Jan. 11, 1955 R. M. PFALZGRAFF ET AL 2,699,230

BACKLASH ELIMINATING BRAKE

Filed March 25, 1953

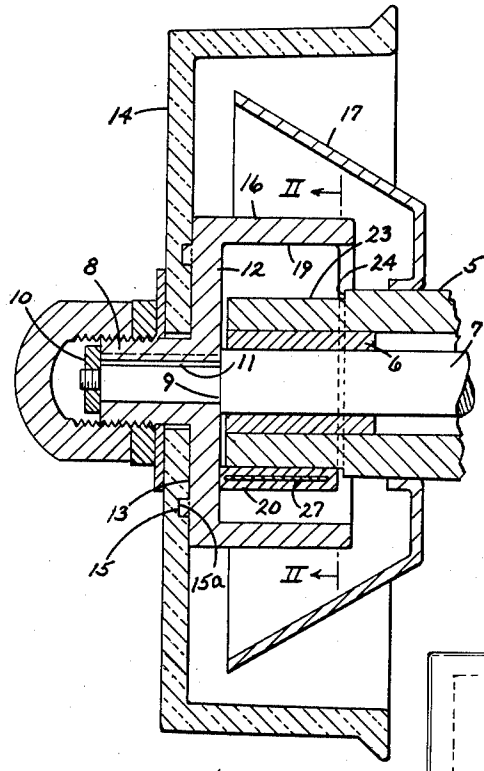


Fig. 1

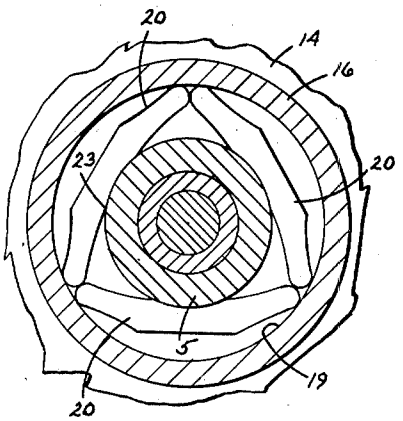


Fig. 2

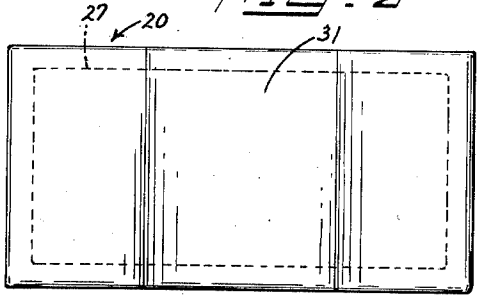


Fig. 3

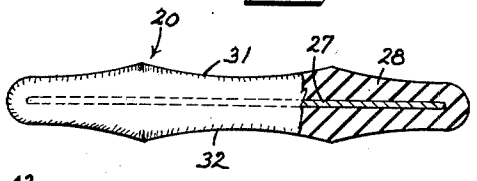
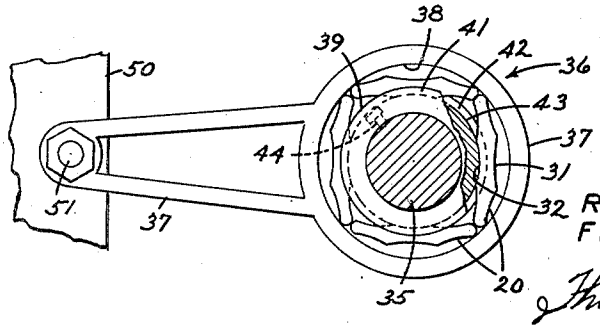


Fig. 4

Fig. 5



INVENTORS.
ROSS M. PFALZGRAFF
FRANK H. HOLMAN, JR.

Thomas R. Kinally
ATTORNEY.

United States Patent Office

2,699,230

Patented Jan. 11, 1955

2,699,230

BACKLASH ELIMINATING BRAKE

Ross M. Pfalzgraff and Frank H. Holman, Jr., Swarthmore, Pa., assignors to American Viscose Corporation, Philadelphia, Pa., a corporation of Delaware

Application March 25, 1953, Serial No. 344,501

4 Claims. (Cl. 188—83)

The present invention relates to improvements in rotor driving systems and particularly to the elimination of backlash resulting from looseness or play of a rotor with respect to a driving system therefor. Such backlash accelerates the wear in such a system, and in many applications, results in inferior performance of equipment as well as products of inferior quality derived from the use of such equipment.

In the manufacturing of viscose rayon yarn, for example, the operation or the rotation of godets, without backlash or "fluttering" with respect to the gear drives therefor, is greatly desired, especially when spinning light denier yarns, so that the freshly spun filamentary material may be withdrawn from the spinneret and stretched with as little variation in denier as possible. The present invention obviously has extensive applicability in uses other than the spinning of filamentary materials but for purposes of illustration, the invention is hereinbelow described with respect to a yarn-handling godet as used in the manufacturing of viscose rayon yarn.

