

No. 673,352.

Patented Apr. 30, 1901.

L. ANDERSON.
GEARING.

(Application filed Nov. 8, 1899.)

(No Model.)

Fig. 3

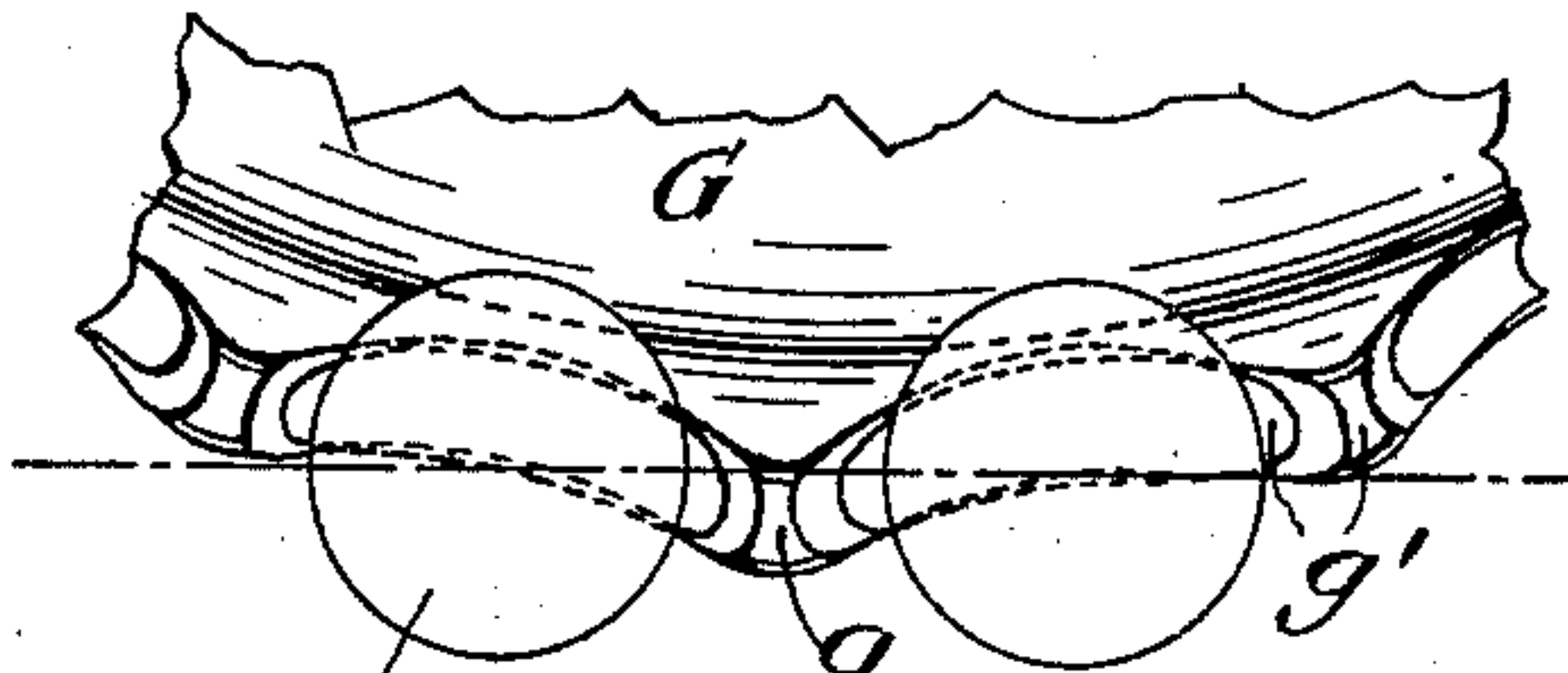


Fig. 5

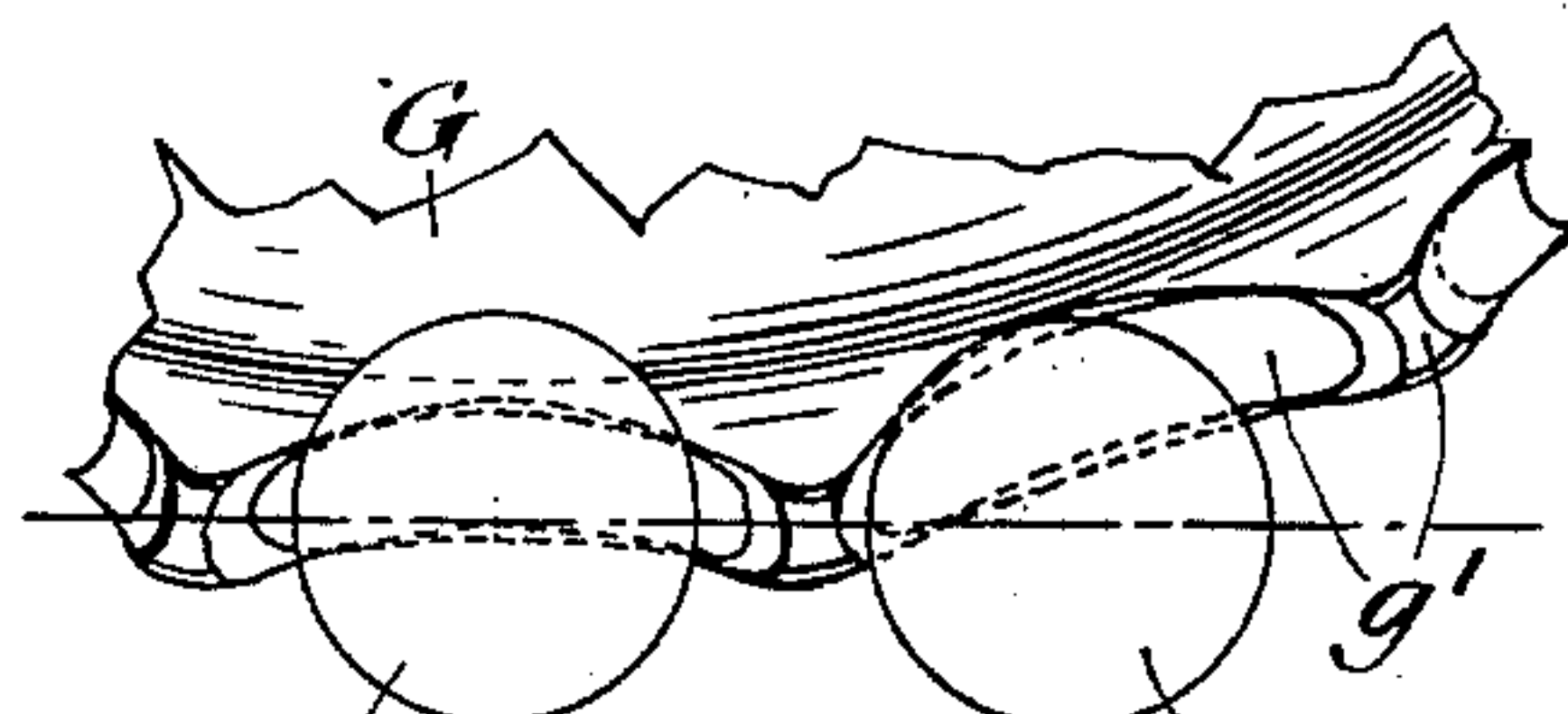


Fig. 4

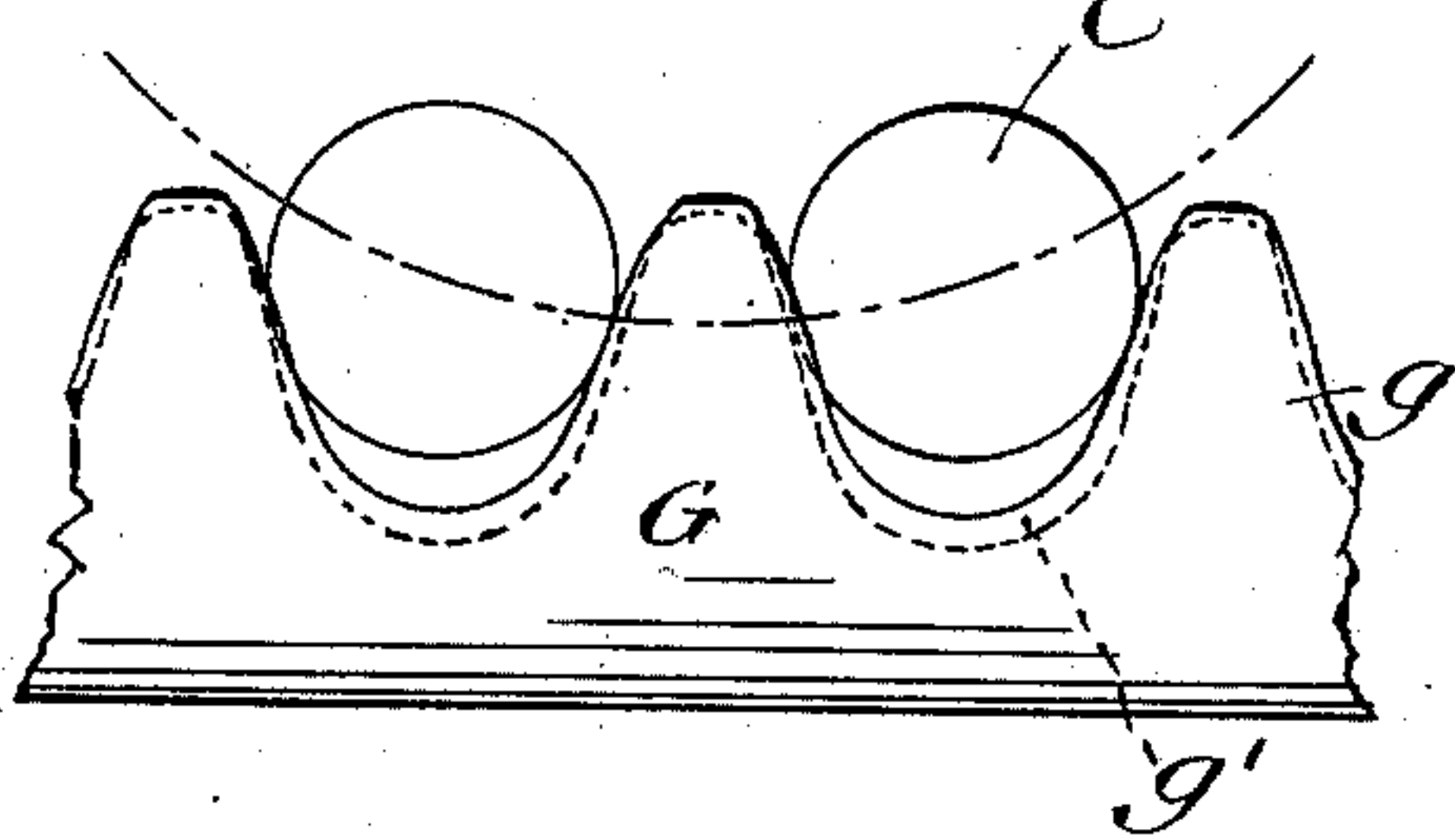


