

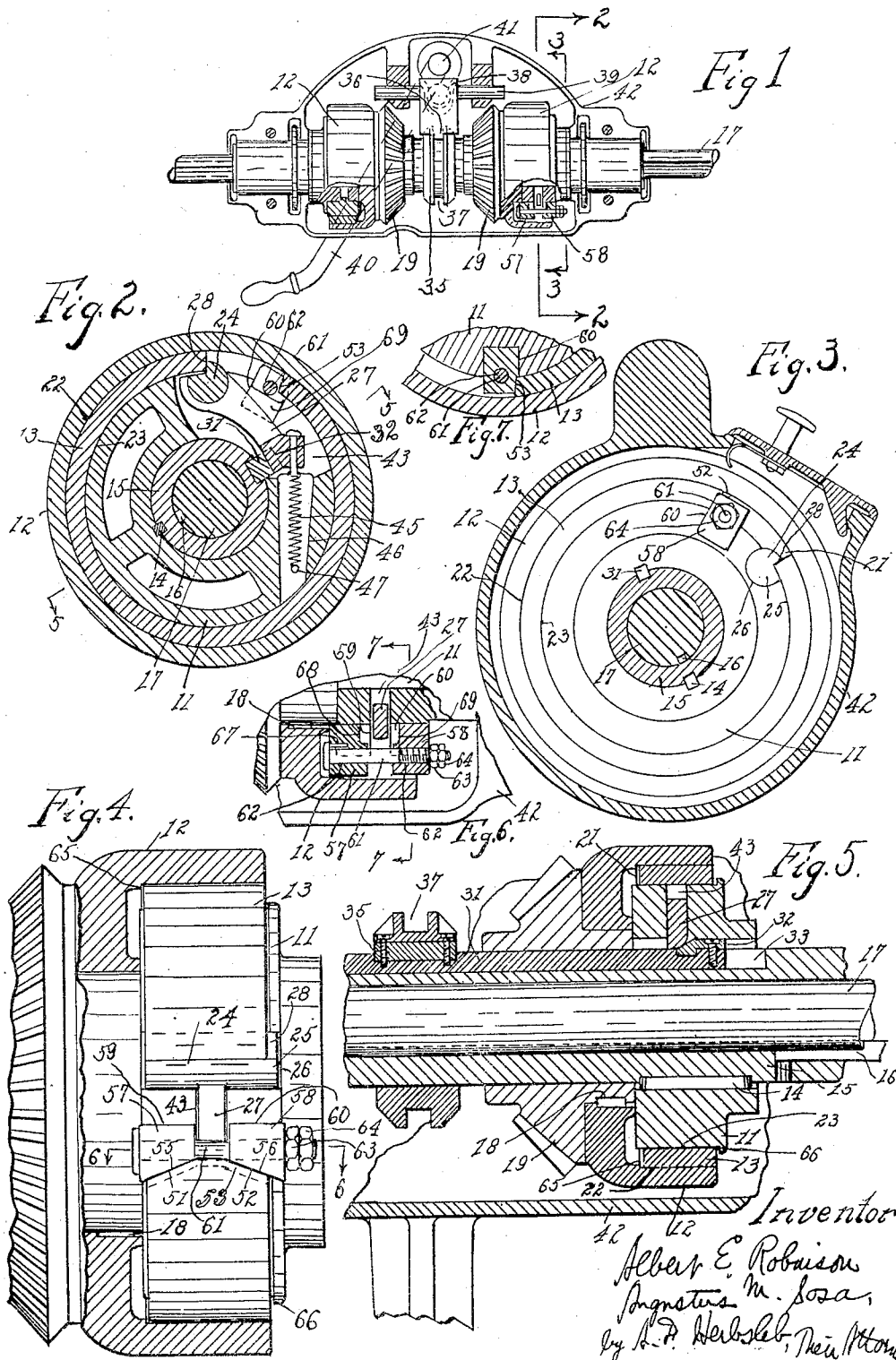
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CLUTCH.

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1,293,552.

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UNITED STATES PATENT OFFICE.

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CLUTCH.

1,293,552.

Specification of Letters Patent.

Patented Feb. 4, 1919.

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To all whom it may concern:

Be it known that we, ALBERT E. ROBINSON and AUGUSTUS M. SOSA, citizens of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have jointly invented certain new and useful Improvements in Clutches, of which the following is a specification.

Our invention relates to clutches comprising a friction-band. It is the object of our invention to provide novel means in a friction-clutch to equalize the friction contact between the friction-band and its coating friction surface.

We have found that in the manufacture of friction-bands or in treating or seasoning the same, the friction-bands are liable to become warped, or, due to varying stresses in the metal, one edge of the friction-band is liable to vary with relation to the other, this variation being sometimes in length, the result being that there is liable to be unequal force of contact between the friction-band and its coating friction surface when the friction-band is in use.

