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THERMAL TREATMENT OF TEXTILE YARNS

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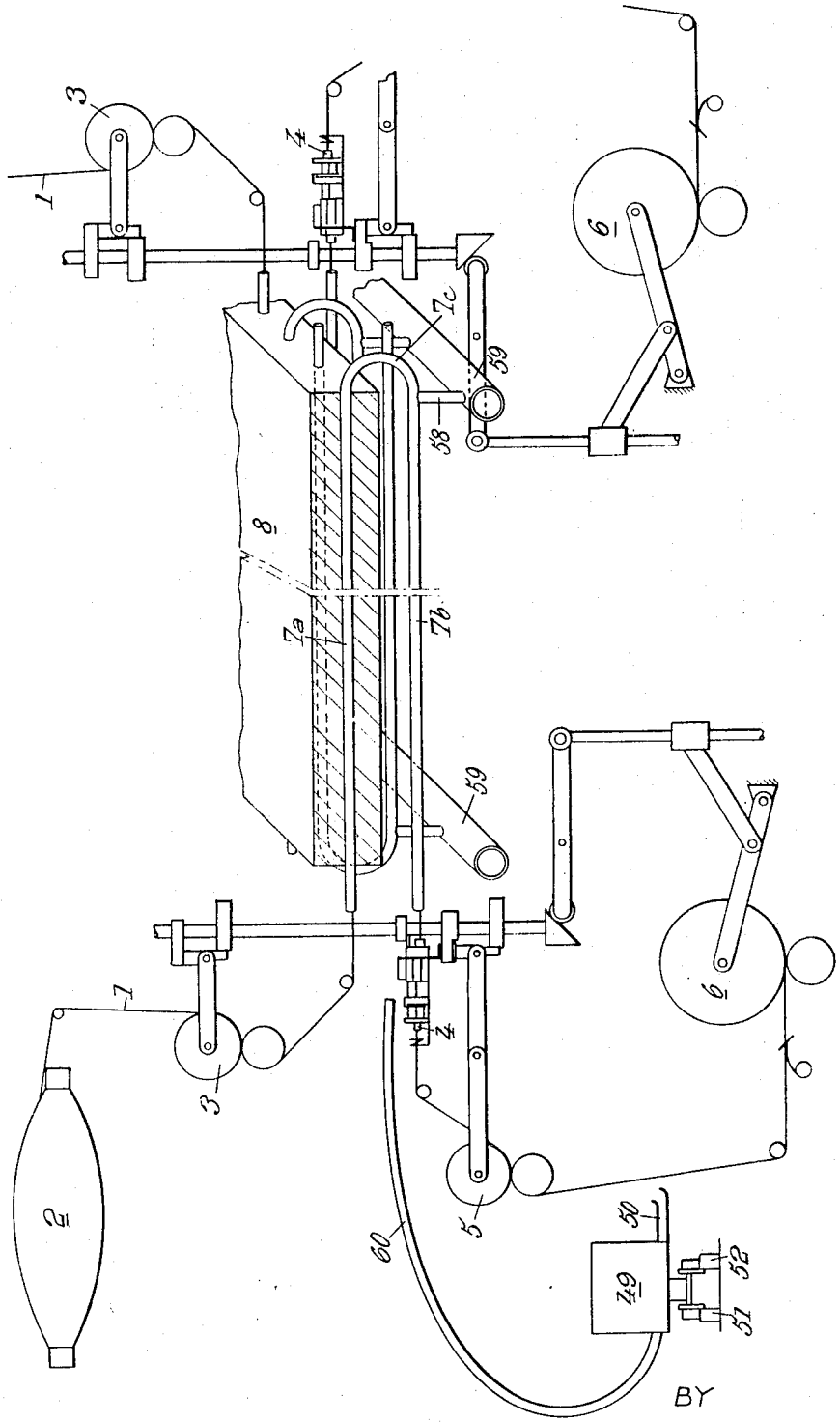

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THERMAL TREATMENT OF TEXTILE YARNS

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The present invention relates to machines for the thermal treatment of textile yarns, in particular for false twist crimping, of the type comprising a guide conduit at one end of which the yarn enters and at the other end of which said yarn issues after having been heated when passing through said conduit.

In the known machines of this type, said conduit extends over a substantially straight path, generally vertical, and therefore its ends are at a distance from each other of the order of magnitude of its length. In view of the fact that the temperature of heating in said conduit cannot exceed a given value, the rate of movement of the yarn passing through said conduit cannot exceed a given value if a given degree of heating is to be reached.