Fig. 6

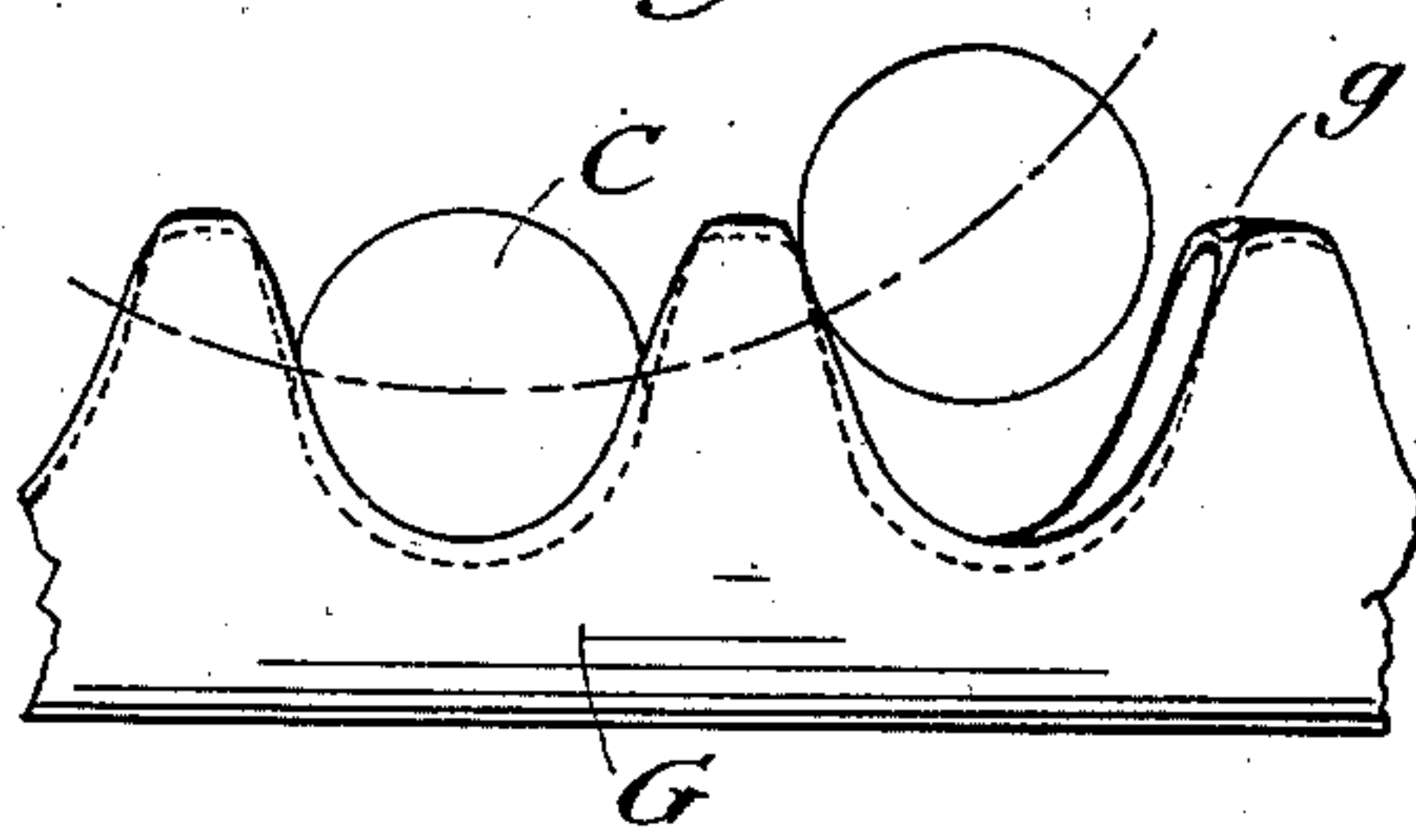


Fig. 1

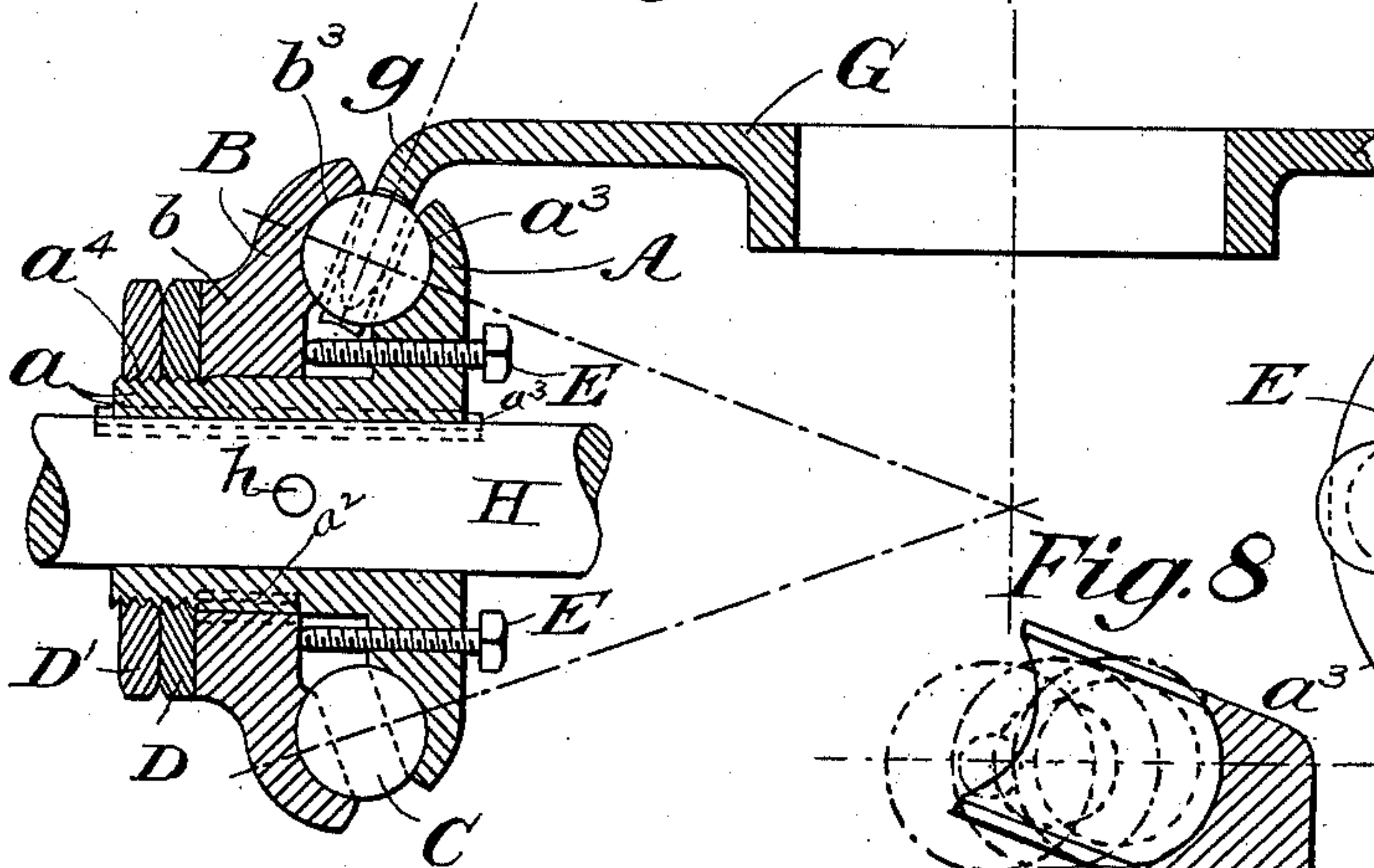


Fig. 2

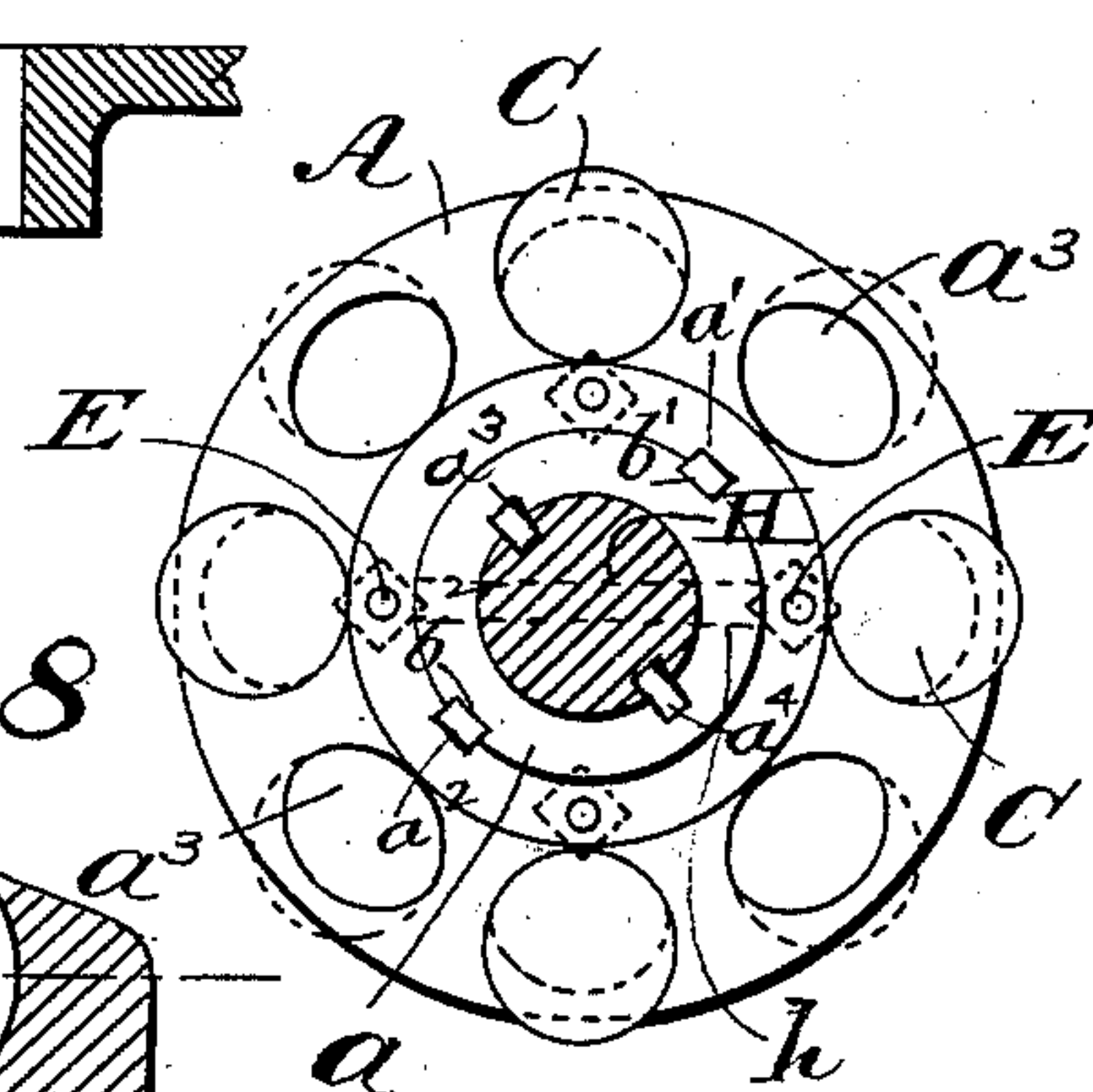


Fig. 8

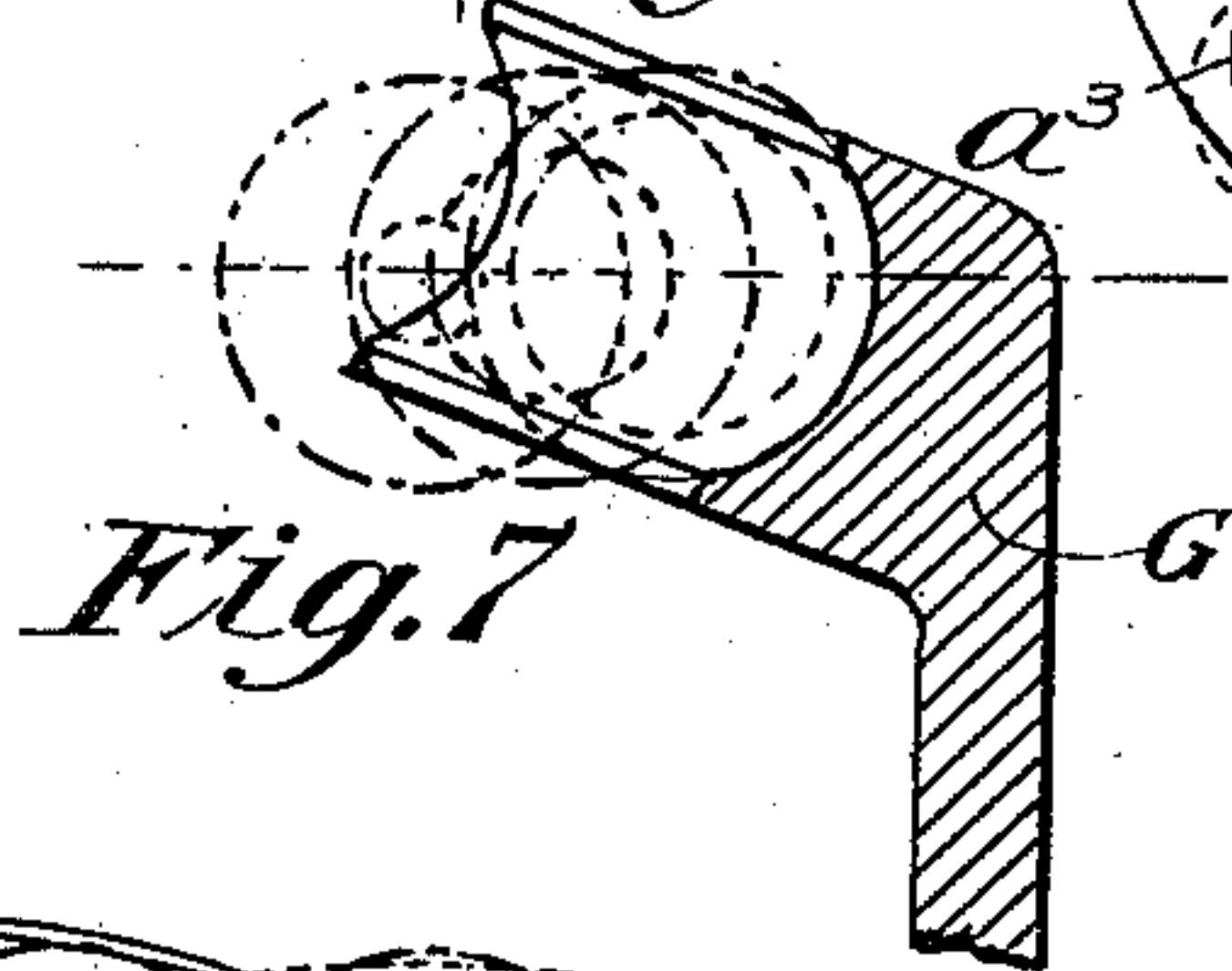
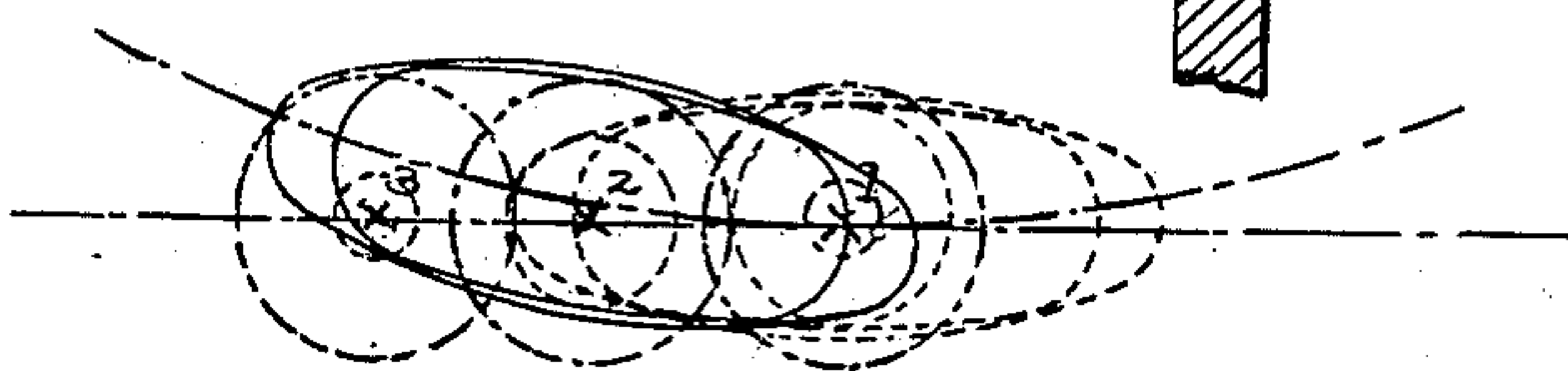


Fig. 7



Witnesses.

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LARS ANDERSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO MINOR T. JONES,
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GEARING.

SPECIFICATION forming part of Letters Patent No. 673,352, dated April 30, 1901.

Application filed November 8, 1899. Serial No. 736,217. (No model.)

To all whom it may concern:

Be it known that I, LARS ANDERSON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Gearing, of which the following is a specification.

The object of my invention is to provide a gear especially adapted to bicycles or other light-running machines wherein the gear-shafts are lightly held together and are liable to slight displacement, which would materially effect the true contact and engagement of standard gear-wheels, and where a high speed is desirable with a minimum degree of lost motion and friction.

My invention consists, primarily, in a gear having balls held within oppositely-disposed cups in a novel manner and adapted to receive the spur-teeth of a crown-gear wheel, the teeth of which will pass between the said cup-plates and engage with the balls.

My invention further consists in certain novel features incidental to the construction above specified, as will hereinafter appear.