It is an object of the invention to eliminate backlash or play of one rotary member with respect to another rotary member by which the first member is driven, and to maintain continuous drive relationship therebetween. It is also an object to improve the operation of artificial yarn-spinning equipment whereby yarn of improved quality may be produced, and especially to enable the production of fine denier yarn of great uniformity in denier. It is another object to provide improvements in accordance with the foregoing objects that are readily adaptable to existing spinning machines. Still another object is to produce a backlash-eliminating system that will be inexpensive and simple in construction and that will materially reduce the frequency of godet-drive parts replacement and service. Other objects, features, and advantages will become apparent from the following description of the invention and the drawing relating thereto in which

Fig. 1 is a section through the axis of a godet and the driving spindle therefor equipped with a braking system in accordance with the invention;

Fig. 2 is a fragmentary view in section taken along line II—II of Fig. 1;

Fig. 3 is a face view of a frictional element of the brake system shown in Figs. 1 and 2;

Fig. 4 is a lateral view in partial section of the element shown in Fig. 3; and

Fig. 5 is a fragmentary view partly in section of a modified braking system.

In accordance with the present invention, an annular space between two radially-spaced, substantially-concentric, relatively-rotatable surfaces, at least one of which is a surface of revolution, containing at least one frictional element which extends in engagement with two spaced portions of the inwardly-facing surface and an intermediately disposed portion of the inner outwardly-facing surface. Such surfaces may be revolved at different angular speeds in the same direction, in opposite directions, or either one may be stationary while the member defining the other surface is rotated. In the normal practice of this invention one of the surfaces will be associated with a rotor and the other with a stator having a portion in concentric relationship with the surface associated with the rotor. The surfaces are preferably cylindrical although they may be of any cross-sectional contour taken lengthwise of their axis. Such surfaces may be associated with radially-extending surfaces to maintain the frictional element in the relationship just described, and to provide additional braking surface.

Fig. 1 illustrates a godet assembly of the type that is extensively used in the spinning of rayon yarn. The assembly comprises a bearing housing **5** having a bushing **6** secured along its bore, a spindle **7** which extends from a gear box (not shown) through the bushing and extends beyond the bushing in portions of stepped-down diameter. Other portions of the godet assembly are a removable hub member **8** which seats against a shoulder **9** occurring at a point of reduction in the diameter of the spindle **7**. The hub is forced into seating relationship with the shoulder by a nut **10** and is prevented from turning relative to the spindle by a key **11**.

The hub comprises a disc section **12** which provides a radially-extending surface **13** against which the disc portion of the godet drum **14** may seat. The godet drum and hub section **12** have complementary bosses **15** and recesses **15***a* to prevent rotation of the drum relative to the hub. The hub is conventionally provided with a drum section **16** which prevents spin bath materials from entering the spindle bearing and also prevents any yarn which may leave the yarn-supporting surface of the godet drum **14** from winding about the bearing housing adjacent the disc portion of the drum. An annular, partly frustoconical guard **17** is mounted on the bearing housing to provide an additional shield for catching yarn or spray from the spin bath and preventing such yarn or spray from entering the spindle bearing.

The improvement provided by the present invention is the utilization of the annular space between the exterior of the bearing housing **5** and the interior cylindrical surface **19** of the drum section **16** of the hub for disposing one or more friction elements in the manner shown in Fig. 2 wherein three elements **20** are contained within such a region. As shown, the ends of each element are disposed approximately 120° apart in contact with spaced points along the inner surface of the drum section **16**; the middle section of each element engages an exterior surface **23** of the bearing housing **5** at a point of contact spaced angularly between the aforementioned points of contact with the inner surface of the drum. Although the bearing housing in conventional spinning machines is provided without the shoulder **24** and the surface **23** having a diameter that is reduced with respect to the regular contour of the housing, the surface **23** is preferably provided with a smaller diameter so that a cylindrical surface will be applied against the elements **20** and the shoulder **24** will be formed which may engage the sides of the elements and prevent them from working out of their normal operating region.

Since the elements **20** are flexible, at least one of the surfaces **19** and **23** must be circular but need not be truly cylindrical. However, a cylindrical surface is preferable in obtaining maximum service from the elements. Surfaces of non-cylindrical contour may be provided, if desired, and elements of corresponding contour fabricated to a shape adapted to provide substantial contact with the length in an axial direction of such non-cylindrical surfaces. Moreover, the radially-extending surfaces of members corresponding to those of either the hub **8** or the bearing housing members of the embodiment herein described may be utilized for frictional contact with the elements **20** to increase the breaking capacity of the system generally described herein.

A braking element **20** of a preferred construction is illustrated in Figs. 3 and 4 and comprises a spring element **27**, preferably of spring steel, enclosed within a layer of acid-resistant material such as a vulcanizate of rubber or one of the rubber-like synthetic polymers. The friction provided by the brake element is dependent to a large extent on the stiffness and construction of the spring element **27**. Spring steel is particularly advantageous in fabricating the element **27** since it may be maintained for long periods under deflection without fatiguing or losing its tension. It is preferred, however, that the element be proportioned particularly as to thickness to provide adequate deflection and resistance to deflection when installed so that the element may exert a desired frictional force on the rotatable member.

