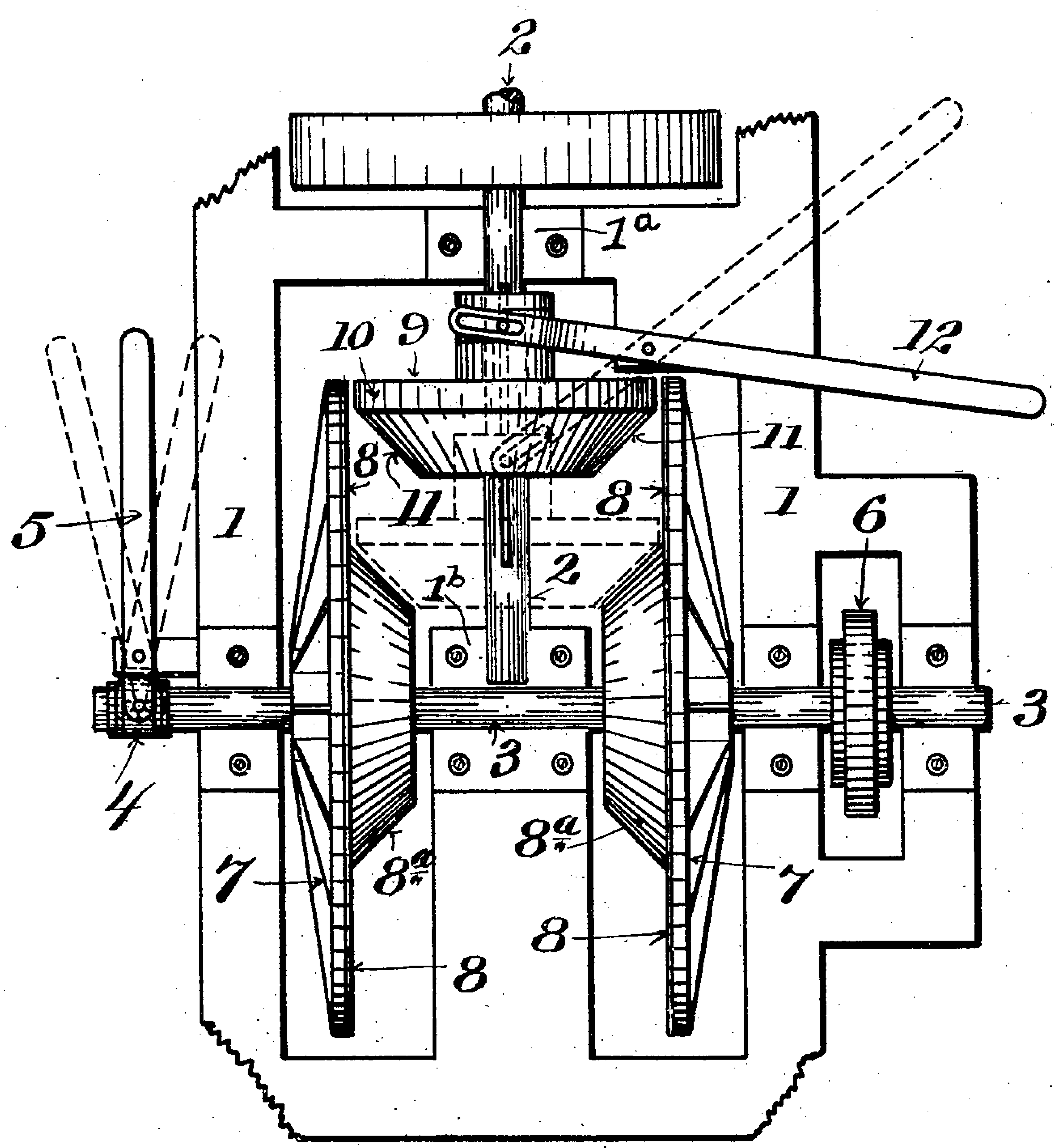
W. K. BLACKBURN.

FRICTION GEARING.

APPLICATION FILED NOV. 5, 1909.

969,448. Patented Sept. 6, 1910.



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UNITED STATES PATENT OFFICE.

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FRICTION-GEARING.

969,448. Specification of Letters Patent. Patented Sept. 6, 1910.

Application filed November 5, 1909. Serial No. 526,329.

To all whom it may concern:

Be it known that I, WILLIAM K. BLACKBURN, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Friction-Gearing; and I do hereby declare that the following is a full, clear, and exact description thereof.

The object of my invention is to provide simple, effective and durable friction-gearing, the construction and arrangement being such that motion from a pulley, in spline-connection with a transmission-shaft, is imparted to either one of a pair of disks secured to a counter-shaft, which shaft is at a right-angle to the transmission-shaft, the counter-shaft being capable of longitudinal shift, whereby the motion thereof is reversed, the pulley being adjusted radially of the disk axis to attain variable speed of counter-shaft.

Another object of the invention is to provide the driving-pulley with a bevel-face adapted to engage either one of similarly bevel faced hubs of the disks, whereby uniform coherence is attained between the friction drive and driven surface at high speed, thereby eliminating the grinding or milling effect, which result would obtain when disks having flat right-angle frictional faces are utilized within close proximity to the disk axis.

The invention therefore consists in certain details of construction and combination of parts as hereinafter fully described with reference to the accompanying drawing and subsequently claimed.

