April 27, 1943. H. DREYFUS ET AL 2,317,448

APPARATUS FOR TREATMENT OF ARTIFICIAL MATERIALS

Filed Dec. 31, 1938

FIG. 1

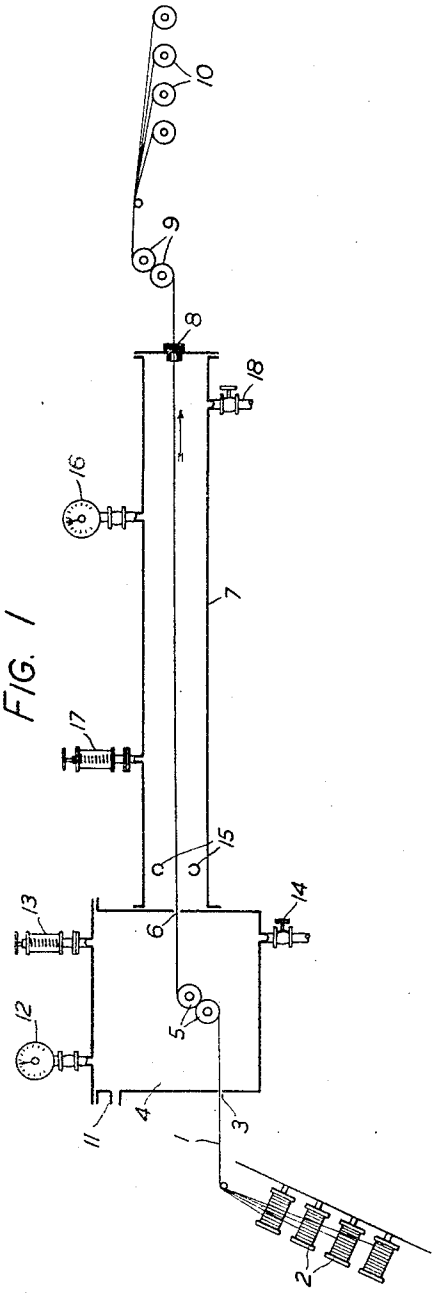


FIG. 5

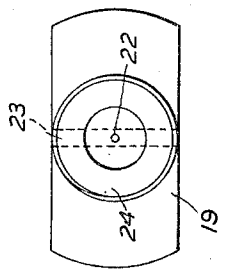


FIG. 4

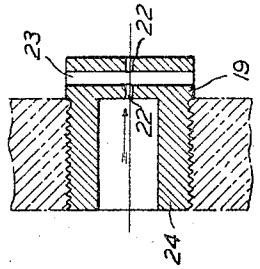


FIG. 3

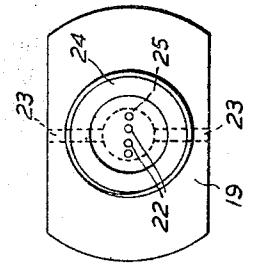
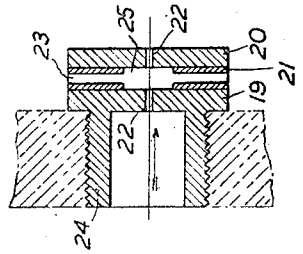


FIG. 2



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APPARATUS FOR TREATMENT OF ARTIFICIAL MATERIALS

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Application December 31, 1938, Serial No. 248,862
In Great Britain January 5, 1938

1 Claim. (Cl. 68—5)

This invention relates to improvements in or relating to the treatment of yarns and other materials, and particularly to improvements in apparatus in which yarns and other materials are subjected to treatment with fluids under pressure.

This application is a continuation-in-part of application S. No. 123,104, filed January 30, 1937 (issued as Patent No. 2,142,722, January 3, 1939), said application being a division of application S. No. 4,510, filed February 1, 1935.

U. S. Patents Nos. 2,142,722 and 2,142,721 describe processes for improving the tenacity of artificial filaments, threads and other materials according to which they are stretched during their passage through a chamber containing steam or hot water under pressure. The materials leave the chamber through small orifices, and unless special precautions ar taken, such as the provision of an end chamber as described in U. S. Patent No. 2,142,909, a flow of fluid from the chamber through the orifices takes place. This fluid current may exert an undesirable tension on the materials, particularly when the pressure in the steam chamber is high, since the fluid currents issuing from the exit orifices may persist for some distance along the path of the materials. These currents may also prevent rapid cooling of the materials when they emerge from the stretching chamber.

It has now been discovered that these disadvantages may be reduced or eliminated by diverting the fluid current from the materials as they pass into the atmosphere. This may be effected according to the present invention by means of a jet for the passage of the materials which is provided with an additional fluid outlet, distinct from the orifice or orifices through which the materials pass. The additional fluid outlet may comprise one or more orifices. There may also be one or more orifices for the materials which are referred to collectively in the specification as the outlet for the materials. The additional outlet is connected with the stretching chamber through the outlet for the materials and not directly with the chamber. By making the total cross-sectional area of the additional fluid outlet large in comparison with the cross-sectional area of the outlet for the materials, the flow of fluid through this outlet may be reduced considerably or substantially eliminated.

The additional outlet may be connected with means for cooling and collecting the steam or hot water escaping from the stretching chamber, which is advantageous not only from the economic point of view but also because an undue degree of humidity in the atmosphere of the stretching room may thus be avoided.

