordinarily permit the passage of the thread, but prevent the passage of knots or other imperfections in the thread (see Figure 8). In this way the eye constitutes means for detecting imperfections in the thread. A knot or other imperfection in the thread larger than the opening in the eye 132 will, as the thread is being drawn downwardly towards the tank 36, depress the outer end of the lever 125, thereby disengaging the head 130 from the sockets 127 and 129. This action will release the lever 120 and the spring 111 will force the clutch 107 outwardly thus swinging the lever on its fulcrum. This action will move the lug 123 towards the periphery of the drum thereby permitting the springs 119 to draw the sections of the band 113 into frictional engagement with the periphery of the drum. The continued rotation of the reel 21, lengthens the loop 25, thus permitting the arm 26 and roller 28 to descend, thereby applying the band 32 to the disk 31 in the manner heretofore described, and in this way further rotation of the reel 21 will be prevented.

Inasmuch as the drum 69 is driven from the shaft 50, as soon as the clutch 107 has been disengaged from the drum 47, the drum 69 will also be stopped, and in this manner further travel of the thread through the machine will be prevented until the levers 120 and 125 are reset to the operative position shown in Figure 6.

The lever 120, above the socket piece 127, is provided with a handle 133, which may be used to manually disconnect the lever 120 from the lever 125, and which may also be used to reengage the ends of the levers with the latch provided by the sockets 127 and 129 and the head 130.

The stop motion shown in this application forms the subject matter of a separate application filed on even date herewith in which the claims are more specifically drawn to that mechanism.

The foregoing description is directed solely towards the construction illustrated, but I desire it to be understood that I reserve the privilege of resorting to all the mechanical changes to which the device is susceptible, the invention being defined and limited only by the terms of the appended claims.

The invention claimed is:—

1. In a thread dressing machine, means for impregnating the thread with a liquid dressing, means for partially drying the thread, including a pair of spaced drums adapted to carry a multiplicity of loops of the thread, means for drying the thread, including a heated casing, means for supporting the thread within the said dryer, including a pair of spaced drums adapted to carry a multiplicity of loops of the thread, and means for ironing the thread while it is being dried.

2. In a thread-dressing machine, two sets of drums spaced from each other, one set being driven faster than the other set, and a length of thread looped a plurality of times about each set to hold the thread against slipping in either set while the stretching tension is being applied to that portion extending between the sets.

3. In a thread-dressing machine, a set of spaced drums about which a single thread is looped a plurality of times, a separate set of drums widely spaced from the first set and from each other about which the thread is

led and also looped a plurality of times to prevent slipping under a stretching tension and facilitate drying, and means for driving the second set faster than the first set.

4. In a thread-dressing machine, means for moistening the thread, a set of spaced drums about which the moistened thread is looped a plurality of times to prevent slipping while under tension and partially dry it in the open air, a vertically disposed drying chamber, a separate set of drums in said chamber to and about which the thread is led from the first pair and looped a plurality of times, and means for driving the second set faster than the first set.

5. In a thread-dressing machine, means for moistening the thread, a set of spaced drums about which the moistened thread is looped a plurality of times to prevent slipping while under tension and partially dry it in the open air, a separate set of drums widely spaced from the first set and from each other and about which the thread is looped a plurality of times to prevent slipping and facilitate drying, means for driving the second set faster than the first set, and means for applying a drying heat to the thread while traveling over the second set.

6. In a thread-dressing machine, a pair of grooved drums adapted to carry a multiplicity of loops of a length of damp thread, a second pair of widely spaced grooved drums also adapted to carry a multiplicity of loops of this thread after the same has passed around the said first pair of drums, and means for driving the second pair of drums faster than the said first pair, whereby the thread will be stretched between the two sets of drums and held from slipping by the plurality of loops about each pair.

7. In a thread-dressing machine, a supply reel, a tank containing a dressing solution, means for passing the thread thru the tank, a pair of grooved drums adapted to carry a multiplicity of loops of the damp thread after the same emerges from the tank so as to prevent the thread from slipping and to permit the thread to partially dry, a second pair of grooved drums also adapted to carry a multiplicity of loops of the thread after the same has passed around the said first pair of drums, means for driving both pairs of drums from a single source of power, said second pair of drums being adapted to be driven faster than the said first-named pair of drums, whereby the thread will be stretched between the pairs of drums, means for drying the thread while traveling over the second pair of drums, means for ironing the thread so as to compress the fibres thereof, and means for packaging the thread.

8. A method of finishing thread, which consists in impregnating the thread with a sizing solution, holding the same from slipping and also partially drying the thread by wrapping it a plurality of times about a pair of spaced rotatable members, stretching the thread while partially dried by leading it to and wrapping it a plurality of times about a pair of more rapidly rotating members and drying the thread while held in stretched condition.

9. A method of finishing thread, which consists in impregnating the thread with a sizing solution, holding the same from slipping and also partially drying the thread by wrapping it a plurality of times about a pair of spaced rotatable members, stretching the thread while partially dried by leading it to and wrapping it a plurality of times about a pair of more rapidly rotating members, and drying and ironing the thread while in a stretched condition.

10. A method of finishing thread, which consists in impregnating the thread with a sizing solution, holding the same from slipping and also partially drying the thread by wrapping it a plurality of times about a pair of spaced rotatable members, stretching the thread while partially dried by leading it to and wrapping it a plurality of times about a pair of more rapidly rotating members, causing the loops about the second rotatable members to pass thru a heated drying chamber, subjecting the thread to a plurality of ironing operations and finally packaging the thread.

In testimony whereof I affix my signature.

JOHN P. KING.