

March 14, 1944.

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2,344,181

METHOD OF AND APPARATUS FOR TREATING CLOTH

Filed Aug. 3, 1940

3 Sheets-Sheet 1

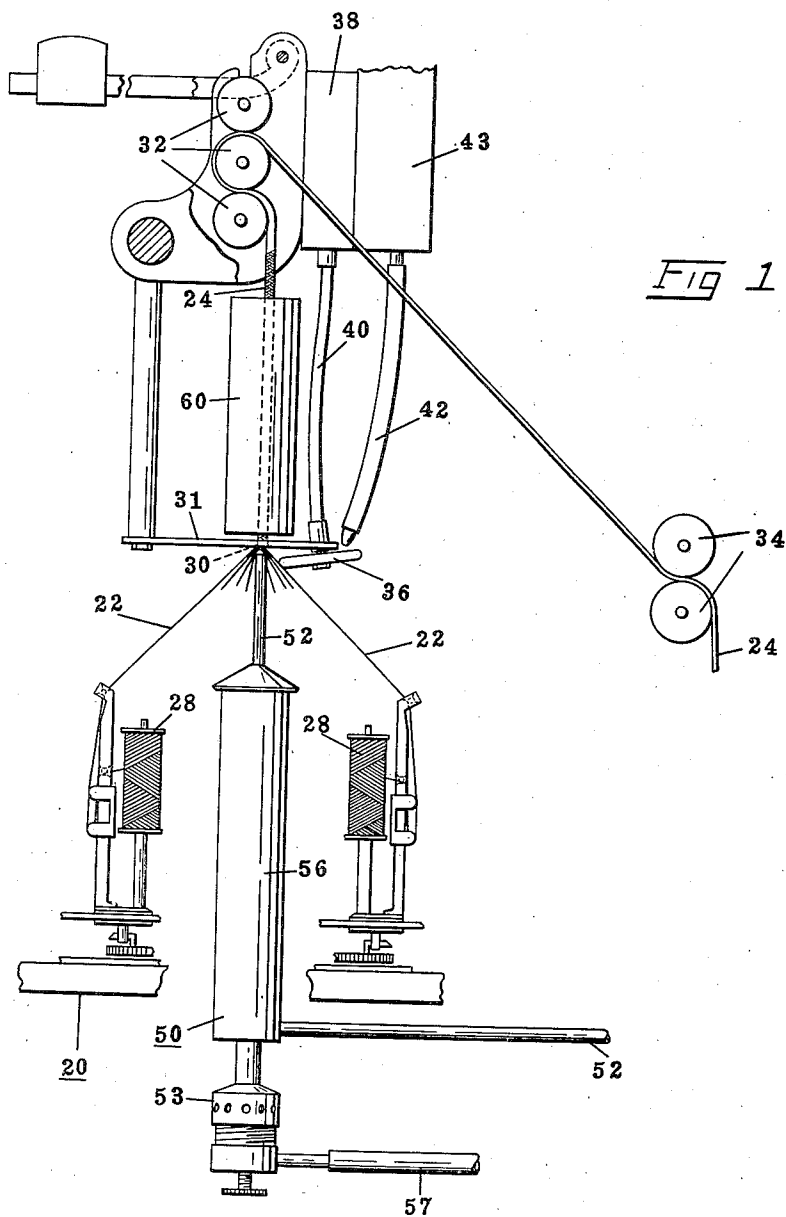


Fig 1

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3 Sheets-Sheet 2

