No. 729,157. PATENTED MAY 26, 1903.

W. R. GREEN.

GEARING.

APPLICATION FILED OCT. 9, 1899.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

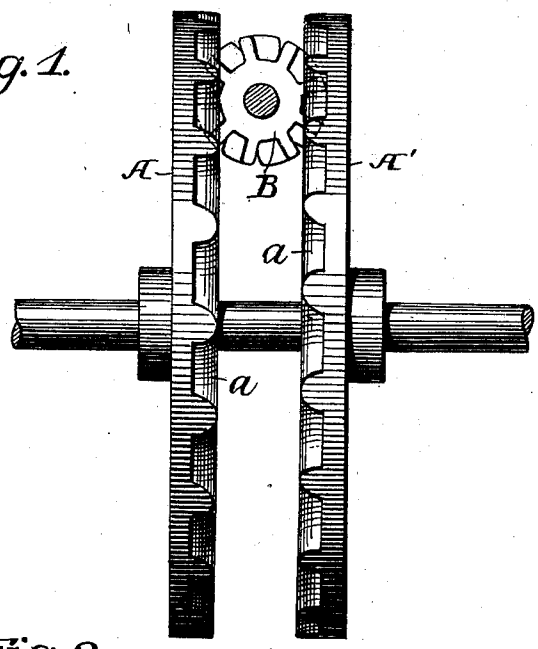
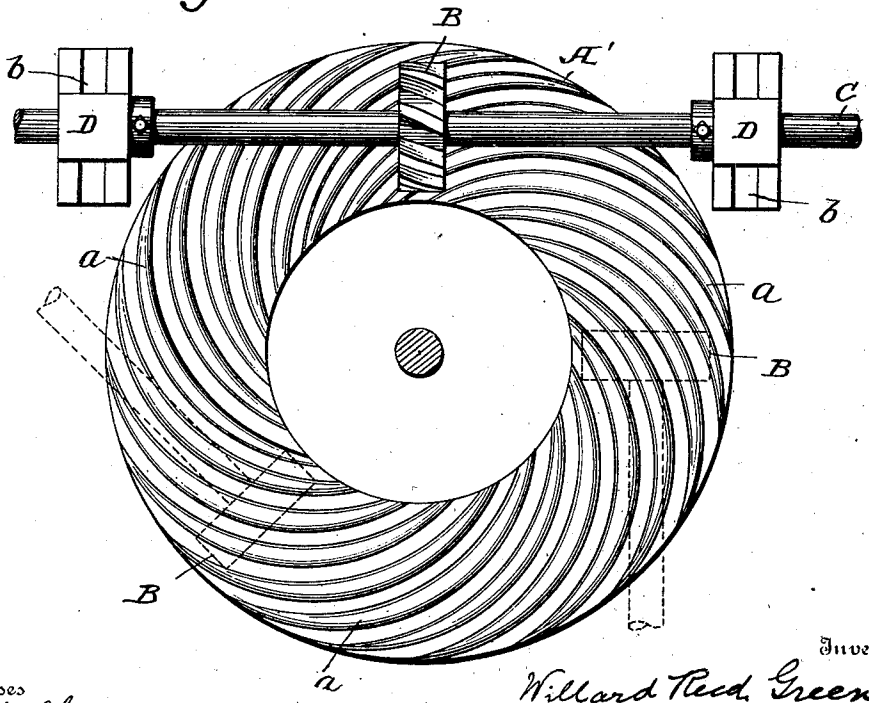


Fig. 2.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

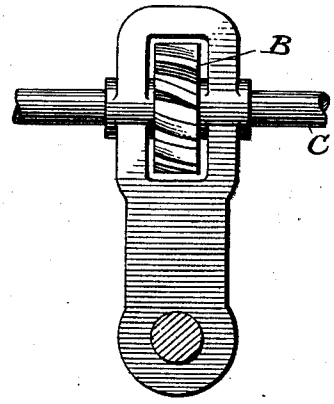


Fig. 4.

