July 15, 1969 H. FASSBENDER 3,454,986

SPINNERET

Filed March 16, 1967

FIG. 1

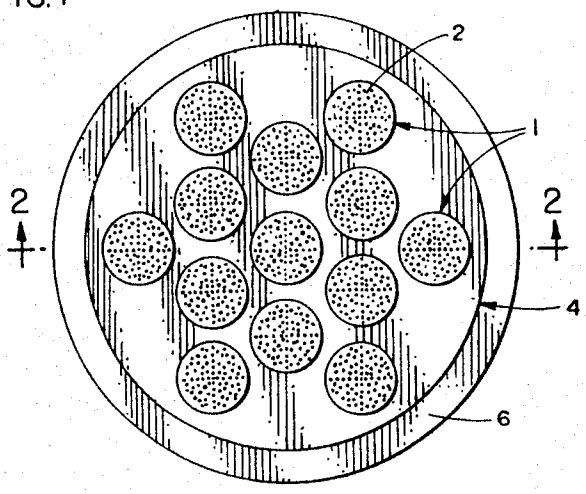


FIG. 2

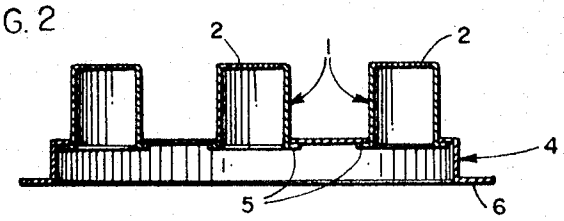
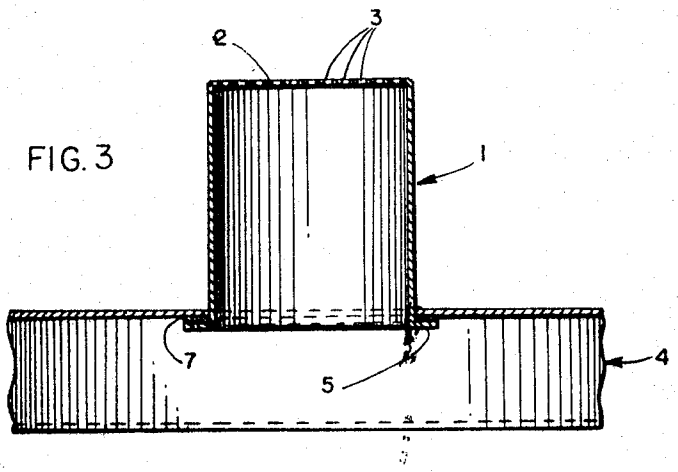


FIG. 3



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United States Patent Office 3,454,986
Patented July 15, 1969

3,454,986

SPINNERET

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Filed Mar. 16, 1967, Ser. No. 623,607
Claims priority, application Germany, Mar. 19, 1966, G 34,344
Int. Cl. D01d 3/00
U.S. Cl. 18—8 3 Claims

ABSTRACT OF THE DISCLOSURE

A spinneret for extruding cellulosic filaments in which several perforated nozzles are removably joined to a base plate by means of a fine gold solder.

The invention is concerned with an improvement in the construction of spinnerets as used in the extrusion or spinning of cellulosic filaments or threads, and more particularly, the spinneret or so-called spinning jet according to this invention is a single unit wherein several perforated nozzles are mounted on a common base plate.

For the manufacture of certain cellulosic filaments of high tenacity or tensile strentgh, it is known that the rate of spinning with reference to the velocity at which the filaments are discharged is much lower in comparison to the process used with normal cellulosic filaments. It was therefore necessary to develop spinnerets or spinning jets with a greater number of holes or fine perforations so as to take advantage of the increased capacity of an individual spinning machine. It is quite difficult to drill or puncture a single large multiple hole nozzle because of the requirement for a relatively strong face plate and also because of the normal use of alloy metals of high hardness, e.g. a platinum-iridium alloy. Also, it may be necessary to drill as many as 10,000 holes so that in addition to the problem of perforating a thick, hard nozzle face, the risk of errors resulting in a large piece of scrap metal is quite high.

In order to avoid these problems, it has been considered advisable to use several small nozzles for combination into a single large spinneret. This has been done by inserting the individual small nozzles into a hard rubber or plastic threaded fitting and then positioning and securing the nozzles by means of suitable seals or packing and threaded rings. Aside from the fact that this means of mounting and sealing the individual nozzles does not give satisfactory results, each nozzle must be separately mounted and sealed so as to require relatively large seating areas and cosniderable time to complete each mounting. Another design for such multiple nozzle spinnerets incorporates the nozzles as an integral part of a solid base member or the spinning areas or portions of the nozzles are inserted into a nozzle socket in the form of special cups or face plates which are held in place by crimping the protruding edge of the socket. In this design, the spinning plates are composed of a noble metal alloy while the socket is made from a less expensive material.

The design of a spinneret from one solid piece gives rise to the problems mentioned above with respect to the high risk of damaging the entire unit during drilling of the spinning holes or perforations. Where a small face plate or cup is held by a crimped nozzle socket, it is not always possible to achieve a positive seal, and there is the disadvantage that individual nozzles cannot be exchanged when damaged.

One object of the present invention is to provide a novel spinneret in which several individual nozzles, perforated in the usual manner, are effectively joined to a common base plate and yet can be readily removed or exchanged in case of damage. Another object of the invention is to provide the combination of separate spinning nozzles in a common base plate in a manner such that it can be easily prepared and assembled with a minimum risk of scrapping valuable metals. These and other objects and advantages of the invention will be more evident from the following detailed description.