In the accompanying drawings, Figure 1 is a diametric section through the axis of the ball-gear and a section of a crown-gear to engage therewith constructed in accordance with my invention. Fig. 2 is a face view of one of the ball-gear disks with cups and with gear-balls placed in the alternate cups of said disk. Fig. 3 is a fragmental plan, and Fig. 4 a fragmental elevation, of three teeth of the crown-gear and two gear-balls oppositely placed upon the intermediate tooth. Fig. 5 is a fragmental plan, and Fig. 6 a fragmental elevation, of three teeth of the crown-gear moved to the right, showing one of the gear-balls in contact with the bottom of the space between two of the teeth and a second gear-ball in a half-raised position in contact with one side of the point of the tooth. Fig. 7 is a diagram showing by full lines in one position and also by dotted lines in a second position the elliptical outlines of the involute of a crown-gear tooth, by a broken segment-line the direction of movement of the gear-ball, the letters x' , x^2 , x^3 representing three successive positions of the contact-point of the gear-ball with the surface of the tooth,

and the three double circles in dotted and broken lines centering upon said points representing, respectively, the contact diameters and the full diameters of the said gear-balls. Fig. 8 is a sectional detail in elevation of one of the crown-gear teeth with a gear-ball represented in three corresponding positions and in a similar manner as in Fig. 7 of the drawings.

The gear comprises two disks A and B, the disk A having a sleeve-hub a to fit upon the shaft and the disk B having a short hub b to fit upon the sleeve-hub a of the disk A, key-seats b' b^2 being provided on the outside of the hub b to receive keys a' a^2 upon the sleeve-hub a of the disk A, and thus hold the said disks from turning, the said disks having opposed cups a^3 b^3 , respectively, which are thus held in fixed relationship to each other to receive gear-balls C and allow them to turn freely therein. The disks A and B are held from turning upon the shaft H by means of a key or keys a^3 b^4 set into the shaft and hub, as shown in Fig. 2, and the disks may be secured from moving on the shaft by a pin h or by a set-bolt or other suitable means. The end of the sleeve-hub a has a screw-thread a^4 thereon, which receives a screw-nut D, which serves to adjust the disks toward each other, and the disk A has a set-bolt or set-bolts E, which prevent the disk B from moving too far toward the disk C, thus binding the gear-balls between them and preventing them from turning within the cups of the disks. A lock-nut D' holds the nut D from turning when adjusted. The gear-balls C are held securely within the cups, ample space being provided between the said disks to receive the teeth g of a crown or spur gear G and allow a sufficient clearance to admit of a considerable deviation of the gear-shafts from their proper pitch without causing the teeth and gear-balls to engage or bind unevenly one upon the other, as would be the case with a bevel gear and pinion of the standard type. The fixed teeth g of the crown-gear G are formed with gutters or grooves g' , which extend over the entire contact-surface of the said teeth, and the spaces between the crown-segments of the teeth are in the form of a hyperbolic curve. The gear-balls C may

thus freely roll over the contact-surface of the teeth and be held therein with more or less contact at all times without material or excessive lost motion. The gear thus described may be manufactured at small cost, and the several parts are all securely held together and capable of the most accurate adjustment.

The jostling and hammering of a road-wagon upon rough roads would soon render the tooth contact-surfaces of an ordinary gear inoperative while a gear such as the one herein described and claimed would, though severely strained and greatly displaced, run as well as need be and with scarcely a perceptible difference from its operation when in its true position.

I claim as my invention and desire to secure by Letters Patent—

1. The combination with a gear-wheel, of a pinion comprising a hub having a disk-plate thereon and an opposing disk mounted upon the hub, each disk having cups in the opposing faces thereof, a key fitted in the hub and a slot formed in the opposing disk and lock-nuts fitted upon the hub to hold the cups of the hub-disk and the opposing disk in

proper relation to each other substantially as described.

2. The combination with a gear-wheel, of a pinion comprising a hub-sleeve and disk thereof having cups in the face thereof, and made integral with the hub-sleeve, a loose disk-plate having similar cups therein fitted upon said hub-sleeve the cups in the two disks being opposite each other, a key and seat upon said hub-sleeve and disk-plate, a nut fitted upon the end of the hub-sleeve and a set-bolt for holding the hub-sleeve and disk-plate adjustably in fixed relation to each other, substantially as described.

3. The combination of a gear-wheel having dished teeth projecting angularly therefrom, each tooth having a gutter upon its contact-surface adapted to receive a gear-ball in rolling contact therewith with a pinion having oppositely-disposed disks provided with cups and loose balls within said cups adapted to enter said gutter, substantially as described.

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Witnesses:

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