The drawing illustrates a plan view of a friction-gearing embodying the features of my invention, parts being broken away and parts removed to more clearly show structural details.

Referring by numerals to the drawing 1 indicates a frame provided with bearings 1^a, 1^b, for a transmission-shaft 2, which shaft is designed to be connected to a motor or other suitable source of power. Intersecting the axis of the transmission-shaft and at a right-angle thereto is a counter-shaft 3, which shaft is also mounted in bearings of said frame. The counter-shaft is arranged to have a slight longitudinal shift in its bearings, being provided with suitable collars, between which is loosely mounted a spanner-ring 4 for the reception of a lever by means of which the counter-shaft is shifted in either direction. A gear-wheel 6 of any suitable character is secured to one end of the counter-shaft, from which gear-wheel power is transferred to any desired source. A pair of oppositely disposed disks 7 are secured to the counter-shaft 3, each of which disks are provided with flat working faces 8 that extend from the outer diameter and inwardly to a point approximately midway between said outer diameter and the axis thereof. Each of these working faces are merged into beveled face conical friction hubs 8^a. These conical sections are of such angle that their imaginary apexes will intersect a common axis at a point slightly spaced apart.

The transmission-shaft 2 is upon the same horizontal plane as the counter-shaft and the inner end thereof terminates just clear of said counter-shaft, which end is also journaled in the bearing 1^b that extends from the frame 1, the said bearing being intermediate of the disks 7 as shown.

By utilizing an intermediate bearing for the counter-shaft, into which also the inner end of the transmission-shaft 2 is journaled, it will be seen that both of these shafts are securely held against buckling when subjected to strain, due to engagement of the friction drive members. The transmission-shaft 2 is also arranged to be held midway between the disk 7 and carries a conical driving pulley 9, that is in spline connection therewith. This conical pulley also constitutes the section of a cone, which has a working face 11, that is a duplicate of the working faces 8^a of the disks 7, the outer edge of which working face terminates with a peripheral working face 10.

When the disks 7 are in their normal or central position, the working face 10 of the conical pulley 9 is just clear of the working faces 8 of the disks, and hence there will be no motion imparted thereto. The said pulley 9 is adjusted upon the transmission-shaft by means of a lever 12, that is in spanner connection with an annularly grooved hub extension of the aforesaid pulley. The counter-shaft lever 5, as shown in full lines in the illustration, is in its midway position, in which position each disk is disposed at an equal distance from the peripheral working face 10 of the pulley. The pulley as shown is in such adjustment upon its shaft as to be in position to engage the extreme outer face 8 of either disk. Should the counter-shaft be shifted in either direction when the several parts are in the position shown, one of the disks will engage the flat face of the pulley and thereby be rotated at slow speed. To progressively increase the speed the pulley is moved inwardly by its lever 12 for a distance equal to the width of the flat face of either disk, at which point the efficiency of the friction drive between the flat face of the disk and pulley would not be appreciably impaired, owing to the fact that both working faces are of approximately equal diameter. To move the pulley farther would reduce the working diameter of the disk surface to less than the diameter of said pulley and hence jeopardize the transmission by causing a grind or milling effect between the cohesive surfaces, which results in burning out or wear and a consequent loss of power at a time when maximum speed is desired. This damaging result is overcome by the beveled face of the pulley and cone-hub of the disks being now thrown into frictional engagement, whereby a large area of cohesive surface is applied at a time when the speed is to be accelerated.

Owing to the uniform diameter of the cone-hubs and pulley and the relative dispositions thereof upon their respective shafts, when either two members are brought into frictional engagement, the contact faces will coincide to produce a perfect working contact. To reverse the counter-shaft motion the lever 5 is thrown in the opposite direction from that previously assumed, the two working positions of the lever being indicated by dotted lines.

Thus it will be seen that a frictional driving gearing is had wherein by simple movements forward or backward motion is imparted to the counter-shaft at varying speeds, or the driving power of the same may be entirely disconnected.

When the lever 5 is actuated to throw either one or the other of the disks 7 into working engagement with the cone pulley it will be observed that great strain is thrown upon the transmission shaft 2, which strain would ordinarily tend to buckle or spring the shaft. This tendency is entirely overcome by utilizing a bearing 1^b for said shaft intermediate of the disks, which bearing in connection with the bearing 1^a, effectually resists the tendency of spring in said shaft and likewise any spring in the counter-shaft 3 is resisted by the series of bearings therefor carried by said frame and disposed upon opposite sides of said disks.

I claim:

A frictional gearing comprising a frame having outer and an intermediate bearing, a shaft mounted in the outer and intermediate bearings, disks secured to the shaft upon opposite sides of the intermediate bearing, means for imparting longitudinal motion to the shaft, the disks being provided with flat working faces and conical faced hubs, a second shaft arranged upon the same horizontal plane as the first named shaft, an outer bearing for the second shaft in the frame, the inner end of the shaft being journaled in the bearing intermediate of the disks, and a conical pulley provided with a peripheral driving face in spline connection with the last named shaft, the peripheral driving face of which pulley is of less diameter than the fixed space between the flat working faces of the disks.

In testimony that I claim the foregoing I have hereunto set my hand at Milwaukee in the county of Milwaukee and State of Wisconsin in the presence of two witnesses.

WILLIAM K. BLACKBURN.

Witnesses:
GEO. W. YOUNG,
GEORGE FELBER.