Thus, it has now been found that an improved spinneret can be achieved by providing the combination of a plurality of substantially cylindrical spinning nozzles and a nozzle receiving base plate, each of which is composed of a noble metal of Group VIII of the Periodic Table or their alloys, especially a platinum-iridium alloy, wherein the nozzles are joined to the base plate by means of a fine gold solder. The nozzles preferably carry an annular shoulder or collar in the form of an outwardly extending transverse flange at one end thereof, such that each nozzle can be inserted into a circular opening of the base plate, this opening having approximately the same diameter as the nozzle, with the annular flange resting upon the base plate and being soldered thereto with a small amount of fine gold. The annular flange of the nozzle is advantageously joined to the inner surface of the base plate adjacent the opening therein. If it becomes necessary to replace an individual nozzle, this operation is facilitated by simply melting the fine gold joint between the nozzle and the base plate.

One embodiment of the improved spinneret of the invention is shown in the accompanying drawing wherein:

FIG. 1 is a top plan view of the spinneret in which a pluraltiy of spinning nozzles are carried on a common base plate;

FIG. 2 is a cross-sectional view taken on line 2—2 of FIG. 1 with those nozzles omitted which do not appear in the cross-section itself; and

FIG. 3 is an enlarged cross-sectional view of the middle nozzle as shown in FIG. 2, the remaining portions of the combination being cut away.

Each of the nozzles **1** is identical in construction and consists of a platinum-iridium alloy shaped in the form of a short tube or cylnidrical cup having a face plate **2** containing a large number of bores or drilled openings **3**, which are somewhat exaggerated and oversized for purposes of illustration in FIG. 3. For example each of the thirteen nozzles shown in FIG. 1 may contain as many as 500 to 1,000 individual orifices or openings distributed in a regular pattern in accordance with conventional practice. Each nozzle fits snugly into openings in the nozzle receiving base pate **4** which is also composed of a platinum-iridium alloy, and the nozzles are each provided with a shoulder, lip or annular flange **5** at the end opposite the face plate **2** such that this flange rests upon or can be placed in contact with the inner surface of the base plate **4** adjacent the opening therein. The base plate is preferably also cylindrical in shape so that it can be easily mounted on conventional spinning apparatus, for example by means of bolting the annular collar **6** to a corresponding collar of the spinning apparatus or by threading the base plate on a peripheral surface for engagement in a correspondingly threaded outlet of the spinning apparatus. The present invention is not concerned with the means of mounting the base plate since it is posisble to adopt any conventional technique used for connecting known spinnerets to the remainder of the spinning apparatus.

Each nozzle **1** is united or fastened to the base plate **4** in a secure rigid position by means of a fine gold solder **7** joining the annular flange **5** around its entire surface where it overlaps the inner surface of the base plate. This

soldered gold joint 7 can be quickly and easily made by conventional soldering methods so that each nozzle is held firmly in place and the combination of the nozzles and common base plate become a unitary structure. At the same time, the fine gold joint 7 between the nozzle flange 5 and the base plate 4 can be readily melted to facilitate replacement of individual nozzles when they become damaged or partially plugged during actual use in spinning filaments.

It is essential for purposes of this invention that both the spinning nozzles and the common base plate be composed of noble metals of Group VIII of the Periodic Table, i.e. the so-called "platinum metals" consisting of the members platinum, iridium, osmium, palladium, rhodium and ruthenium, or alloys of these noble metals.

The term "fine gold" is used herein as referring to substantially pure gold which has the lowest melting point of the entire class of noble metals. It is this low melting point which makes it possible to use a fine gold solder as a joint between the nozzles and base plate composed of a different noble metal or noble metal alloy having much higher melting point. Thus, in soldering the joint, some care must be exercised to avoid exposing the nozzles and base plate to damaging temperatures, but this can be readily accomplished where the gold solder has a substantially lower melting point. In addition, a gold solder joint has the advantage that it is not affected by the conditions or bath ingredients to which the spinneret is exposed during the spinning of celluosic filaments.

The improved spinneret of the present invention possesses the desirable advantage of eliminating the high risk of scrap during the boring or drilling of nozzle openings. At the same time, the soldering of the nozzle edge, rim or flange to the base plate guarantees a positive seal and completely rigid joint during spinning operations while still permitting the rapid replacement of the individual nozzles.

It will be recognized that any number of minor variations or changes can be made in the exact construction or

design of the nozzles and base plate without departing from the spirit or scope of the invention as defined by the claims appended hereto.

The invention is hereby claimed as follows:

1. An improved spinneret for the extrusion of cellulosic filaments which comprises a plurality of cylindrical nozzles and a nozzle receiving base plate, each of which is composed of a metal selected from the class consisting of the noble metals of Group VIII of the Periodic Table and their alloys, each of said cylindrical nozzles being inserted into a circular opening of the base plate, said opening having approximately the same diameter as said nozzle, and each of said cylindrical nozzles bearing an outwardly extended annular flange which rests on said base plate and which is joined thereto by means of a fine gold solder.

2. A spinneret as claimed in claim 1 wherein said annular flanges is joined to the inner surface of said base plate adjacent the circular opening therein.

3. A spinneret as claimed in claim 2 wherein each of said cylindrical nozzles and said base plate is composed of a platinum-iridium alloy.

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U.S. Cl. X.R.

29—504; 76—107