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MEANS FOR SEALING REELS

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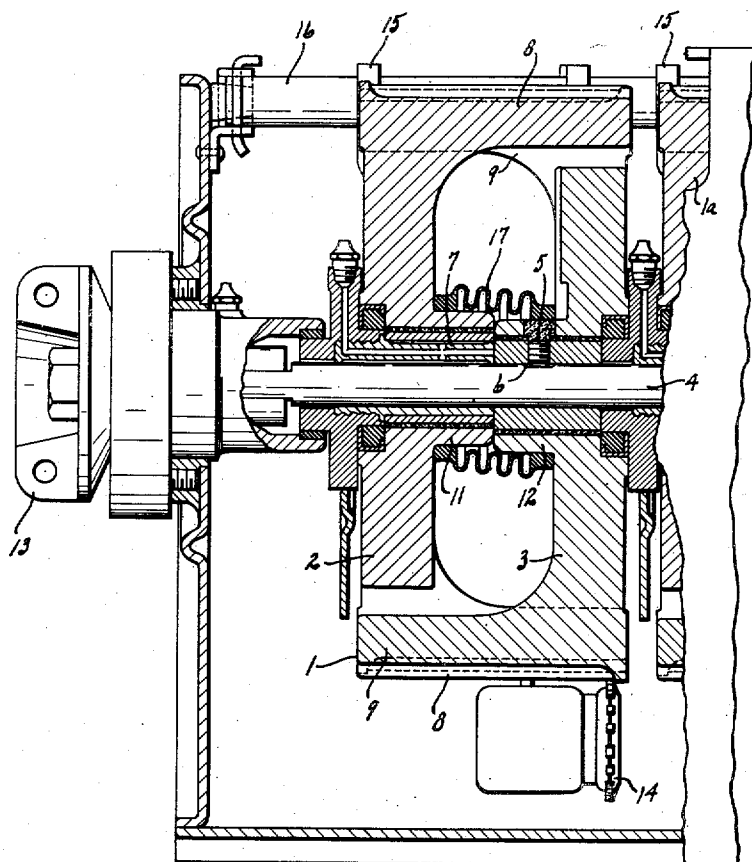


FIG-1

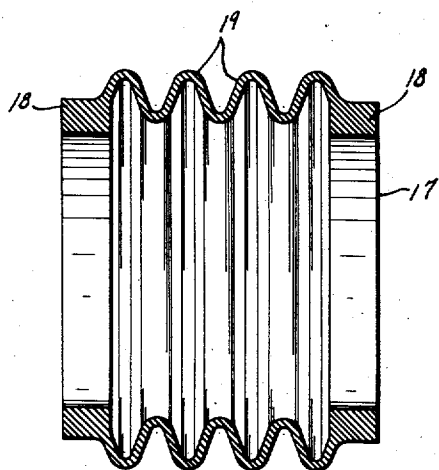


FIG-2

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MEANS FOR SEALING REELS

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11 Claims. (Cl. 242—53)

This invention relates to a reel organization capable of being used in the continuous spinning or other processing of or otherwise processing artificial silk produced. Among other things the invention has to do with the provision in such a reel organization of a flexible member, preferably in the form of a sleeve, for preventing the passage of fluids which would corrode the parts thereof or contaminate the treating bath. The member is preferably so constructed, of an irregular or convoluted shape, that it can be seated on eccentrically mounted parts having limited relative but common rotary movement without rising off its seat to cause leaks when the seating parts move relatively to each other. While the structure is particularly intended for use with reels for spinning or otherwise processing artificial silk by the viscose, cuprammonium or other wet process and will be described in connection therewith, it may also be used wherever it is desired to seal off liquids by means of a seal seated on surfaces having limited relative but common rotary movement.

In copending applications, Serial Nos. 652,089, filed January 16, 1933, and 693,955, filed October 17, 1933, there have been described reels for use in a spinning machine which spins artificial silk, particularly viscose silk, by a continuous process. These reels are made up of intermeshing cage members having bars which convey the thread in an approximately helical path along the reel so that various chemicals can be sprayed thereon to process the thread, the axial advance of the thread turns being brought about by the mounting of the cage members on axes which are both offset and askew with respect to each other. The hubs of the cage members are correspondingly displaced relative to each other and provide a wobbling seat during rotation for a seal member which engages both. The reels rotate in an atmosphere which is often very corrosive, as when sulphide and acid baths are being showered down on the silk, and such baths would quickly corrode unprotected metal parts, such as the shaft of the reel, and contaminate the bath and the silk with the products of corrosion. It is the aim of this invention to provide a seal which will protect such metal parts, as the shaft, from contact with the corrosive liquids used in the process, such seal being so constructed and mounted, preferably in the form of a sleeve, as to maintain a liquid-tight engagement despite the fact that it must rest on two eccentrically disposed rapidly rotating surfaces.