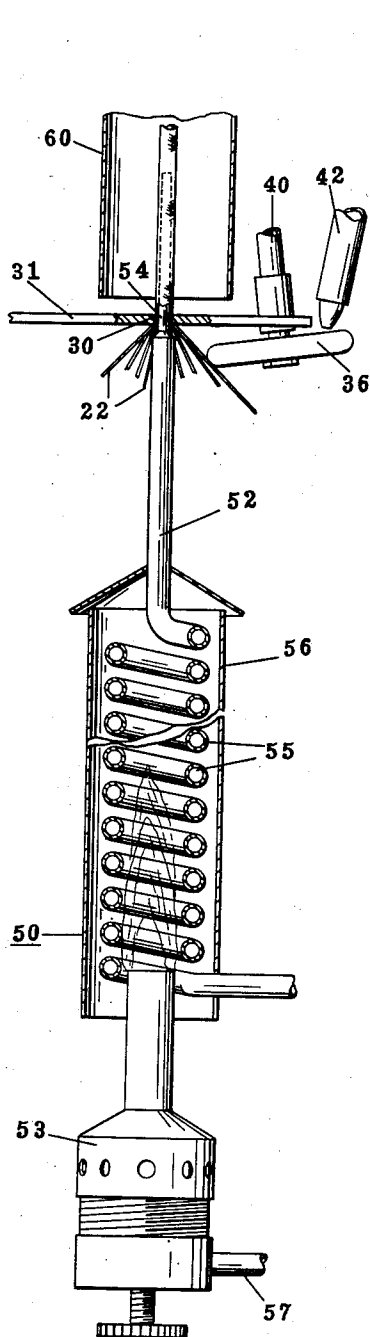


Fig 2

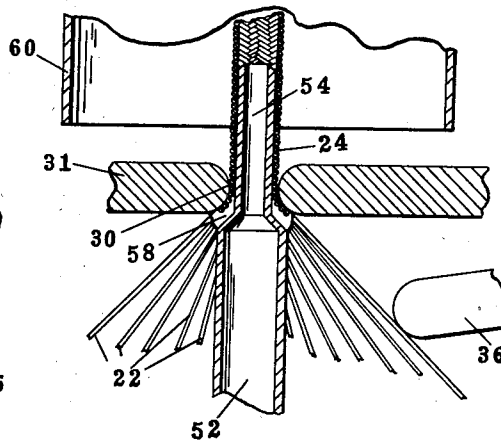


Fig 3

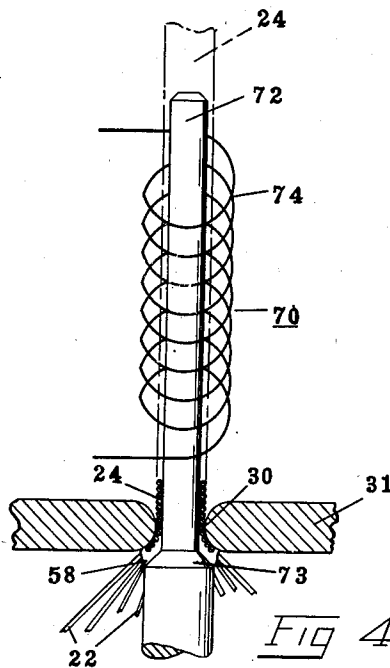


Fig 4

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3 Sheets-Sheet 3

FIG 5

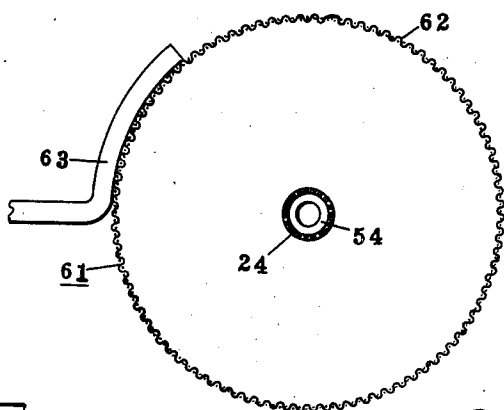
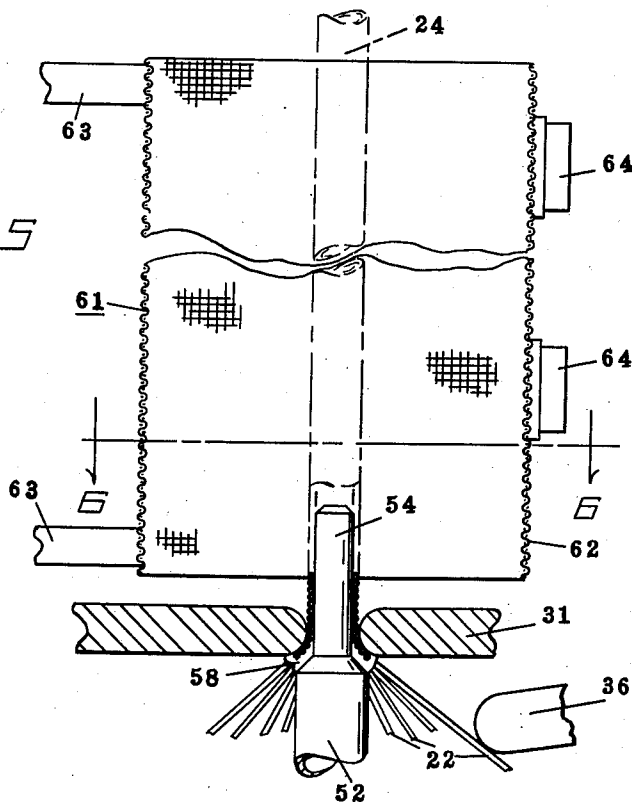


