

June 6, 1967

K. J. M. VAN DRUNEN ETAL

3,323,168

SPINNERET FOR SPINNING HOLLOW FILAMENTS

Filed May 17, 1963

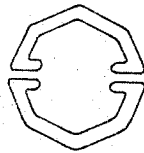


FIG. 1

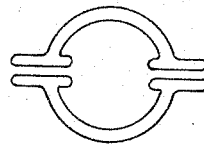


FIG. 2

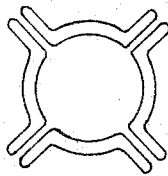


FIG. 3

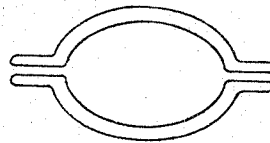


FIG. 4

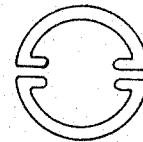


FIG. 5

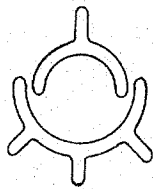


FIG. 6

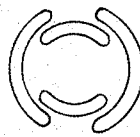


FIG. 7

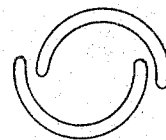


FIG. 8

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SPINNERET FOR SPINNING HOLLOW
FILAMENTS

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Filed May 17, 1963, Ser. No. 281,253

Claims priority, application Netherlands, May 24, 1962,
278,885

6 Claims. (Cl. 18—8)

The invention relates to an apparatus for the manufacture of hollow synthetic threads and staple fibers by extruding the melt of polycondensation products or polymerization products, such as polyamides, polyesters, polyolefines, etc., through one or more slit-shaped spinning orifices including a novel spinneret.

There is a known process for the manufacture of hollow synthetic threads and staple fibers from synthetic linear polycondensation products or polymerization products by extruding the melt of polycondensation products or polymerization products into a gaseous medium through at least one slit-shaped spinning orifice in a spinneret, each spinning orifice consisting of two or more arc-like slits which, in combination, partly surround a section of the spinneret, the distances between the neighboring slits ranging from 1 to 6 times the width of the slits. A disadvantage of this process is that after spinning has proceeded for some time the melt no longer coalesces, so that instead of hollow threads ribbon-shaped threads are obtained.

There is also a known process in which the melt of polycondensation products or polymerization products is extruded into a gaseous medium through a spiral slit the two ends of which are parallel with each other. A disadvantage of this spiral slit is that after spinning has proceeded for a short time, the core of the spiral is forced out of the spinneret, which is particularly the case in the spinning of high-denier threads, where a high pressure is exerted on the spinneret.

It is an important object of this invention to provide an improved apparatus for the preparation of hollow synthetic threads or staple fibers which will be free from the foregoing and other disadvantages.

A further object of this invention is the provision of a novel spinneret for the preparation of hollow synthetic threads or staple fibers, having a basis of synthetic linear polycondensation or polymerization products, of improved properties.

Other objects of this invention will appear from the following description.

It has now been found that if the melt spinning of polycondensation products or polymerization products, such as polyamides, polyesters, polyolefines and the like, is conducted in a certain prescribed manner and with certain prescribed apparatus, the threads so produced will have smooth surfaces and show very satisfactory properties such as high covering power. Woven and knitted fabrics prepared from such threads retain heat satisfactorily and are voluminous and elastic.

In its broadest aspect the instant invention comprises the production of hollow synthetic threads from a melt of synthetic linear polycondensation products or polymerization products by extruding the melt through a spinneret provided with spinning orifices in the form of slits. The magnitude of the hollow space in the thread to be spun is dependent on the ratio between the partly surrounded area and the slit width. The slit width may vary from 0.02 to 0.4 mm.

In the accompanying drawing, FIGURES 1-8 illustrate various embodiments of the present invention.

The slits of the spinning orifices, in combination, partly surround a surface area of from 0.01 to 7 mm.², and the

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ends of the neighboring slits preferably run parallel to one another as shown in FIGURES 1-8. The distance along which the slits run parallel to one another may vary between wide limits, namely from 0.05 to 2 mm.

The ends of neighboring arc-like slits run parallel to one another or may be bent, in which case the bent ends run parallel to one another (FIGURES 1-5). The ends may be bent inwards (FIGURES 1 and 5) or outwards (FIGURES 3 and 4). However, it is also possible for them to be bent both inwards and outwards (FIGURE 2).

In accordance with this invention a melt of a polycondensation product or a polymerization product is extruded through a spinneret provided with one or more slit-shaped spinning orifices, each spinning orifice consisting of two or more arc-like slits which, in combination, partly surround a section of the spinneret. The distances between the neighboring slits range from 1 to 6 times the width of the slits. The slits, in combination, partly surround a surface area of from 0.1 to 7 mm.², and the ends of the neighboring slits run parallel to one another. In this spinneret the distance along which the slits run parallel to one another is from 0.05 to 2 mm., and the slits have a width of from 0.02 to 0.4 mm.

In the spinneret according to this invention the ends of the neighboring slits may be bent, i.e., the spinneret slits may be shaped to contain slits extending toward and/or away from a central point within the partially-enclosed area.

Where the arc-like slits are provided on the outside with side slits (FIGURE 6), then hollow threads are obtained having profiled cross-sections, which is, as a matter of fact, also the case where the ends of the slits are bent outwards. These profiled hollow threads have higher covering power than have the non-profiled threads according to the invention.

Threads having triangular or quadrangular cross-sections reflect the light in a special way, as a result of which they produce, when worked up in textile products, special effects which make these products extremely suitable for various applications.

Where the ends of the slits are bent inwards, it is also possible to spin threads which show a plurality of hollow spaces instead of one.

The arc-like slits may be parts of circles or of ellipses. However, they also may be parts of polygons (FIGURE 1). Two or more of the spinning orifices according to the invention may be interconnected.

Although the depth of the slits in the spinneret is not critical, it is still advisable not to make the same extremely small. According to the invention the depth of the slits should preferably be more than 0.1 mm.

It is to be understood that the foregoing description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of this invention.

What is claimed is:

1. A spinneret for the manufacture of hollow synthetic threads or staple fibers from synthetic linear polycondensation products or polymerization products, said spinneret being provided with at least one slit-shaped spinning orifice, each spinning orifice consisting of at least two separate arc-like slits which, in combination, partly surround a section of the spinneret, the distances between the neighboring slits ranging from 1 to 6 times the width of the slits, said slits, in combination, partly surrounding a surface area of from 0.1 to 7 mm.² the ends of the neighboring slits running parallel to one another and the ends of the neighboring slits are bent.

2. A spinneret according to claim 1, characterized in that the distance along which the slits run parallel to one another is from 0.05 to 2 mm.

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3. A spinneret according to claim 1, characterized in that the slits have a width of from 0.02 to 0.4 mm.

4. A spinneret according to claim 1, characterized in that the ends are bent inwards.

5. A spinneret according to claim 1, characterized in that the ends are bent outwards.

6. A spinneret according to claim 1, characterized in that the ends are bent both inwards and outwards.

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