If liquid-tight engagement is to be attained in

a reel of the type described, a flexible material must ordinarily be used for the sleeve which constitutes the seal. However, such a flexible sleeve must under ordinary circumstances also be of sufficient length to absorb the twist imparted to it by the relative movement of the hubs on which it seats, a short sleeve being raised off the hubs by such movement and tending to pass fluid through the temporary gaps thus created. The construction of this type reel renders it impossible to provide the necessary space for the reception of a cylindrical sleeve of the requisite length, as will appear from considerations given below, and it has been necessary to devise means for overcoming this difficulty.

The reels may be used in large numbers in a given installation, as many as nine being placed in superposed relation to handle one thread which runs continuously over each reel in turn and receives chemical or other treatment while on each reel. The reels may be disposed in line horizontally, a number of reels being mounted on the same shaft and the same liquid being applied to the thread on all of the reels upon a given shaft, from a common distributing means, if desired. Since the large number of reels required to spin or otherwise process a commercial quantity of silk multiplies the dimensions of the individual reel many times, it is obvious that the amount of space required will be determined by the dimensions of the unit reel and that it will be desirable to keep this reel size to a minimum. Specifically, the length of path, along which the thread must travel over the reel at a given speed in order that the required time may be afforded for contact between the liquid reagent and the thread, is accurately determined and the length of the reel, taken in connection with its diameter, is established to provide the necessary time of treatment. These dimensions cannot be departed from readily and as a result, the dimensions of the cage members going to make up a reel are relatively fixed and the space between one cage member and the other, available for reception of the sleeve seal, is relatively limited.

It is found that sufficient flexibility is not usually afforded by a sleeve fitting around the eccentric elements and extending along the available space in the form of a regular cylinder. The flexing set up by the limited relative movement of the parts will, in such case, cause distortion of the sleeve which results in an opening between the sleeve and the surface which it grips to permit the passage of corrosive fluid into the lubricant surrounding the shaft and other metal parts

or to permit the escape of lubricant therefrom. In either case, damage will be done by corrosion of the metal or by contamination of the bath by the lubricant and the products of corrosion. In order to overcome this difficulty, it has been found that a sleeve which is made with an irregular contour or body, as with an accordion plait effect, increases the flexibility of the sleeve while not increasing the allowable length. In effect, a sleeve is provided having a length which, if the sleeve were stretched out, would exceed the space between the reel cage members but which is folded up so as to fit within the space provided. The twisting of the sleeve resulting from the rapid rotation of the reel cage members is, consequently, taken up by the convolutions in the body of the sleeve and no distortion of the gripping portions of the sleeve results.

It is, accordingly, an object of the present invention to provide a seal for machine parts having an irregular movement, the seal effectively shielding the parts despite the distortion set up by such movement. Another object of the invention is to provide a sleeve seal engaging eccentrically mounted machine parts having common rotary movement. A further object of the invention is to provide a sleeve seal for preventing ingress of corrosive fluids to the metal parts of a reel used for the continuous spinning or other processing of artificial silk and to prevent the egress of lubricant from such parts despite the necessity for mounting such seal on rotating elements mounted eccentrically with respect to each other. Other objects of the invention will in part be obvious and will in part appear hereinafter.

One form of the invention is illustrated in the accompanying drawing, although it will be understood that various modifications and adaptations of the structure shown and applications of the invention to other structures may be made without departing from the scope of the invention.

In said annexed drawing: Fig. 1 is a longitudinal section through a reel and housing with the seal in place; and Fig. 2 is a longitudinal section of the sleeve seal taken along the axis.

Referring to the drawing, the reel 1 is made up of cage members 2 and 3 mounted to rotate about a shaft 4. This shaft extends horizontally and may carry a number of other reels thereon, such as 1a. The cage member 3 is fixed concentrically to the shaft 4 by means of a set screw 5 fitting into a groove 6 in the shaft and, consequently, this cage member rotates with the shaft. The cage member 2 is not mounted directly on the shaft but, instead, on a sleeve 7 which is fixed against rotation and is mounted eccentrically around the shaft 4. The outer surface of this sleeve is also askew with respect to the cage member 3 and the axis of the shaft 4, this canting being very slight, usually about $\frac{1}{2}^\circ$. The cage member 2 is rotatably mounted on this sleeve and the bars 8 thereof are, as a consequence, both offset and askew with relation to the bars 9 of the cage member 3. The hub 11 of the cage member 2 is also offset with relation to the hub 12 of the cage member 3.