One form of jet according to the present invention consists of three plates transverse to the direction of travel of the materials. The outer plates are made of sheet material of a suitable thickness, for example 1.5–2 mm. and drilled with a small orifice of about .4 mm. for the passage of the materials. The centre plate, which is made of sheet material of a similar thickness or slightly greater, is drilled with a larger orifice, for example 5 or 10 mm., the centres of all three orifices lying in the same straight line. Leading from the orifice in the centre plate are one, two or more radial orifices having a diameter of about 1 mm. and communicating with the external atmosphere. When this jet is in operation the fluid passes through the orifice in the plate nearest the stretching chamber into the chamber formed between the first and third plates by the orifice in the middle plate and most of it escapes through the radial orifices, since they are considerably larger than the orifice in the third plate through which the material issues into the atmosphere.

A similar jet suitable for a number of ends, e. g. about forty, consists of two outer circular plates about 8 inches in diameter and ⅛ inch thick and a centre circular plate of the same diameter and about ¾ inch thick. This plate has a central circular hole about 4 inches diameter which is connected with the edge of the plate by one or more orifices of e. g. ½ inch diameter. A suitable number of small orifices for the passage of the yarns are drilled in the outer plates and so positioned that when the three plates are assembled the yarns can pass through these orifices and through the central hole in the centre plate.

The amount of fluid issuing from the chamber and the relative proportions of the fluid passing through the additional fluid outlet and through the outlet by which the materials enter the external atmosphere may be regulated by modification of the lengths and cross-sectional areas of the different outlets. For example the third plate may be considerably thicker than the other two plates and may have a thickness of 10 or 20 mm. thus reducing the flow of fluid as compared with the case when it has a thickness of only 1.5–2 mm. The best dimensions for any particular outlet are dependent upon the dimensions of the other outlet and also upon the fluid pressure in the chamber.

While the additional fluid orifices are preferably radial and in a plane normal to the direction of travel of the materials, it is not essential that this should be so in order that the fluid current may be diverted. Thus, for example, they may lie on the surface of an imaginary cone, the axis of which lies along the direction of travel of the materials and the apex of which is nearer the stretching chamber than the base, so that the fluid shortly after its entry into the outlet for the materials diverges from the path of travel of the materials and follows a path which is inclined to their path at an angle less than the right angle. The small chamber formed between the first and third plates may also be omitted, and the jet may comprise merely an orifice of uniform cross-section for the materials connected with other orifices for the fluid.

Diversion of the fluid current issuing from the outlet by which the materials leave the stretching chamber may also be effected by means of a shield in the form of a plate positioned at a suitable distance from the outlet, e. g. 5 or 10 mm., and pierced with a suitable outlet for the passage of the materials. The space between this shield and the end of the chamber may be partially closed, e. g. on three sides, so that the fluid, after diversion by the shield, is forced to flow in one or more predetermined directions or it may be open on all sides.

The invention has been described in relation to the diversion of the flow of fluid through the outlet from a stretching chamber, since it is of most importance in this connection. It is, however, also applicable to the inlet to a stretching chamber and also in other cases in which fluid media under pressure are employed, e. g. when water is employed in an end chamber as described in U. S. Patent No. 2,142,912.

The apparatus according to the present invention is illustrated in the accompanying drawing, wherein

Fig. 1 shows a vertical cross-section of an apparatus suitable for stretching in the presence of steam and provided with a jet adapted to divert the steam from the materials issuing from the apparatus;

Figs. 2 and 3 illustrate, respectively, a vertical cross-section and an end view of a jet according to the present invention; and

Figs. 4 and 5 illustrate, respectively, a vertical cross-section and an end view of another jet according to the present invention.

Referring to Fig. 1, the threads 1 from a creel of bobbins 2 pass through small orifices 3 into a compressed air chamber 4 in non-slipping contact with nip rollers 5 in the compressed air chamber, through small orifices 6 into a steam chamber 7, out of the steam chamber through jet 8 of the type illustrated in Figs. 2 and 3, in non-slipping contact with nip rollers 9 for stretching, and are finally wound on a creel of bobbins 10. The compressed air is introduced through the inlet 11 into the chamber 4 which is provided with a pressure gauge 12, a pressure relief valve 13, and a steam trap 14. Steam enters through perforated pipes 15 so positioned that wet steam is directed on to the threads immediately on their entry into the steam chamber 7. The chamber 7 is also provided with a pressure gauge 16, a pressure relief valve 17, and a drain 18 for condensate.

The jet illustrated in Figs. 2 and 3 consists of three plates 19, 20 and 21 which are soldered or brazed together, the plate 19 having a threaded shank 24 adapted to screw into the end of the chamber for treatment fluid. The centre plate 21 has a circular hole 25 through its centre and leading from this hole are orifices 23. The other two plates 19 and 20 have central holes 22. In operation the yarn issuing from the treatment chamber passes through the holes 22 and 25 in the plates 19, 21 and 20 and the treatment fluid issuing from the chamber through the hole 22 passes into the hole 25 and escapes mainly through the radial orifices 23.

The jet illustrated in Figs. 4 and 5 contains only one thread orifice but is otherwise similar to that illustrated in Figs. 2 and 3 except that it is formed of a single piece of metal and the passage through the jet at right-angles to the thread orifice is of uniform dimensions throughout.

Having described our invention what we desire to secure by Letters Patent is:

Apparatus for the treatment of yarns, foils and similar materials with fluid media under pressure during their travel from one point to another, which comprises a substantially closed pressure vessel for fluid medium formed with a small orifice for the passage of the material under treatment through a wall of the vessel and an outlet communicating with a point within the length of the orifice so as to divert substantially all of the fluid medium entering the orifice along a path diverging from that of the material before the material reaches the atmosphere, the length of the path for the material through the orifice being small relative to the length of its path through the vessel.

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