It is the object of our invention to compensate for inequalities in the friction-band, and, further, to compensate for the same by automatic means arranged to automatically take care of variations in the friction-band, or variations in concentricity of the friction-band with relation to the concentricity of its coating friction-wall.

It is the object of our invention, further, to provide abutment means for the friction-band and the friction-band with coating pressure-faces whereby a lateral shifting between the abutment means and the friction-band may take place to automatically compensate for variations at the respective sides of the median circumferential line of the friction-band.

The invention will be further readily understood from the following description and claims, and from the drawings, in which latter:

Figure 1 is a plan view, partly broken away, exemplifying our improved device applied in a usual back-gear drive of a drilling machine.

Fig. 2 is a cross-section of our improved device, taken in the plane of the line 2-2 of Fig. 1.

Fig. 3 is a cross-section of the same, taken in the plane of the line 3-3 of Fig. 1.

Fig. 4 is an edge elevation of our improved device, showing the outer rotating member partly in axial section to expose the clutch parts.

Fig. 5 is an axial section of our improved device, taken in the plane of the line 5-5 of Fig. 2.

Fig. 6 is a detail axial section of the same, taken in the plane of the line 6-6 of Fig. 4; and,

Fig. 7 is a detail section of the same, taken in the plane of the line 7-7 of Fig. 6.

In the present exemplification, the friction-clutch is shown as comprising an inner member 11 and an outer member 12, having a friction-band 13 between the same. The inner member is shown as a band-supporting part fixed, as by a key 14, to a sleeve 15, having spline-connection 16 with a drive-shaft 17, which may represent the usual back-shaft extending lengthwise of the drill-arm of a drilling machine.

The member 12 is exemplified as keyed by a key 18 to a bevel-gear 19. The member 12 represents the driven member of the clutch in the present exemplification. This driven member may transmit motion to suitable mechanism, as the usual driving and feeding mechanism in the drill-head of a drilling machine. We have, in Fig. 1, represented the parts in reverse duplicates.

The inner and outer members have a space 21 between them, in which the friction-band is received. The outer member is provided with an annular friction-wall 22 which forms one of the walls of said space. The other wall 23 of said space forms a support for the band. The band may be of suitable metal. The friction-band is exemplified as an expansible friction-band with one end of the friction-band held by the inner member, while the other end of said band is pressed, as by a key 24, for expanding the friction-band into engagement with the friction-wall.

The key is provided with trunnions 25 received in seats 26 in the inner member, and has an arm 27 extending therefrom. The end of the friction-band is received in a recess 28 in said key, the end-wall of said recess coacting with said friction-band for expanding the same. A spline 31, having a key-moving part 32 thereon, is arranged to impinge the swinging end of the arm of said key for rocking said key and actuating said friction-clutch. The spline is arranged to

reciprocate in a splineway 33 in the sleeve 15, actuated by means of a collar 35 secured to said spline, arranged to receive a finger 36 in an annular groove 37 therein, the finger being on a block 38 shiftable laterally on a rod 39 by means of an operating arm 40 pivoted at 41 to the casing 42 inclosing the clutch device.

The arm 27 of the key 24 is arranged to reciprocate in a slot 43 of the inner member, the seats or bearings 26 for the respective trunnions of the key being at the respective sides of said slot, and the arm being at the middle portion of the key, to equalize the pressure exerted by the key.

A spring 45 normally urges the key into releasing position. It is received in a bore 46 in the inner member, the respective ends of the spring being secured to the arm 27 and a pin 47 in said bore.

The friction-band is provided with contact faces 51, 52, which slope relatively to each other crosswise of the width of the friction-band, and are exemplified as formed on the end of said friction-band. They also preferably slope outwardly in the direction of the force applied, as shown at 53 in Fig. 2 and in dotted lines in Fig. 4, for bringing the friction-band into coacting relation with its coacting friction-wall at the contacted end of the friction-band and throughout its length.

Contact-faces 55, 56, which coact with the faces on the friction-band, are represented as located on blocks 57, 58, received in guideways 59, 60, in the inner member at the respective sides of the slot 43 therein. The coacting friction-faces are preferably relatively adjustable, for which purpose the contact-faces 55, 56, are shown on separate blocks, the adjustment being represented as accomplished by means of a bolt 61 received in bores 62 in said blocks, an adjusting nut 63 threaded to the threaded end of said bolt determining the distance between said blocks, a jam-nut 64 maintaining the adjusting nut in adjusted position. A pin 67 prevents turning of the bolt. In the present exemplification, therefore, outward opposed lateral force is applied to said blocks in a direction substantially parallel to the axis of rotation of the clutch, the outward movement being limited respectively by the head of said bolt and the nut received about the said bolt. The relative adjustment of the blocks adjusts the force applied by the friction-band with a given extent of movement of the rocking key. The blocks are provided with inner clearance-spaces 68, 69, for accommodating the arm 27 and permitting lateral movement of the blocks.