FIG 6

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METHOD OF AND APPARATUS FOR
TREATING CLOTH

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Application August 3, 1940, Serial No. 350,536

20 Claims. (Cl. 87—1)

The present invention relates to the method of and apparatus for manufacturing and treating cloth and more particularly to the treating of cloth while it is being manufactured by a machine, such as a circular loom or a braiding machine, for making cloth in tube-like form.

It is among the objects of the present invention to subject the strands, which form the tube-like shaped cloth, to a wet solution including a substance adapted to adhere to the strands, and, after the tube-like shaped cloth is formed, to apply heat from the interior thereof.

More specifically, it is a further object of the present invention to apply heated air to the interior of the tube-like shaped cloth.

Another object of the invention is to provide for first subjecting the wet tube to heat while the tube is in a relatively dormant atmosphere and thereafter subjecting the partially dried tube to heated air.

A still further object is to first wet the strands with a solution containing a substance adapted to adhere to the strands and thereafter subject the entwined strands to a like but drier solution and thereafter apply sufficient heat and/or air to thoroughly dry the tube.

Other and further objects and advantages will be apparent from the following description, reference being had to the accompanying drawings wherein preferred forms of embodiments of the present invention are clearly shown.

In the drawings:

Fig. 1 is a view in elevation of a braiding apparatus. For clearness of illustration, parts of the apparatus are shown broken away and other parts are shown diagrammatically;

Fig. 2 is a fragmentary view, partly in section and on a larger scale, of parts of the apparatus shown in Fig. 1;

Fig. 3 is a fragmentary sectional view on a still larger scale, of certain parts shown in Fig. 2;

Fig. 4 is a view, partly in section, of an alternate form of heater;

Fig. 5 is a view similar to Fig. 3, but showing a heater for the exterior of a braided tube, and Fig. 6 is a view taken on line 6—6 of Fig. 5.

Any type of mechanism for entwining strands or threads for fabricating cloth into a tube or in a tube-like shape may be utilized, and to illustrate one form of the invention, I have shown a conventional braiding machine such as that shown in the booklet entitled "Nebuttco Braiding Machinery Catalog 38," published by New England Butt Co., Providence, R. I., for forming braided tubes. This braiding machine is gen-

erally shown at 20 for braiding strands 22 into a tube 24.

The strands 22 are carried on a plurality of bobbins 28, only two appearing in the drawings, and the strands extend upwardly through an opening 30 in a plate 31. The bobbins 28 are moved in sinuous, circular paths for causing the strands to be braided to form the tube 24 at the opening 30. As the tube 24 is formed it is drawn upwardly between rollers 32 and it is then directed to a suitable container, not shown, by rollers 34.

A wet solution of material adapted to adhere to the strands 22 is applied to the strands by a rotating wheel 36 having its periphery engaging the strands below the opening 30. Preferably the wheel 36 has a periphery formed of soft fibrous material for presenting a wide moisture retaining surface to the strands. The wheel is rotated by mechanism, indicated at 38, through a flexible shaft 40. The solution, which may be, for example, a colloidal solution of latex, is directed onto the upper face of the wheel 36 through a tube 42 connected with a receptacle 43. The wheel 36 is tilted toward the strands and the solution flows over the periphery of the wheel and onto the strands. Thus, as the strands are moved in the circular path and upwardly by the braiding mechanism, each strand is subjected to the solution flowing over the periphery of the wheel 36.

A drying device, indicated at 50, comprises a tube 52, preferably formed of copper and a burner 53 for heating the tube and air passing through the tube. The tube is connected at one end to a source of air supply, not shown, and an elongated nozzle 54 is provided at the upper end thereof. The tube 52 is formed in a spiral 55 above the burner 53 and the spiral is enclosed by a stack 56. The burner 53 is connected with a source of fuel through a pipe 57. The nozzle 54 extends upwardly through the opening 30 and the cloth tube 24 is formed around the nozzle.