The reel is operated by turning the shaft 4 through a coupling 13, connected to a suitable source of power, the cage member 3 being rotated by the shaft and the bars 9 thereof, which intermesh with the bars 8 of the other cage member 2, driving this other cage member by bar to bar contact. As the reel rotates, a thread of

artificial silk, such as viscose silk, which has been led thereon will wind in an approximately helical path axially along the reel, this forward travel of the thread being brought about by the offset and canted relation of the bars of the two reel members. Thus, offsetting of one set of bars causes these to move in and out radially with respect to the other set of bars and alternately pick up and drop the thread turns. Since the bars of this set are also askew with relation to those of the other set, each time that the turns are dropped onto the other bars they will be transferred to a point on these bars slightly advanced from the previous position of the turns. This action continues until the thread has reached the end of the reel, whereupon a transfer mechanism 14 comes into operation to sever the thread and transfer it to the next reel below.

While the thread is on a given reel it is showered with any desired reagent, such as a desulphurizing agent, a bleaching agent, or a souring agent, as well as washing liquids. The liquid is sprayed onto the silk on the reel from a reagent distributor 15, a series of these distributors being placed on a manifold 16, one opposite each reel, and supplied with liquid from such manifold.

It will be obvious that the various reagents necessary to the processing of the artificial silk may attack the metal surfaces with which they come in contact. For this reason, the reel members and other parts of the reel are made of a resistant material, such as a ceramic material or glass, or are made of metal coated with glass or other chemically resistant material. However, the shaft 4 and bearing surfaces cannot be made of chemically resistant material or coated with such material. It is necessary, then, to exclude the various baths from contact with such metal parts since contact between chemical and metal would result in corrosion of the part and contamination of the bath and thread with the products of corrosion, the bath being returned to the distributors 15 for further use. A lubricant is also required for the bearing surfaces and such lubricant would, if it got into the bath, contaminate the latter and discolor the silk. These metal parts must, as a consequence, be protected in some manner from any access whatever of the corrosive atmosphere and such means should also effectively prevent the escape of lubricant into the bath.

Such a means is illustrated in the drawing and consists of a sleeve 17 having a cylindrical form and engaging in liquid-tight relation with both the hub 11 and the hub 12. The sleeve is made of some flexible material of the nature of rubber but preferably having a greater resistance than rubber to chemical attack. However, the material selected will be chosen with respect to both its flexibility and its resistance to such attack. The sleeve is provided with a collar 18 at either end thereof adapted to fit snugly around the hubs 11 and 12. Such an arrangement effectively seals the shaft 4 and other metal surfaces against the passage of corrosive materials between the two hubs. It also holds lubricant securely around the moving parts and prevents such lubricant from getting out. No difficulty in this regard would arise were there no relative movement between one hub and the other.

The sleeve seal must be effective, however, when the reel is rotating and the hubs of the two reel cage members are moving relatively to each other due to the eccentric mounting of the cage member 2. Such movement will flex and twist the sleeve seal and will tend to twist the collars

18 so that a gap is left between them and the surface of the hubs. Chemicals and oils or grease can easily pass through such a gap and the purpose of the seal would be vitiated if the seal consisted merely of a uniform cylindrical casing. This twisting and lifting action on the gripping members of the seal could be avoided if the seal were lengthened greatly so that torsion would be taken up in the body of the seal and its effect on the collars so lessened that these latter would not be lifted off their seats. However, the space available for the sleeve is strictly limited by the considerations mentioned above that the reel must be made as short as possible consistent with providing the necessary exposure of the thread to each reagent. Where, for example, the reel is approximately 10" in diameter and 4½" long, these being preferred dimensions, the space available for the reception of the seal is approximately 2". This length has not been found sufficient in the case of cylindrical seals to prevent raising of the collars 18.

In order to overcome this difficulty, a sleeve has been provided which has an irregular body or contour, giving the effect of greater length but without increasing the space necessary to receive the seal. Such irregularities may be of various kinds and may be uniform or varying in their nature. A preferred form is illustrated in the drawing consisting of a number of annular corrugations 19 imparting a bellows or accordion effect to the appearance of the sleeve. These irregularities or corrugations will absorb the distortion imparted to the sleeve as the hub 11 changes its position with respect to the hub. Despite the changing relative positions of the two hubs, the collars 18 will remain firmly engaging these hubs and no liquid can pass in either direction beyond the seal. The number of corrugations in the preferred form of seal may, of course, vary and may be either greater or less than the number shown. In effect, the seal has the flexibility of a sleeve of greater length than the combined available length of the two hubs on which it is mounted.

While the invention has been described with particular reference to an artificial silk spinning machine in connection with which corrosive liquids are employed, it is also useful, as will be obvious, in connection with other apparatus in which it may be desired to protect metal parts from access of corrosive liquids or vapors but where the seal must be mounted on parts having limited relative movement, and also where it may be desired, under similar conditions, to retain a lubricant around bearing surfaces in such manner that the lubricant cannot get out and contaminate materials with which the apparatus is surrounded.

