Nov. 13, 1934. W. I. TAYLOR 1,980,234

APPARATUS FOR THE PRODUCTION OF ARTIFICIAL THREADS OR LIKE PRODUCTS

Filed May 4, 1933

FIG. 1.

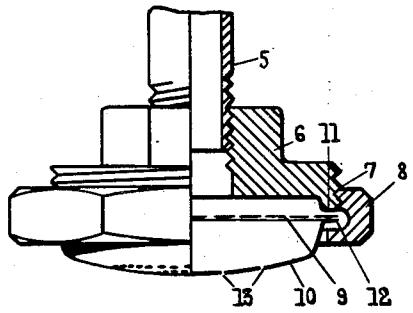


FIG. 2.

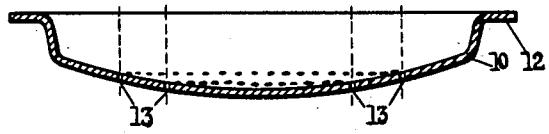


FIG. 3.

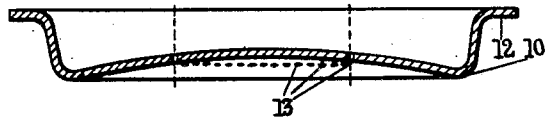
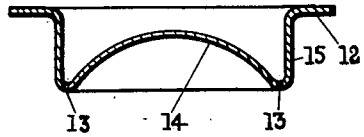


FIG. 4.



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APPARATUS FOR THE PRODUCTION OF ARTIFICIAL THREADS OR LIKE PRODUCTS

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Application May 4, 1933, Serial No. 669,280
In Great Britain June 2, 1932

3 Claims. (Cl. 18—8)

This invention relates to apparatus for the manufacture of artificial materials, and is particularly concerned with improvements in the spinning jets or nozzles used in the production of artificial filaments or like extruded products. The invention is of particular importance in connection with the spinning of filaments at high speeds and the spinning of fine filaments, whether at high speeds or otherwise.

Spinning jets for the production of artificial filaments are usually and most conveniently made of sheet metal, pressed or otherwise formed into the shape of a shallow cup, the flat bottom of which is pierced with orifices for the extrusion of the filaments. A spinning solution is supplied inside the jets under pressure, and is thereby forced through the orifices to form the filaments, the faster the required rate of extrusion and the finer the orifices the higher being the pressure which must be applied to the spinning solution behind the face of the spinning jet. In spinning at high speeds therefore, and especially in the spinning of fine filaments the pressure behind the jet may be so high as to cause the jet to bulge outwardly. The phenomenon of jet bulging gives rise to many difficulties. Thus for example, in a bulged jet, the spinning orifices point outwards, and cause the extruded filaments to spread instead of proceeding as a parallel compact bundle. It is an object of the present invention to reduce or overcome the difficulties outlined above, by reducing or preventing the bulging of the jets.

According to the present invention, in a spinning jet for the production of artificial filaments the face of the jet containing the spinning orifices consists of a thin surface which is curved, and thereby stiffened to resist distortion. In this manner disadvantageous bulging of the jet when under pressure is avoided or reduced to a large extent, as a result of the increased strength arising from the curved construction of the jet face. Thus, while a plane sheet of metal may be distorted under pressure to a considerable extent, a sheet which is curved in spherical or other non-planar form will not be distorted to nearly the same degree under the same pressure, whether such curved form is concave or convex. Slight distortion of the jet face under pressure cannot of course be completely overcome by this method, but the disadvantages arising from the degree of bulging which obtains when the present invention is used are substantially negligible.

The orifices are preferably formed in the jet after the jet has been given the curved form since they may thereby easily be bored parallel to the axis of the jet and to one another. While the orifices may conveniently be bored through the curved face of the jet, they may alternatively be disposed around the edge of such face, e. g. on the line of intersection between the curved face and the side walls of the jet. In this position, the curved face of the jet will still act as a reinforcement to prevent distortion of the orifices. A considerable advantage arising from the use of the present invention lies in the fact that the face of the jet is smooth, and even when concave can be readily wiped clean when necessary in starting-up the spinning operation.