The application of friction to the inner brake surface

23 by the element 20 is enhanced to a considerable degree by the concave surfaces 31 and 32 thereof which may be developed in such a manner as to substantially conform to the periphery of the surface 23 when the elements are installed as shown in Fig. 2. The opposite faces of the elements are provided with identical contour as shown in Fig. 4 and are symmetrical with respect to a central longitudinal plane extending through the spring 27 parallel to its flat surfaces so that the faces may be reversed with respect to the housing surface 23 to engage either surface 31 or 32 therewith. In the manufacturing of viscose rayon, a satisfactory rubber-like material resistant to the bath ingredients for enclosing the springs 27 associated therewith is a composition comprising a polymer of chlorobutadiene such as that commercially known as "neoprene."

Fig. 5 illustrates another embodiment of the invention wherein the rotation of a shaft 35 is opposed by a brake system 36 comprising a torsion member or arm 37 having an inner surface of revolution 37, a collar 39 having annular flanges 41 and 42 extending radially outwardly from a drum surface 43 which faces radially outwardly. The collar 39 is secured to the shaft 35 by means such as a set screw 44. Four frictional elements 20 are supported between the surfaces 38 and 43. The end portions of each element engage sections of the surface 38 that are angularly spaced approximately 90 degrees with respect to the axis of the shaft 35. An intermediate portion of each element having oppositely-facing arcuate surfaces 31 and 32, engages a section of the drum surface 43 of the collar which is angularly spaced with respect to the shaft axis between the sections of the surface 38 engaged by respective end portions of the same element.

The elements 20 are constructed so that when they are removed from the braking system 36, they have preferably the rectilinear alignment illustrated in Fig. 4. The elements 20, however, are supported between the surfaces 38 and 43 in a state of deformation wherein they are laterally deflected from their normal unstressed condition of free rest. The arm 37 is prevented from turning with the shaft 35 by being connected by a pivotal element 51 to a stationary or non-rotatable member 50, such as a frame portion.

Such a mounting permits the shaft a small amount of movement in a lateral direction from the position shown, such as might be encountered in vibration, misalignment, or other conditions producing eccentric or sidewise movement of the shaft. Any lateral movement of the shaft 35 not absorbed by movement of the brake system as a whole about the axis at 51 of the arm 37 is absorbed by eccentric movement of the collar 39 relative to the surface 38. The elements 20 are free to resiliently deflect to a different magnitude while engaging both surfaces 38 and 43. The flanges of the collar 39 prevent escape of the elements from the region between the surfaces 38 and 43 in a lateral direction. In this respect they have the same function as the shoulder 24 and the disc section 12 of the godet system shown in Fig. 1. If preferred, an equivalent result may be obtained by providing radial flanges on the arm 37 extending inwardly from the surface 38.

While preferred embodiments of the invention have been shown and described, it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In combination with two relatively rotatable members having spaced concentric mutually-facing surfaces, an element adapted to fit between the surfaces and engage the surface of larger diameter at two angularly spaced points of contact and to engage the other surfaces at a point of contact spaced angularly between said two points of contact of said outer surface, the element being supported between said surfaces in a state of lateral deflection with respect to its normal unstressed condition of free rest, said element comprising an inner metallic leaf spring member and a layer of resiliently flexible rubber-like material extending over the surfaces of the spring member.

2. A combination as defined in claim 1 wherein the rubber-like material comprises a vulcanizable resin from the group including natural rubber and synthetic elastomers.

3. In combination with two relatively rotatable members having spaced concentric mutually-facing surfaces, an element adapted to fit between the surfaces and engage the surface of larger diameter at two angularly spaced points of contact and to engage the other surfaces at a point of contact spaced angularly between the two points of contact of said outer surface, said element comprising an inner metallic leaf-spring member and a layer of resiliently flexible rubber-like material extending in adherent relationship with the spring member and constituting those portions of the element in engagement with said surfaces, said element being supported between said surfaces in a state of lateral deflection with respect to its normal unstressed condition of free rest.

4. A frictional element adapted to fit between two concentric relatively rotatable mutually-facing surfaces of revolution in a condition of deflection from an unstressed condition of free rest comprising in its normally undeflected condition free of said surfaces, a flat leaf-spring member, and a layer of flexibly resilient rubber-like material extending over all surfaces of the member, the exterior surface of the element comprising an intermediate portion and end portions, the element being generally symmetrical with respect to the general plane of the flat spring member, the intermediate portion having oppositely-facing arcuate concave surfaces which are approximately complementary to the inner surfaces of said concentric surfaces, the end portions being wedge-shaped and extending away from the arcuate surfaces of the intermediate section in converging surfaces.

References Cited in the file of this patent

UNITED STATES PATENTS

2,295,503	Miller	Sept. 8, 1942
2,483,696	Giera	Oct. 4, 1949
2,483,779	Mucher	Oct. 4, 1949

FOREIGN PATENTS

908,172	France	Aug. 20, 1945