Sept. 30, 1969 L. H. MOTT 3,469,280

SPINNERETTE DISK FOR EXTRUSION OF SYNTHETIC POLYMER FIBERS

Filed June 19, 1967

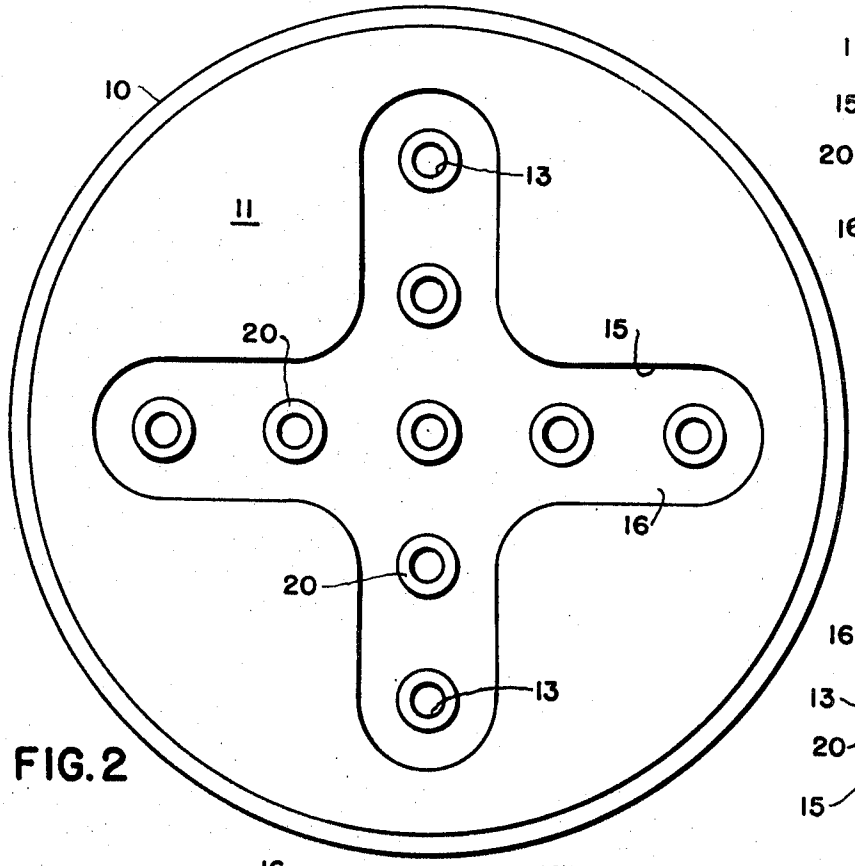

FIG. 2

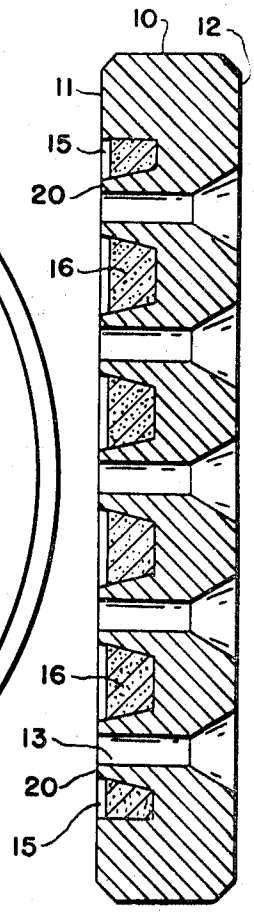

FIG. 1

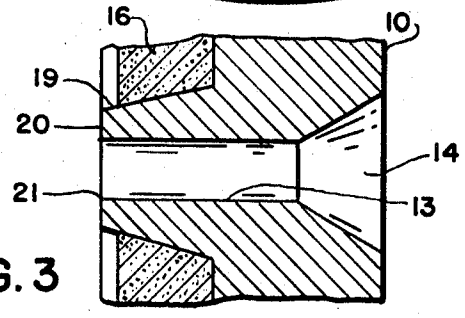

FIG. 3

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ABSTRACT OF THE DISCLOSURE

A spinnerette disk having extrusion orifices therethrough with a porous metal oil reservoir disposed about each orifice behind the forwardly disposed exit surface surrounding each orifice.