The object of the present invention is to permit a higher rate of movement of the yarn passing through the conduit while keeping the respective ends of said conduit within easy reach of the operator.

For this purpose, the yarn guiding conduit according to the invention is in the form of a loop having its inlet end at a distance from its outlet end small enough to place them both within easy reach of a normal operator, the length of said loop being substantially greater than the maximum scope of reaching of said operator, means being provided for heating a portion of said loop ending at a distance from said outlet end.

A preferred embodiment of the present invention will be hereinafter described with reference to the appended drawing, given merely by way of example, and in which:

The sole figure is a diagrammatical view, partly in section and partly in perspective, of a machine according to the present invention.

The machine according to the present invention comprises a cop **2** from which the yarn to be treated is unwound, a first delivery device **3** to receive the yarn from cop **2**, a conduit **7***a*–**7***b* in which the yarn from delivery device **3** is heated, a false twist spindle **4** adapted to receive the yarn from conduit **7***a*–**7***b*, a second yarn delivery device **5** located downstream of said false twist spindle **4** and a receiving reel **6** for the yarn from said delivery device **5**.

In the known machines, the conduit extending between delivery device **3** and false twist spindle **4** was a straight conduit, generally vertical, heated over its entire length. As both ends of said conduit had to be within reach of the operator and as the heating temperature was limited, the speed of travel of the yarn through said conduit was also limited, in order to obtain the desired heating.

According to the present invention, conduit **7***a*–**7***b* is in the form of a loop, heated over a portion **7***a* of its length, so that the length of said loop, and therefore of the heated portion thereof, can be given any desired length, thus making it possible to increase the speed of travel therein to any corresponding desired value, whereas the inlet end and the outlet end of conduit **7***a*–**7***b* are located at a distance from each other small enough to place them both with easy reach of the operator.

In the embodiment shown in the drawing, the loop is formed of two conduit portions **7***a* and **7***b* parallel to each other and connected by an intermediate bend **7***c* so that the yarn travels in portion **7***b* in a direction parallel but opposed to that in which it travels in portion **7***a*.

The yarn is heated in conduit portion **7***a* and cooled in conduit portion **7***b*.

It is thus possible, according to the present invention, to cause the yarn to travel at the rate of 100 meters per minute, the heating and cooling path being each equal to about 1.6 meters.

Conduit branches **7***a* and **7***b* are horizontal and located one above the other, the top branch **7***a* extending through a heating device **8**.

This heating device, which advantageously consists of a metallic block, is heat insulated to prevent the outflow of heat therefrom and contains heating resistors. Preferably, the block, as shown, is common to a plurality of parallel branches **7***a* of hair-pin shaped conduits opening alternately on one side and the other, respectively, of the machine.

The branch **7***b* of each conduit extends through the atmosphere for cooling purposes. It might also, according to a modification not shown, extend through a vessel in which circulates a cooling fluid such as water.

Furthermore, advantageously, as shown, the conduit, near the bend **7***c* thereof through which branches **7***a* and **7***b* are connected together, is in communication with a suction conduit **58**. This conduit **58** permits evacuating vapors from the hot conduit branch **7***a* which are formed therein and increasing the cooling of the yarn in branch **7***b*.

Evacuation of the vapors given off by the portion of the yarn that is heated, especially when said yarn is made of a polyamide, which vapors might condense on the inner wall of conduit branch **7***a*, prevents clogging thereof.

Advantageously, as shown, all the conduits the bends of which are located on the same side of the common heating device **8** are branched to a common collecting conduit **59** which runs parallel to the corresponding side of device **8**.

Preferably, the two collecting conduits **59** located on respective sides of the common heating device **8** communicate with a common suction device, not shown.

Advantageously, the suction created in tube **7***a*, **7***b*, **7***c* ranges from —200 to —300 grams per square centimeter.

If the inner diameter of conduit portion **7***c* is about 6 mm., this conduit portion is made to communicate with conduit **58** through a hole having a diameter of about 2 mm.

According to a modification not shown in the drawing, instead of connecting every portion **7***b* through a tube **58** with a corresponding collecting conduit **59**, every conduit portion **7***b* might pass through collecting conduit **59**, the part of portion **7***b* located inside conduit **59** being provided with a plurality of suction holes.

The arrangement according to the present invention permits obtaining heating and cooling paths as long as desired, the inlet of the heating path and the outlet of the cooling path being always sufficiently close to each other to be both within easy reach of the operator. Conduit **7***a*–**7***b*–**7***c* acts as a guide to permit said operator to pass the yarn therethrough without having to move, advantageously by making use of pneumatic means.

