Oct. 13, 1953 R. W. STANLEY 2,654,962

THREAD PROCESSING REEL

Filed March 9, 1951 2 Sheets-Sheet 1

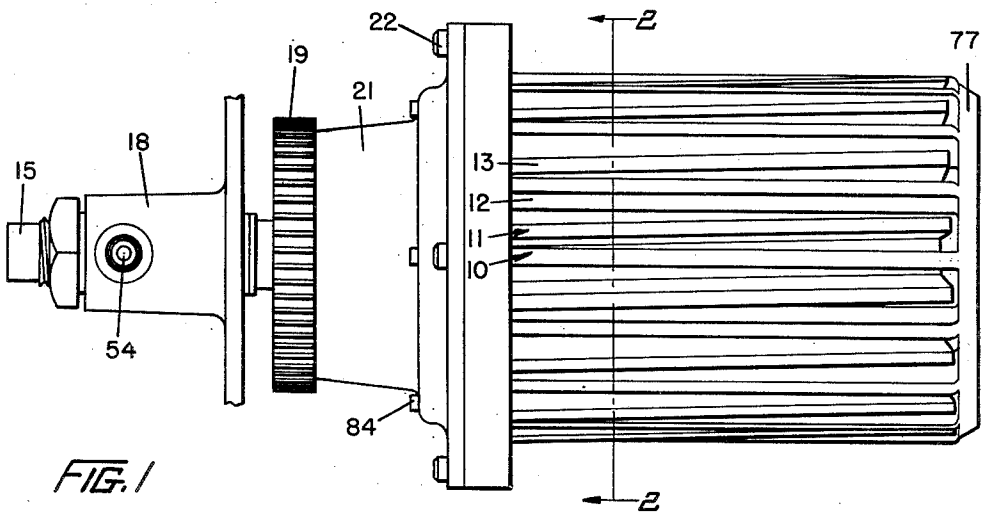

FIG. 1

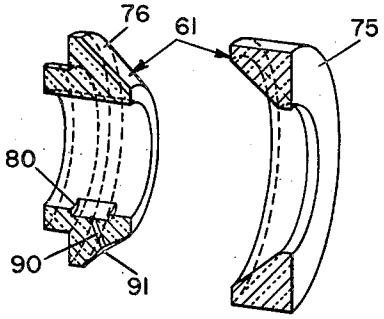

FIG. 4

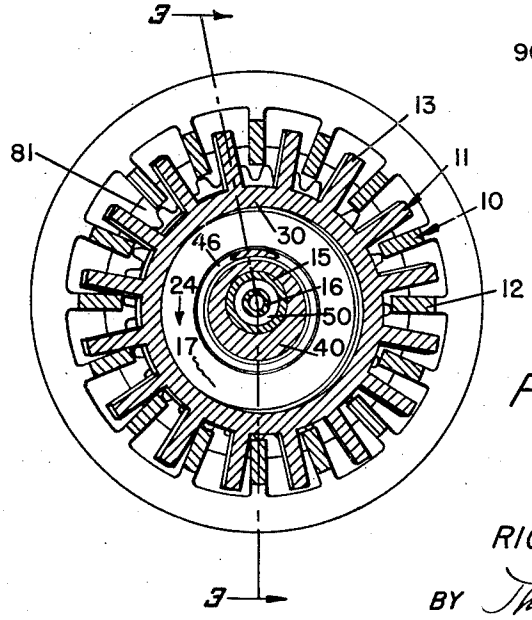

FIG. 2

INVENTOR

RICHARD W. STANLEY

BY Thomas J. Maguire

ATTORNEY

Oct. 13, 1953 R. W. STANLEY 2,654,962

THREAD PROCESSING REEL

Filed March 9, 1951 2 Sheets-Sheet 2

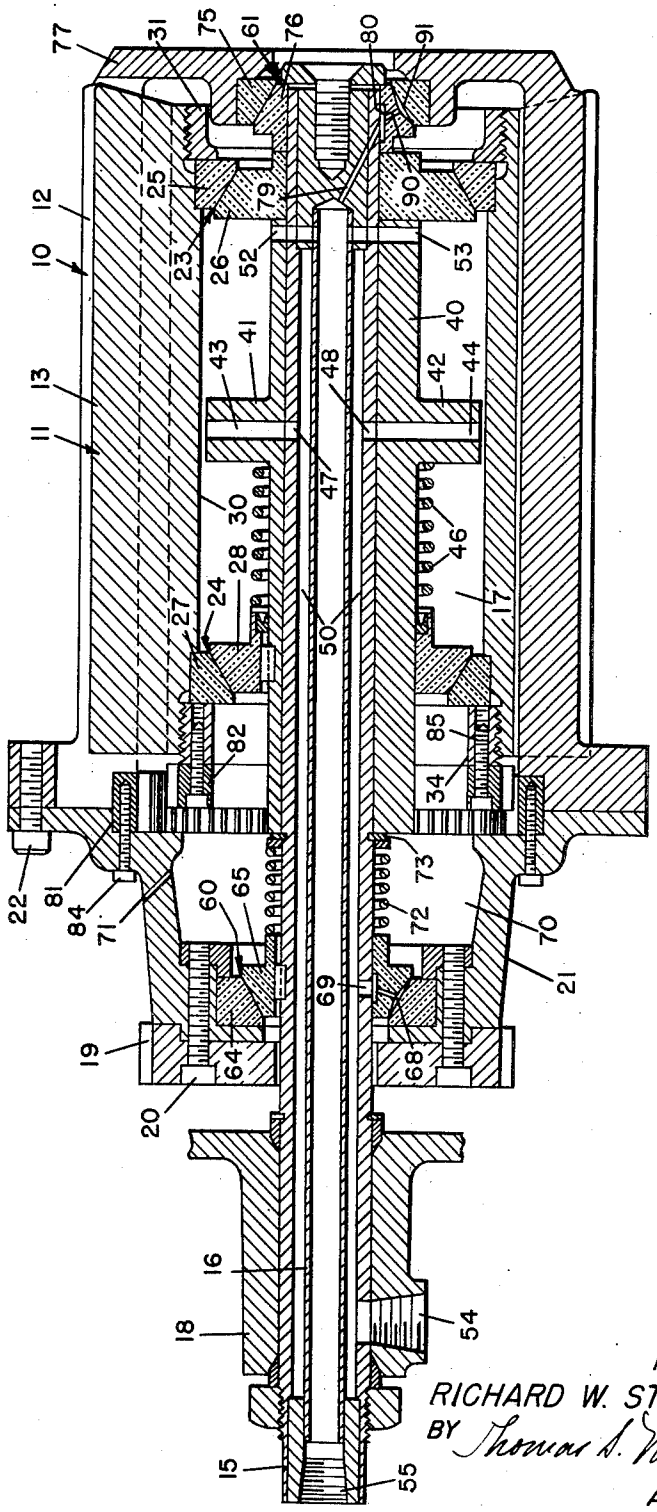

FIG. 3

INVENTOR
RICHARD W. STANLEY
BY Thomas A. Wagner
ATTORNEY

Patented Oct. 13, 1953

2,654,962

UNITED STATES PATENT OFFICE

2,654,962

THREAD PROCESSING REEL

Richard W. Stanley, Rocky River, Ohio, assignor to Industrial Rayon Corporation, Cleveland, Ohio, a corporation of Delaware

Application March 9, 1951, Serial No. 214,687

8 Claims. (Cl. 34—153)

1

This invention relates to thread processing reels, and more particularly to reels through which is circulated a heating medium for drying thread or the like or for the application of other processing treatments at elevated temperatures.

Reels utilized for drying of thread or for raising the temperature of the thread during a processing step while it is temporarily stored on the reel are generally lubricated with oils or greases that require frequent replacement because of the high temperatures involved. Improved greases, seals and the circulation of cooling lubricating oils through the various reel bearings have not overcome the required frequent maintenance of reels operating at elevated temperatures. Lubricating greases are not yet available that can withstand continuous high temperatures for prolonged periods of time, and where oil is recirculated the problem of efficiently sealing the bearings against leakage has not yet been satisfactorily solved. The use of circulating oils also requires additional complicated apparatus such as pumps, oil cooling devices, and conduits. It is, of course, desirable to have bearings within a heated reel that are long-wearing and that need little or no attention, that are self-lubricated, and that will withstand elevated temperatures.