Background of the invention

My United States Patent No. 3,304,577 describes how, in the melt spinning of synthetic polymer fibers such as nylon, Orlon, and the like, the synthetic polymer is melted and forced under high pressure, usually from 1500 to 5000 lbs. per square inch, through a spinnerette disk containing extrusion orifices. Since the extrusion pressures are high, as the individual fibers leave a sharp edged orifice on the downstream side of a spinnerette, there is a tendency for the high pressure to be relieved causing the "ballooning" or expansion of each fiber. This "ballooning" usually assumes a teardrop shape directly behind the extrusion orifice which exits at the filament diameter. The expansion may be caused by entrained gases or it may be caused by fiber velocity considerations.

Probably caused by this "ballooning" is the result that fibers often "crawl" to one side of an orifice so that the center line of the fiber becomes offset from the center line of the orifice. This may cause a change in the rate of flow of a particular fiber and may cause premature contact between adjacent fibers. This phenomenon causes changes in the extruded fibers which necessitates the shutting down of the apparatus to scrape the downstream face of the spinnerette assembly.

Generally, the coagulation and creeping on the downstream side of an orifice occurs between two to six hours after the particular extrusion process has been started. Often, before the distortion is discovered, considerable material and time is lost.

My forementioned patent solved the problem of "crawl" by providing a lubricated downstream surface about each extrusion orifice. This invention provides for such a lubricated surface, but it additionally allows this surface to be scraped or wiped during operation and it allows the lubricated exit face of a spinnerette disk to be resurfaced after the spinnerette disk wears and the exit edges of the extrusion orifices are no longer sharp.

Summary of the invention

This invention provides a spinnerette disk with an exit surface about each extrusion orifice. The exit surface is machined away or otherwise removed from about each extrusion orifice to form a sunken oil reservoir. Porous metal is sintered in place within the reservoir below the level of the exit surface. When the porous metal is filled with a suitable lubricant such as a silicone oil, the oil will wet the surfaces surrounding the exit orifices which may be wiped or resurfaced without destroying the porosity of the porous metal oil reservoir.

Brief description of the drawing

FIGURE 1 is a longitudinal vertical section through a spinnerette disk according to this invention;

FIGURE 2 is a front view of a spinnerette disk; and FIGURE 3 is a longitudinal section through a fragment of a spinnerette disk containing an extrusion orifice.

Description of the preferred embodiment

A spinnerette disk **10** has an exit face **11** and a rear face **12** between which the extrusion orifices **13** extend. The extrusion orifices **13** may have flared rear portions **14**. An oil reservoir **15** is machined away or otherwise formed for a considerable depth in exit face **11** about each extension orifice **13**. Generally, the spinnerette disk **10** is made from stainless steel.

A stainless steel powder, of a grain size under 70 microns, is compacted and sintered to form the porous oil retaining layer **16**. A typical lubricant that might be used in the spinnerette disk of this invention is Dow-Corning #210–H Fluid or any other equivalent high temperature lubricant which would prevent the wetting of the exit face of the spinnerette disk by an extruded polymer.

As shown in FIGURE 3, silicone oils flows up each conical or cylindrical surface **19** to wet the portion **20** of the exit surface about each extrusion orifice. This wetting of the portions **20** takes place almost immediately as a film of the lubricant is formed thereon. Pores of the porous layer **16** must be in open and free contact with the surfaces **19** to allow for this flow of lubricant. During use, the entire exit surface **11** and the portions **20**, which are in the same plane, may be wiped by a blade or scraper. After wear of the sharp edges **21**, the entire exit surface **11** and the portions **20** may be lapped without the lap blocking the pores of the porous layer **16**. Thus the spinnerette disk of this invention is more efficient in operation and may be reconditioned to have a much longer life.

The term "disk" as used herein is intended to indicate a member of any configuration through which synthetic polymer fibers are extruded. If desired, the reservoir **15** and the layer **16** associated therewith need not be contiguous but they may be disposed in separated areas about the extrusion orifices **13**.

I claim:

1. A spinnerette disk for the extrusion of synthetic polymer fibers therethrough, said disk being of metal, said disk having a downstream side with an exit surface, said disk containing a plurality of extrusion orifices extending therethrough, and said disk containing a lubricant reservoir cut into said exit surface about said extrusion orifices a short distance from said extrusion orifices leaving a portion of said exit surface about each extrusion orifice, and a layer of porous material in said reservoir disposed below the exit surface, said porous material layer containing a lubricant wetting the portions of the exit surface about the extrusion orifices.

2. The combination according to claim **1** wherein said layer of porous material is of metal.

3. The combination according to claim **2** wherein said layer of porous metal is sintered in said reservoir bonding to said disk.

4. The combination according to claim **1** wherein said exit surface and the portions of said exit surface about each extrusion orifice are in the same plane.

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WILLIAM J. STEPHENSON, Primary Examiner

U.S. Cl. X.R.

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