Advantageously, as shown, said pneumatic means comprise a vacuum pump **49**, which may be common to all the conduits **7***a*–**7***b*–**7***c* having their inlets and outlets on the same side of the machine. This vacuum pump **49** is movable along said side of the machine, for instance on rails **51**, **52**.

A flexible pipe **60** permits connecting the vacuum pump **49** to the opening of conduit branch **7***b*, causing yarn **1** to pass through conduit **7***a*–**7***b*–**7***c*. The suction necessary for this purpose advantageously ranges from —800 to —900 grams per square centimeter.

According to a modification not shown in the drawing, the yarn **1** is passed through conduit *7a–7b–7c* by blowing by means of compressed air. In this case, a flexible tube through which compressed air is fed, either from a compressor or from the exhaust of a suction pump **49**, is connected with the end of conduit *7a* where the free end of yarn **1** is introduced.

In order to facilitate this operation, there may be provided at the free end of yarn **1**, a small plug acting as a piston movable in cylindrical conduit *7a–7b–7c*.

Moreover, the pneumatic introduction of the yarn either by suction or by blowing further ensures a periodical cleaning of conduits *7a–7b–7c*.

Concerning the general arrangement of the machine, the yarn is moved from top toward bottom, the receiving reels **6** being located in the lower portion of the machine frame whereas delivering devices **3** and **5** and false twist spindles **4** are located above said reels **6**. It is thus possible to group in the lower portion of the machine all the elements which are to be mechanically driven, which permits lowering the center of gravity of the machine centralizing the driven means and reducing vibrations. Such a machine, all the elements of which are within easy reach of an operator of average size, permits the use of cops of very big size and of winding the yarn on receiving reels until said reels reach a very large diameter.

When yarn **1** is first sent over its path of travel, the beginning of said yarn, which has not been crimped by the false twist spindle, must not be wound on receiving reel **6**. For this reason, there is provided a suction member **50** to receive this initial portion of the yarn downstream of the second delivery device **5**. Suction pump **49** draws in the uncrimped portion of the yarn and once this portion has been removed, the yarn is connected to receiving reels **6**.

Suction opening **50** is advantageously provided, as shown, on the pneumatic pump **49**.

In a general manner, while the above description discloses what is deemed to be a practical and efficient embodiment of the present invention, said invention is not limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the invention as comprehended within the scope of the appended claims.

What I claim is:

1. A yarn thermal treatment machine which comprises, in combination, a yarn guiding conduit for circulation of the yarn therein, said conduit forming at least one loop having two substantially parallel elongated branches, an upstream one and a downstream one, and a bend between said branches, said guiding conduit downstream branch having its outlet at a distance from the inlet of the upstream branch small enough to place both said inlet and said outlet within easy reach of a normal operator, the length of said branches being substantially greater than the scope of reaching of said normal operator, means for heating the upstream branch of said loop, said downstream branch being in a cool medium, and a false twist spindle for said yarn located at the outlet of the downstream branch.

2. A machine according to claim **1**, wherein said conduit has the form of a hair pin.

3. A machine according to claim **1**, wherein said conduit has the form of a hair pin, the two branches of said hair pin shaped conduit being horizontal and located one above the other.

4. A yarn thermal treatment machine which comprises, in combination, a yarn guiding conduit forming a hair pin shaped loop having its outlet end at a distance from its inlet end small enough to place them both within easy reach of a normal operator, the length of each branch of said hair pin shaped loop being substantially greater than the scope of reaching of said normal operator, means for heating only the upstream branch of said loop, and a conduit communicating with a portion of said hair pin shaped conduit close to the bend thereof for, on the one hand, evacuating vapors from said upstream branch and, on the other hand, circulating a cooling air stream through the downstream branch of said loop.

5. A machine according to claim **4** wherein said second mentioned conduit communicates with said first mentioned one at a point thereof downstream of said bend.

6. A yarn thermal treatment machine which comprises, in combination, yarn guiding conduit forming a loop having its outlet end at a distance from its inlet end small enough to place them both within easy reach of a normal operator, the length of said loop being substantially greater than the scope of reaching of said normal operator, means for heating only a portion of said loop ending at a distance from said outlet end thereof, and pneumatic means adapted to be connected with one end of said conduit for passing the end of a yarn therethrough.

7. A machine according to claim **4**, further comprising yarn crimping means located near said conduit outlet end for crimping the yarn having passed through said conduit and a vacuum pump adapted to suck in, at the beginning of the machine operation, the portion of the yarn having passed through said conduit which has not been crimped by said crimping means.

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