It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty reside in the invention.

What we claim is:

1. In a reel for processing artificial silk a shaft, cage members at least one of which is eccentrically mounted on said shaft, and a seal for said shaft comprising an extensible sleeve of flexible material engaging said cage members in liquid-tight relation.

2. In a reel for processing artificial silk, a shaft, cage members at least one of which is eccentrically mounted on said shaft, said cage members having hubs of limited length extending axially of said shaft, and a seal for said shaft

comprising an extensible sleeve of flexible material engaging said hubs in liquid-tight relation.

3. In a processing reel, a unitary shaft, a pair of intermeshing spider-like members mounted on said shaft for limited relative but common rotary movement, and sealing means contacting with each of said spider-like members, said sealing means preventing access of corrosive agents to the bearings of said spider-like members.

4. In a processing reel, unitary shaft, a pair of intermeshing spider-like members mounted on said shaft for relative oscillatory and common rotary movement, and extensible sealing means contacting with each of said spider-like members, said extensible sealing means preventing access of corrosive agents to the bearings of said spider-like members.

5. In a processing reel, a shaft, a pair of intermeshing spider-like members mounted on said shaft for limited relative but common rotary movement, and sealing means preventing access of corrosive agents to the bearings of said spider-like members, said spider-like members intermeshing externally of said sealing means.

6. In a processing reel, interdigitating cage members, said cage members having relative oscillatory movement in the operation of said reel; a shaft about which said cage members are mounted; and sealing means disposed circumferentially about said shaft internally of said reel for preventing access of corrosive agents to the cage member bearings.

7. In a processing reel, interdigitating cage members, said cage members having limited relative but common rotary movement; supporting means upon which said cage members are mounted; and, extending between said cage members, internally disposed sealing means capable, despite relative movement of said cage members, of preventing access of corrosive agents to said supporting means.

8. In a processing reel, a first set of axially extending bars disposed at spaced intervals about the periphery of said reel, a second set of axially extending bars disposed between the bars of said first mentioned set, said sets of bars being mounted upon common supporting means for limited relative movement, and sealing means enclosing said common supporting means without enclosing said sets of axially extending bars, whereby the bearing surfaces upon which said reel turns are protected against the action of corrosive agents.

9. A reel organization for spinning machines comprising a shaft; a hub member rigidly mounted on said shaft; a first spider operatively associated with said rigidly mounted hub member, said spider having attached thereto a plurality of peripherally spaced bars; a hub member loosely mounted on said shaft, said loosely mounted hub member having end-to-end contact with said rigidly mounted hub member; a second spider on said loosely mounted hub member, said second spider having attached thereto a plurality of peripherally spaced bars intermeshing with the bars on said first spider; and, disposed in the space defined by said bars and said first and second spiders, flexible sealing means extending from said first spider to said second spider.

10. A reel organization for spinning machines comprising a shaft; a first cage member rigidly attached to said shaft; a second cage member mounted to permit independent movement of

said cage member about said shaft, said first cage member and said second cage member intermeshing to form a generally cylindrical reel; and, disposed between said cage members, flexible sealing means extending circumferentially and axially of said shaft from said first cage member to said second cage member.

11. In a processing reel, a shaft extending axially of said reel; a plurality of bars parallel to said shaft disposed at intervals about the periphery of said reel, certain of said bars having

limited movement relative to others of said bars; means connecting said shaft and said bars in operative relation, said means and said shaft having mutually engaging bearing surfaces; and, for protecting said bearing surfaces from corrosion by agents employed in the processing operation sealing means maintaining liquid-tight contact with said connecting means at all times during the operation of said reel.

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CERTIFICATE OF CORRECTION.

Patent No. 2,023,477.

December 10, 1935.

WALTER F. KNEBUSCH, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 3, strike out the words "or otherwise processing"; line 4, strike out the word "produced"; and line 18, after "silk" insert produced; page 3, first column, line 35, after "hub" insert the numeral 12; and line 65, claim 1, after "silk" insert a comma; second column, line 7, claim 3, for "contacing" read contacting; line 11, claim 4, before "unitary" insert a; page 4, second column, line 7, claim 11, after the syllable "eration" insert a comma; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of February, A. D. 1936.

Leslie Frazer

Acting Commissioner of Patents.

(Seal)

said cage member about said shaft, said first cage member and said second cage member intermeshing to form a generally cylindrical reel; and, disposed between said cage members, flexible sealing means extending circumferentially and axially of said shaft from said first cage member to said second cage member.

11. In a processing reel, a shaft extending axially of said reel; a plurality of bars parallel to said shaft disposed at intervals about the periphery of said reel, certain of said bars having

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