The formation of the curved face of the spinning jet according to the present invention may be accomplished in any convenient manner. Most conveniently the face can be pressed or spun into the desired form when the sheet metal of which the jet is formed is being formed into the cup-like shape usual in jets, during which operation it is also usual to form a flange around the edge of jet for the purpose of attaching it to a source of supply of spinning solution. Alternatively the jet may be submitted to the action of a fluid under very high pressure to cause the jet face to bulge. This operation may conveniently be performed after stamping the jet into its cup-like form. After its formation, the curved face of the jet may be pierced with the orifices necessary for extrusion, in such a manner that all the orifices are parallel to one another.

While the spinning jet according to the present invention is applicable generally to the production of artificial filaments by extrusion, whether by the wet or coagulation method as usually employed in the spinning of viscose or cuprammonium filaments, or by the dry or evaporative method, as usually employed in the spinning of filaments of cellulose acetate, or other organic derivatives of cellulose, the invention is especially useful in the production of filaments by the dry or evaporative method, because of the high spinning speed usually adopted in this method of spinning and the resultant higher pressures on the jets.

Some specific forms of spinning jet according to the invention will now be described by way of example with reference to the accompanying drawing in which:—

Figure 1 is an elevation in half-section of a spinning jet according to the invention assembled on a supply pipe;

Figure 2 is an enlarged view in cross-section of the spinning jet shown in Figure 1; and

Figures 3 and 4 are views similar to Figure 2 of two further forms of spinning jet.

In Figure 1 a pipe 5 for the supply of spinning solution is provided at its lower end with a connecting piece 6 on to the screw threaded periphery 7 of which is screwed a large nut 8. The nut 8 secures a filter plate 9 and a spinning jet 10 against a bearing face 11 on the connecting piece 6, the spinning jet being provided with a flange 12 for this purpose. The face of the jet 10 is caused to bulge outwardly and is bored with spinning orifices 13. The initial bulged form of the jet strengthens it against further bulging and so enables a jet of relatively large area to be employed through which a correspondingly large number of spinning orifices 13 may be bored, the orifices being arranged in two concentric circles.

In Figure 2 the jet illustrated in Figure 1 is shown on a larger scale in cross-section. The thickness of the metal of which the jet consists is exaggerated in the figure in order to show that the spinning orifices 13, which are bored after the bulging of the face of the jet 10, are bored parallel to the axis of the jet and to each other. The position and direction of the orifices are clearly shown by the dotted lines.

In Figure 3, a view similar to Figure 2 of an alternative form of jet is illustrated. In this figure the face of the jet is caused to curve inwardly in order to produce increased strength against distortion. Here again the spinning orifices 13 are bored parallel to one another and not exactly at right angles to the jet face. The smooth concave face of the jet presents no difficulty in the wiping of the jet at the beginning of the spinning operation.

In Figure 4, a further form of inwardly bulged jet is illustrated, in which the radius of curvature of the jet face 14 is small, and the spinning orifices 13 are bored in the rounded edge between the face 14 of the jet and the side wall 15. In this manner the orifices may easily be bored parallel to the axis of the jet.

What I claim and desire to secure by Letters Patent is:—

1. A spinning jet for the production of artificial filaments, threads, yarns and the like, the face of said jet containing the spinning orifices consisting of a thin material which is curved and thereby stiffened to resist distortion, the bore of said orifices being parallel to the axis of the jet.

2. A spinning jet for the production of artificial filaments, threads, yarns and the like, the face of said jet containing the spinning orifices consisting of a thin material which is concave and thereby stiffened to resist distortion, said orifices being bored through the concave portion of the jet face in a direction parallel to the axis of the jet.

3. A spinning jet for the production of artificial filaments, threads, yarns and the like, the face of said jet containing the spinning orifices consisting of a thin material which is convex and thereby stiffened to resist distortion, said orifices being bored through the convex portion of the jet face in a direction parallel to the axis of the jet.

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