The opposed inclined faces on the friction-band and blocks act as wedges and cause lateral shifting substantially parallel with the axis of rotation of the clutch between

said coacting friction-faces, the lateral shifting or positioning preferably taking place in the blocks, although the elasticity of the device enables shifting to take place either in the faces on the clutch-member or in the band.

If desired, the friction-band may be held in place in the space between the friction-members by annular shoulders 65, 66, on said respective members, these shoulders being preferably spaced apart, a greater distance than the width of said friction-band for allowing slight lateral movement of said friction-band.

It is obvious further, that our improved device is employable in other relations than as particularly exemplified herein, and that the coacting friction-faces may be at the actuated end of the friction-band, and that the invention is employable on a contractible as well as on an expansible friction-band and that changes, within the scope of the appended claims may be made without departing from the spirit of our invention.

In operation, assuming that the friction-band is longer at one side than at the other side of the median line around its circumference, when the key 24 is turned, the longer edge of the friction-band will first contact the annular wall coacting therewith. Continued pressure by the key will cause greater force between the key and the end abutment face at that edge of the friction-band. The resultant force between the coacting inclined or wedge faces at that side of the friction-band will cause a lateral or axial shifting between said coacting friction faces, thereby relieving the pressure at that side of the friction-band and causing equalizing coaction between the inclined or wedge faces at the other side of said friction-band, by relative lateral shifting between said last-named inclined or wedge faces, the equalizing adjustment between the coacting inclined or wedge faces at the respective sides of the friction-band continuing until the endwise force exerted by the key upon the friction-band is equalized throughout the width of the band for equalizing the friction pressure between the friction-band and its coacting wall.

By means of our improved device, the friction engagement between the friction-band and its coacting friction-wall is equalized throughout the area of the friction-band by simple means acting automatically, and the force exerted by the clutch is consequently increased, and inaccuracies in the friction-band compensated for.

Having thus fully described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In a friction clutch, the combination of a plurality of clutch-members, and a friction-band between them, one of said mem-

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bers provided with an annular friction-face coacting with said friction-band, the other of said members provided with end-abutment means for said friction-band, and said
 5 end-abutment means and said friction-band provided with coacting faces causing lateral shifting between said end-abutment means and friction-band whereby to equalize the pressure between said friction-band and said
 10 friction-face coacting therewith.

2. In a friction clutch, the combination of a plurality of clutch-members, and a friction-band between them, one of said members provided with an annular friction-face
 15 coacting with said friction-band, the other of said members provided with end-abutment means for said friction-band, said end-abutment means and said friction-band provided with coacting faces causing lateral
 20 shifting between said end-abutment means and friction-band whereby to equalize the pressure between said friction-band and said friction-face coacting therewith, and means for relatively laterally adjusting said coact-
 25 ing faces.

3. In a friction clutch, the combination of a plurality of clutch-members comprising an annular friction-wall, a friction-band coacting with said wall, means for causing friction engagement between said friction-band and said wall, including the providing of
 30 said friction-band with oppositely sloping abutment faces, and coacting abutment parts for the latter shiftable laterally by unequally distributed endwise pressure of said
 35 band thereon.

4. In a friction clutch, the combination of a plurality of clutch-members comprising an annular friction-wall, a friction-band
 40 coacting with said wall, means for causing friction engagement between said friction-band and said wall, including the providing of said friction-band with oppositely sloping abutment faces, coacting abutment parts for
 45 the latter shiftable laterally by unequally

distributed endwise pressure of said band thereon, and means for adjusting the distance between said abutment parts.

5. In a device of the character described, the combination of clutch-members having
 50 a space therebetween, one of said members having an annular wall of said space thereon, a friction-band in said space having reversely sloping wedge-faces at one end thereof, retaining means on the other of said mem-
 55 bers having cooperating reversely sloping wedge-faces, and means for urging pressure between said wedge-faces for forcing said friction-band into frictional engagement
 60 with said annular wall, said cooperating edge-faces of said friction-band and retaining means arranged for automatically causing lateral shifting movement between said
 65 friction-band and said retaining means when said friction-band is forced into frictional engagement with said annular wall for equalizing said frictional engagement.

6. In a friction clutch, the combination of a plurality of coacting clutch-members, a
 70 friction-band between them, one of said members provided with a friction-face for said friction-band, and means for controlling the friction-pressure of said friction-band comprising a pair of oppositely in-
 75 clined abutting faces, said friction-band provided with a pair of coacting oppositely inclined abutting faces, means for adjusting the distance between the faces of one of said
 80 pairs of oppositely inclined abutting faces, and means for lateral shifting between said pairs of oppositely inclined abutting faces.

In testimony whereof, we have hereunto signed our names in the presence of two subscribing witnesses.

ALBERT E. ROBINSON.
 AUGUSTUS M. SOSA.

Witnesses:

ALBERT G. JENNINGS,
 ALLEN A. EDWARDS.