This invention advantageously provides for a reel adapted to transmit heat which includes carbon type bearings that are long lived and that serve as efficient seals and that are lubricated by a heated circulating medium, e. g. steam, hot water, etc. that is used for heating the reel. The circulating medium, advantageously, also increases the effectiveness of sealing the contacting faces of the bearing surfaces. The bearings, also, provide for a fully enclosed chamber in the thread-storing, thread-advancing reel to be hereinafter described through which the heating medium is adapted to circulate. The bearing material, advantageously, is of impervious graphite, or carbon and graphite, formed and machined into a bearing and as a sealing means. Such a material is available under the names of "Graphitar" or "Karbate." The material has qualties which no other material heretofore had.

The use of a carbon-graphite material for bearings in a heated reel overcomes the shortcomings of various lubricants, their handling, etc. and other types of lubricating means. Heretofore all antifriction bearings in heated reels had to be provided with a lubricant, either grease or oil, unable to withstand continued elevated temperatures. The use of carbon-graphite, however, advantageously replaces standard metallic bearings and the need for an oil or grease type of lubricant, a small quantity of the circulating temperature changing medium, e. g., steam or hot water, used to heat the reel readily provides for the necessary lubrication.

2

This invention will be more specifically described in the following specification and accompanying drawings in which:

Figure 1 represents, in plan, a thread storing, thread advancing reel through which is circulated a temperature changing heating medium;

Figure 2 is a cross-sectional view of the reel of Figure 1 taken across lines 2—2;

Figure 3 is a cross-section of Figure 1; and

Figure 4 is a section in dimetric projection of one of the reel bearings.

As shown in Figure 1 the reel is of a type shown and described in U. S. Patent No. 2,413,217 which comprises a combined plurality of longitudinally extending bar members 12, 13 of two separate reel members 10 and 11, the bar members of the one reel member interdigitating with those of the other. The reel members are mounted for rotation about axes that are offset and askew relative to each other and the rotation of the reel members will advance thread in a plurality of generally helical turns. The reel members, advantageously, are made of heat transmitting material such as, for instance, aluminum having a high coefficient of heat conductivity.

A heating fluid circulated through the interior of the reel at elevated temperatures heats the entire unit with the result that ordinary grease lubricants soon become melted, the seals deteriorate and leak. An impervious graphite or graphitic carbon bearing, as will be hereinafter explained, provides for a bearing and a seal when lubricated with steam condensate as well as for an indefinitely long life.

The reel is supported by and mounted for rotation about a stationary hollow shaft 15. As shown in Figure 3 there is concentrically positioned within the tubular shaft 15 a tube 16. The hollow shaft 15 and the tube 16 are each adapted for the circulation of a heating medium; the annular space 50 about the tube 16 conducts the heating medium out of the interior chamber 17 of the reel member 11, and to a bearing 60, and the tube 16 conducts the medium to the front bearing 61. The shaft 15 is supported in a flanged sleeve 18 through which it extends. The flange of the above provides support for the shaft and for the reel when positioned in the face of

a spinning machine (not shown). A reel driving gear 19 is mounted on the reel hub 21 which upon rotation actuates the reel to advance thread and the like in the form of a helix having a plurality of spaced turns.

Referring more particularly to Figure 3, reel member 11 is supported by and rotates on spaced carbon-graphite type bearings 23 and 24 positioned about the reel shaft 15 but within the lengths of the bar members 13 of the reel member 11. Each bearing is formed of two elements 25, 26, and 27, 28. Element 25 is impressed in the annular wall 30 by a threaded collar 31, while the element 26 is fixed to the reel shaft 15. Similarly, the element 27 is secured in the wall 30 by a threaded collar 34 and the element 28 is on the sleeve 40, being, however, moveable thereon for lateral adjustment. The annular bearings 23 and 24 with the cylindrical wall 30 of the reel member form the enclosed chamber 17 through which there is circulated a temperature changing heating medium.