As the tube 24 is formed the strands 22 are pressed against the edges of the opening 30 and the excess wet solution from the strands collects at 58 intermediate the junction of the tube 52 and nozzle 54. This solution is heated by the heat from the tube 52 which thickens the solution. The thickened solution is tacky and readily adheres to the strands as they are braided. Thus a greater amount of solution may be applied to the tube as the tube is formed.

The tube 24, passing upwardly over the nozzle

54, is heated in a dormant atmosphere by the hot walls of the nozzle. This heat further thickens the solution on the strands and the latex is more firmly "set" on the strands forming the tube. Hot air is injected into the interior of the tube by the nozzle 54, which air passes outwardly through the interstices of the tube and thoroughly dries the tube. Thus the tube may be immediately wound on spools, for example, and the walls of the tube will not adhere to one another. The tube 24 is pinched by the rollers 32 so that the major portion of the air discharged from the nozzle 54 passes through the walls of the tube.

A tubular shield 60 is supported about the tube 24 above the nozzle 54 to retain a warm atmosphere around the outside surface of the tube to aid in the drying of the tube.

Another form of heater for drying the tube 24 is shown at 70. This heater comprises a rod 72 having a shoulder 73 and a portion that extends upwardly through the opening 30, which rod is heated by current induced therein by a high frequency coil 74. The diameters of the rod 72 above and below the plate 31 correspond to the diameters of the nozzle 54 and the tube 52, respectively. The coil 74 is spaced from the portion of the rod 72 above the plate 31 and the tube 24, formed around the rod 72, passes between the coil and rod. Preferably the rod 72 is formed of iron. The coil 74 is connected with a source of high frequency current for inducing an electric current in the rod 72 which causes heating thereof. As the tube 24 is formed, wet solution collects at 58 and the heat from the rod 72 thickens the solution which readily adheres to the tube as the strands 22 are braided. The heated rod dries the tube 24 from the interior thereof as the tube passes upwardly over the rod. The portion of the rod 72 which extends above the opening 30 is of sufficient length to cause thorough drying of the tube.

I have found that the most resilient tube can be made by distributing the heat more evenly and in a preferred embodiment, instead of supplying relatively intense heat at one place, I lessen the intensity of the heat at this place and supply the requisite additional heat at other places. Thus, in the embodiment illustrated in Figs. 5 and 6, heat is applied to the outside of the tube 24 by a cylindrical heater 61 formed of copper wire gauze 62, which gauze is mounted on brackets 63 and surrounds the tube 24 in the same manner as the shield 60. The gauze 62 is heated by suitable electric heaters 64 attached to the gauze. By providing the heater 61 for drying the exterior of the tube 24, the temperature of the air discharged through the nozzle 54 need not be as high as in the embodiment shown in Figs. 1, 2 and 3. The heater 61 may also be used for drying the exterior of the tube 24 when the interior of the tube is heated by the heater 70. In this event the intensity of the heat of the heater 70 may be reduced.

By my method and apparatus a wet solution of material adapted to adhere to the strands forming the tube may be applied to thoroughly coat the strands and the solution is quickly dried so that the tube may be immediately compressed for storage on spools or the like.

The present invention is particularly useful in the manufacture of tubing or flat weave or braid formed of glass or other relatively inert threads. By applying a material such as latex to the threads, the flexibility, elasticity and re-

siliency of the tube are materially increased and the tube attains the characteristics of a product made of organic matter such as one formed of cotton or woolen threads.

While the forms of embodiments of the present invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

I claim:

1. In the manufacture of cloth in tube-like form, those steps in the process which consists in subjecting the strands, which form the tube, to a wet solution including a substance adapted to adhere to the material of the strands, then applying heat to the tube while the tube is in a relatively dormant atmosphere and then applying heated moving air to the tube.

2. In the manufacture of cloth in tube-like form, those steps in the process which consists in subjecting the strands, which form the tube, to a wet solution including a substance adapted to adhere to the material of the strands, then applying heat to the tube from the interior thereof while the tube is in a relatively dormant atmosphere and then applying heated moving air to the tube.

3. In the manufacture of cloth in tube-like form, those steps in the process which consist in subjecting the strands, which form the tube, to a wet solution including a substance adapted to adhere to the material of the strands, then applying heat to the tube while the tube is in a relatively dormant atmosphere and then applying heated moving air to the tube from the interior thereof.