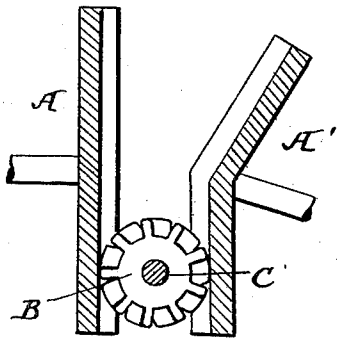


Fig. 5.

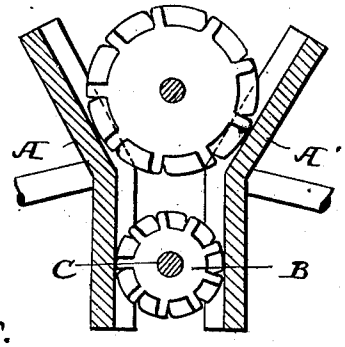
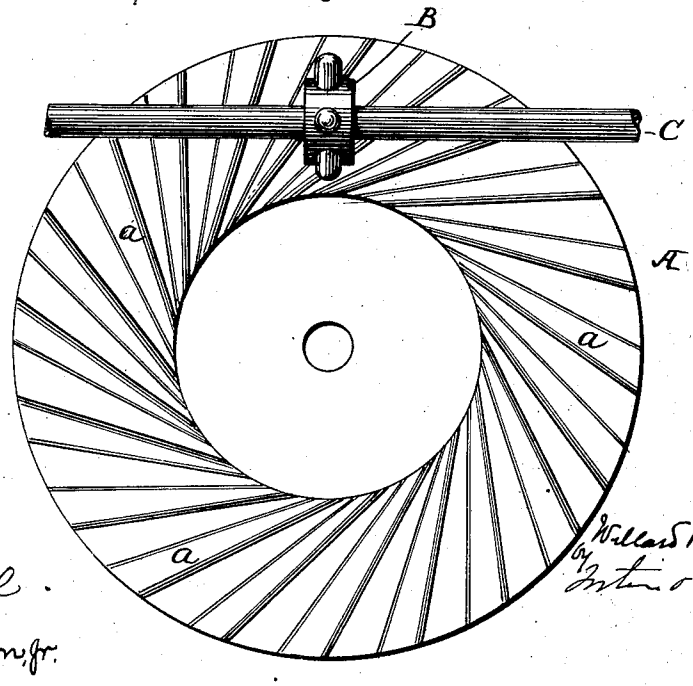


Fig. 6.



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No. 729,157. Patented May 26, 1903.

UNITED STATES PATENT OFFICE.

WILLARD REED GREEN, OF DENVER, COLORADO.

GEARING.

SPECIFICATION forming part of Letters Patent No. 729,157, dated May 26, 1903.

Application filed October 9, 1899. Serial No. 733,087. (No model.)

To all whom it may concern:

Be it known that I, WILLARD REED GREEN, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Gearings, of which the following is a specification.

My invention relates to mechanical gears for receiving, converting, and transmitting motion; and it consists in the adaptation or the form and construction of such gears and the manner of relating the same to each other and to one or more coacting pinions or wheels meshing therewith, whereby two such gear-wheels revolving in the same direction operate upon the said intermediate pinion or pinions and both gears apply force and motion to said pinion or receive force and motion therefrom.

An embodiment of the invention is shown in the accompanying drawings, in which—

Figure 1 is an edge view showing one form of my improved gearing. Fig. 2 is a plan showing one of the gear-wheels and pinion engaging the same. Fig. 3 is a view showing a different support for the pinion. Figs. 4 and 5 illustrate in section different forms of gear-wheels, and Fig. 6 is a face view showing a wheel with teeth of a different form from those shown in Figs. 1 and 2.

My improved gearing is embodied in two opposite gear-wheels A A′, having teeth *a* upon their proximate lateral faces, and one or more intermediate pinions B, the teeth of which engage those of both the wheels A A′, the teeth of the wheels and pinion being of such character and arrangement that the wheels will both rotate in the same direction when turning in engagement with the pinion.

The teeth of the wheels A A′ may be of different forms and arrangements. In the preferred form (shown in Figs. 1 and 2) the teeth *a* consist of curved ribs or ridges following each other in succession around the face of the wheel and of similar lines of curvature eccentric to the axis of the wheel and extending inward to any desired extent from the periphery.