A sleeve 40 having radial extensions 41, 42 is positioned about the reel shaft 15. The extensions 41, 42 are bored to provide passages 43, 44 extending into and joining with the openings 47, 48 in the reel shaft 15 and with annular reel shaft passage 50. The inner core or tube 16 is joined with the chamber 17 by the passages 52, 53. A temperature changing heating medium such as steam is forced through the hollow core of the tube 16 and from the tube through the passages 53, 53 into the chamber 17 formed by the end sealing carbon graphite bearings 23, 24 and the cylindrical wall 30 of the reel member 11. The steam is supplied through an inlet 55 at the end of the reel shaft 15. Some of the steam within the reel chamber condenses and the condensate flows onto and lubricates the bearing 23, 24 surfaces. The excess condensate flows out of the chamber 17 through the radial passages 43, 44 in the radial extensions 41 and 42 of sleeve 40 into the annular passage 50 in the tubular shaft 15 and out through opening 54. The bearings 23, 24 in addition to sealing the chamber 17 also provide support for the reel member 11 about the shaft 15.

The reel member 10 is also supported by condensate lubricated bearings. At one end of the reel member 10 and within the hub 21 there is positioned the carbon-graphite bearing 60 about the stationary reel shaft 15, and at the other end the bearing 61 is positioned in the frontal reel section 77 and about the reel shaft 15.

The bearing 60 comprises two elements 64 and 65. The element 65 is positioned about and closely fitted to the shaft 15 while the element 64 is contained in the end of the hub or sleeve 21 and it is maintained in position by being compressed by the lower bearing element resisting a spring 72. The bearing element 65 is provided with a condensate passage 68 which connects with a shaft opening 69 and with the annular passage 50 of the reel shaft 15. Moist steam or condensate is thus provided to the contacting surfaces of the bearing 60. Excess condensate forced through the bearing, if any, will flow into the hub enclosure 70 and therefore it will be forced out through passages 71 in the wall of hub 21. The bearing element 65 is continuously maintained in contact with the bearing element 64 by the expansion spring 72 positioned about the reel shaft 15 and abutting a ring or collar 73. The spring 72 also tends to maintain the front reel bearing 61 in compression. The front supporting bearing 61 of the reel member 10 also comprises two bearing elements 75 and 76. Bearing element 76 is positioned about the reel shaft 15 while the bearing element 75 is contained in a recess in the front supporting section 77 of the reel member 10. The bearing element 75 presses against the element 76 through the expansion forces of the spring 72. The bearing 76 is fixed in position about the shaft abutting the bearing element 26 which in turn is maintained against movement by the sleeve 40 that is maintained against displacement by the collar 73. The elements of the spaced bearing 61 are kept in continual compression by the expansion of the spring 72 acting through the reel member 10 while the contacting bearing surfaces are lubricated by steam condensate flowing to them through passage 79 provided for such a purpose. Continued pressure is exerted against all bearing surfaces through the expansion of the springs 46 and 72 positioned about the sleeve 40 and the reel shaft 15.

The manner of lubrication of the end reel bearings 60, 61 is more specifically shown in Figure 4. The bearing of Figure 4 is the front reel bearing 61 having component parts 75, 76. The part 76, positioned on the shaft 15, is lubricated by condensate from within the tube 16 flowing through the condensate conducting passage 79 which terminates in a small well 80. The well 80 advantageously maintains a supply of the condensate liquid as a small reservoir which supplies it to a passage 90 and therethrough to between the surfaces of the component parts 75, 76. The condensate, upon emerging from the passage 90, flows into a slight depression 91 which also acts as a reservoir and a lubricant spreading means over the two contacting surfaces of the component bearing parts. The rear bearing 60 is similarly constructed and lubricated. The bearings 23, 24 which form the end closures of the reel chamber 17 are lubricated directly by the condensate from within the chamber itself. But a small amount of condensate is necessary to lubricate the contacting surfaces of all the bearings. The lubricant also acts as an excellent seal to prevent the escape of the fluid from chamber 17 which fluid is generally under some pressure.

When the gear 19 is driven the reel member 10 drives the reel member 11 through the annular gear 81 which drive the inner gear 82 positioned within the reel hub 21. The gear 81 is attached to the hub 21 by bolts 84 and gear 82 is attached to the reel member 11 by bolts 85.