4. In the manufacture of cloth in tube-like form, those steps in the process which consists in subjecting the strands, which form the tube, to a wet solution including a substance adapted to adhere to the material of the strands, then applying heat to the tube from the interior thereof while the tube is in a relatively dormant atmosphere and then applying heated moving air to the tube from the interior thereof.

5. In the manufacture of cloth in tube-like form, those steps in the process which consist in subjecting individual strands to a wet solution including a substance adapted to adhere to the material of the strands, then subjecting the entwined strands to a like solution, then applying heat to the tube while the tube is in a relatively dormant atmosphere and then applying heated moving air to the tube.

6. In the manufacture of cloth in tube-like form, those steps in the process which consist in subjecting individual strands to a wet solution including a substance adapted to adhere to the material of the strands, then subjecting the entwined strands to a like solution and then drying the tube from the interior thereof outwardly.

7. In the manufacture of cloth in tube-like form, those steps in the process which consist in subjecting individual strands to a wet solution including a substance adapted to adhere to the material of the strands, then subjecting the entwined strands to a like solution, then applying heat to the tube from the interior thereof while the tube is in a relatively dormant atmosphere and then applying heated moving air to the tube.

8. In the manufacture of cloth in tube-like form, those steps in the process which consist in subjecting individual strands to a wet solution including a substance adapted to adhere to the material of the strands, then subjecting the en-

twined strands to a like solution, then applying heat to the tube from the interior thereof while the tube is in a relatively dormant atmosphere and then applying heated moving air to the tube from the interior thereof.

9. In the manufacture of cloth in tube-like form, those steps in the process which consist in subjecting individual strands to a wet solution including a substance adapted to adhere to the material of the strands, then subjecting the entwined strands to a partially dried, like solution while the strands are being entwined to form the tube; and then drying the tube.

10. In combination with a machine for making cloth in tube-like form; means for supplying a wet solution to the strands while the tube is being formed; heating means disposed adjacent the forming end of the tube; and means beyond the forming end of the tube for applying heat to the tube.

11. In combination with a machine for making cloth in tube-like form; means for supplying a wet solution to the strands while the tube is being formed; heating means within the tube disposed adjacent the forming end of the tube; and means beyond the forming end of the tube for applying heat to the tube.

12. In combination with a machine for making cloth in tube-like form; means for supplying a wet solution to the strands while the tube is being formed; heating means disposed adjacent the forming end of the tube; and means beyond the forming end of the tube and within the tube for applying heat to the tube.

13. In combination with a machine for making cloth in tube-like form; means for supplying a wet solution to the strands while the tube is being formed; a hollow element within the tube disposed adjacent the forming end of the tube; and means for supplying heated fluid to the element in the direction of movement of the tube.

14. In the manufacture of cloth in tube-like form, those steps in the process which consist in subjecting the strands, which form the tube, to a wet solution including a substance adapted to adhere to the material of the strands and then applying heat to the tube from the interior and exterior thereof.

15. An article of manufacture comprising a

resilient and pervious tube formed of entwined glass strands, and each strand having a coat of dried elastic material.

16. An article of manufacture comprising a resilient and pervious tubularly shaped element formed of entwined strands, said strands being formed of glass, and each having a substantially individual coat of dried resilient material.

17. The process of manufacturing a resilient and elastic tube from glass strands, which consists in coating the strands with a wet solution containing a substance, which when dried forms a resilient body and which adheres to the strands, then entwining the strands for forming a tube, and then drying the wet solution on the strands by forcing a drying fluid through the walls of the tube.

18. The process of manufacturing a pervious, resilient and elastic tube like member from glass strands, which consists in coating the strands which form the tube with a wet solution including a substance which forms a resilient body when dry and which is adapted to adhere to and to form individual coatings for each of the strands, and then drying the solution while the entwined strands are in tubular form.

19. The process of manufacturing a pervious, resilient and elastic tube like member from glass strands, which consists in coating the strands which form the tube with a wet solution including a substance which forms a resilient body when dry and which is adapted to adhere to and to form individual coatings for each of the strands, and then drying the strands forming the tube by forcing a drying medium through the interstices of the tube.

20. The process of manufacturing a pervious, resilient and elastic tube like member from glass strands, which consists in coating the strands which form the tube with a wet solution including a substance which forms a resilient body when dry and which is adapted to adhere to and to form individual coatings for each of the strands, and then drying the strands forming the tube by forcing a drying medium axially into the tube and outwardly through the interstices of the tube.

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