The wheels are placed opposite to each other, as shown in Fig. 1, and it is obvious that if two such wheels of similar form and having teeth upon their respective working faces curved in a common direction about their centers are placed with their respective working faces proximate or toward each other the effect of such relative placing is to cause the teeth upon said two wheels to stand relatively as curved in opposite directions—that is, the teeth of one wheel at an angle to those of the other. It will be seen that with a pinion B engaging both sets of teeth upon rotating said two wheels upon their axes in the same direction the action of the opposite teeth results by said difference in angle in acting upon the pinion in opposite directions, or, in other words, the action of one of said wheels is to move the periphery of the pinion toward the periphery of the wheels and the other toward the center of the wheels, respectively, and the result is that said pinion is rotated through the coaction of said two wheels and by the application of force by both said wheels upon both sides of the axis of said pinion. As the opposing forces balance each other, the thrust of the pinion-shaft against its bearings is thus avoided.

It will be seen that the direction of rotation of the pinion will depend upon the direction of curvature of said teeth and that it may be altered by altering said direction.

It is evident that one or more pinions may be suitably mounted or operatively arranged in relation to said face-wheels in any known or desired manner and may be independently supported and, if desired, may be supported by a yoke or arbor fixedly or pivotally supported by the axis of the wheels, as shown in Fig. 3, and if pivoted the yoke may be revolved about the axis of said wheels as desired. Also such pinion may be suitably mounted to be moved toward or from the axis of the wheels, as by making the shaft C adjustable in its bearings D, or the latter may be adjustable on ways *b b* to carry the pinion to or from the axis of the wheels, and any well-known means may be employed for so shifting the position of said parts.

The word "pinion" is used to include any wheel meshing with any suitable forms of wheels A A′. Thus in Fig. 4 one wheel A is flat and the wheel A′ is conical, and in Fig. 5 both are conical.

The teeth may be at any angle with the radius of the wheel or have any pitch, and they

may be curved in either direction or may be straight, as in Fig. 6, in which case the teeth of the pinion are rounded. The faces of the wheels may, if necessary, be concave or convex. The formation of the pinion-teeth is dependent upon the relation of the pinion-shaft to the wheels or the working faces thereof and upon the angle or arrangement and form of the teeth. These teeth may occupy any desired proportion of the wheel-faces between the peripheries and the center.

Where a number of different pinions are operated by two such coöperating wheels at the same time, they may be placed in different or various relative positions upon or as to the wheels, and several pinions so placed, as shown in dotted lines, Fig. 2, may be used to convey power to the same or to different gear-wheels or mechanisms with which said pinions and their shafts may be operatively connected.

It will be seen that the wheels A A′ need not necessarily be upon the same shaft or axis, though this is in some respects preferable; but they may be upon different shafts in alinement or they may not necessarily be in alinement, and in some circumstances two wheels upon different centers and having a different pitch or curvature to their teeth or a different number of teeth may be so placed as to mesh with a common pinion and coöperate in the manner herein described.

While I have referred to the wheels as constituting the driving member of the gearing, they may be driven by the pinion. When the shaft of the pinion is carried by a yoke swinging about the axis of the wheels A A′, as in Fig. 3, it affords a ready means of driving tools of different kinds which are held in the hand, but driven by power.

Without limiting myself to the precise construction and arrangement of parts shown, I claim—

1. A gearing consisting of two disks having lateral faces with curved teeth, said disks secured centrally to different shafts, and an intermediate pinion engaging the teeth of both disks, substantially as set forth.

2. The combination with two shafts, of two opposite gear-wheels each connected with one of said shafts and having teeth on their proximate lateral faces, the teeth on one wheel being at an angle to those on the other wheel, an intermediate pinion engaging both sets of teeth, and a shaft for said pinion, substantially as described.

3. The combination in a gearing of two opposite gear-wheels having curved teeth upon their proximate lateral faces and an intermediate pinion engaging both wheels to rotate therewith as both wheels turn in the same direction, substantially as set forth.

4. The combination with wheels arranged opposite each other with teeth upon their proximate lateral faces, of an intermediate pinion engaging both wheels and means for adjusting the pinion between the wheels, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLARD REED GREEN.

Witnesses:
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W. CLARENCE DUVALL.