There is provided by the aforesaid described bearing construction a reel that can be heated to substantially any desirable degree for the processing of thread and the like and one which does not require the use of any lubricating medium other than the circulating heating fluid. The moisture in the circulating steam, or if hot water is used, provides for a sufficiency of lubrication of the contacting carbon graphite bearing surfaces. When thus lubricated substantially no friction is existent between the two surfaces so that long life may be expected. The illustration shows a reel including a chamber for purposes of storing heat however, where heat requirements are low or where none is required the chamber can be eliminated and water can be circulated through the reel shaft. Passages can be readily provided to the bearings from the shaft conduits since the shaft is stationary and the bearing elements about it also. In the reel described such a bearing construction provides for rigidity of the

reel members against the compressive forces of a drying thread with the result that long and consistent quality of drying thread can be maintained.

While the preferred type of material described herein is an impervious graphite, or carbon-graphite, a metallic material including graphite, e. g. graphite-bronze, can also be utilized. With metallic bearings the circulating medium preferably would be an oil solution.

I claim:

1. In a reel through which a temperature changing medium is circulated, a shaft, bearings about the shaft, the bearings load carrying surfaces being in continuous sealing contact, said reel rotating on said bearings, a chamber in said reel, end bearings in said chamber forming end-closures for said chamber, means for supplying a temperature changing fluid medium to said chamber for circulation therethrough, means for exhausting said temperature changing fluid from said chamber, and means diverting a portion of said temperature changing fluid to the bearings for their lubrication.

2. A reel through which a temperature changing medium is circulated comprising, a hollow shaft adapted for the circulation of a temperature changing fluid, two reel members in an interdigitating relation mounted for rotation about said hollow shaft, said reel members having peripheries of longitudinally extending bar members the bar members of one being interleaved with the bar members of the other, a chamber in one of said reel members, said chamber being connected by passages to said hollow shaft, bearings in the ends of said chamber forming end-closures for said chamber and rotatably supporting the reel member in which they are included, bearings for the rotatable support of the other of said reel members, said chamber forming bearings being lubricated by the temperature changing fluid medium in said chamber, and means connecting said bearings of said other reel member with the hollow shaft and with the circulating temperature changing fluid medium flowing therethrough.

3. A reel through which a temperature changing medium is circulated comprising, a hollow shaft adapted for the circulation of a temperature changing fluid, two reel members in an interdigitating relation mounted for rotation about said hollow shaft, said reel members having peripheries of longitudinally extending bar members the bar members of one being interleaved with the bar members of the other, a chamber in one of said reel members, said chamber being connected by passages to said hollow shaft, carbon-graphite bearings in the ends of said chamber forming end-closures for said chamber and rotatably supporting the reel member, carbon-graphite bearings for the rotatable support of the other of said reel members, said carbon-graphite bearings having two elements the bearing surfaces being inclined and one of said elements being held against rotation, said chamber end-closure carbon-graphite bearings being lubricated by the circulating temperature changing fluid medium in said chamber, means connecting the carbon-graphite bearings of said other reel member with the hollow shaft and with the circulating temperature changing fluid medium flowing therethrough, and said carbon-graphite bearings of said other reel member having a depression in the surface of one of the elements for the accumulation and spreading of a lubricating temperature changing medium between the rotating surfaces.

4. In a thread-storing, thread-advancing reel through which a temperature changing fluid medium is circulated, a hollow stationary shaft, a plurality of bearings about the shaft, the bearings' load carrying surfaces being in continuous sealing contact, said reel rotating on said bearings, a chamber in said reel communicating with said hollow shaft, some of said bearings forming end closures for said chamber, means for circulating a fluid temperature changing medium through said hollow shaft and into said chamber, means for exhausting said fluid medium from said chamber through said hollow shaft, and means diverting a portion of said circulating fluid medium to the bearings for their lubrication.

5. In the reel of the character described in claim 1 where the circulating fluid medium is steam.

6. In the reel of the character described in claim 1 where the circulating fluid medium is a liquid lubricant.

7. In the reel of the character described in claim 1 wherein all of the bearings about the shaft are carbon-graphite bearings.

8. In the thread-storing, thread-advancing reel of the character described in claim 4 wherein all of the bearings about the shaft are carbon-graphite bearings.

RICHARD W. STANLEY.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,413,217	Corey	Dec. 24, 1946
2,442,202	Hughes-Caley	May 25, 1948
2,516,199	Fry	July 25, 1950