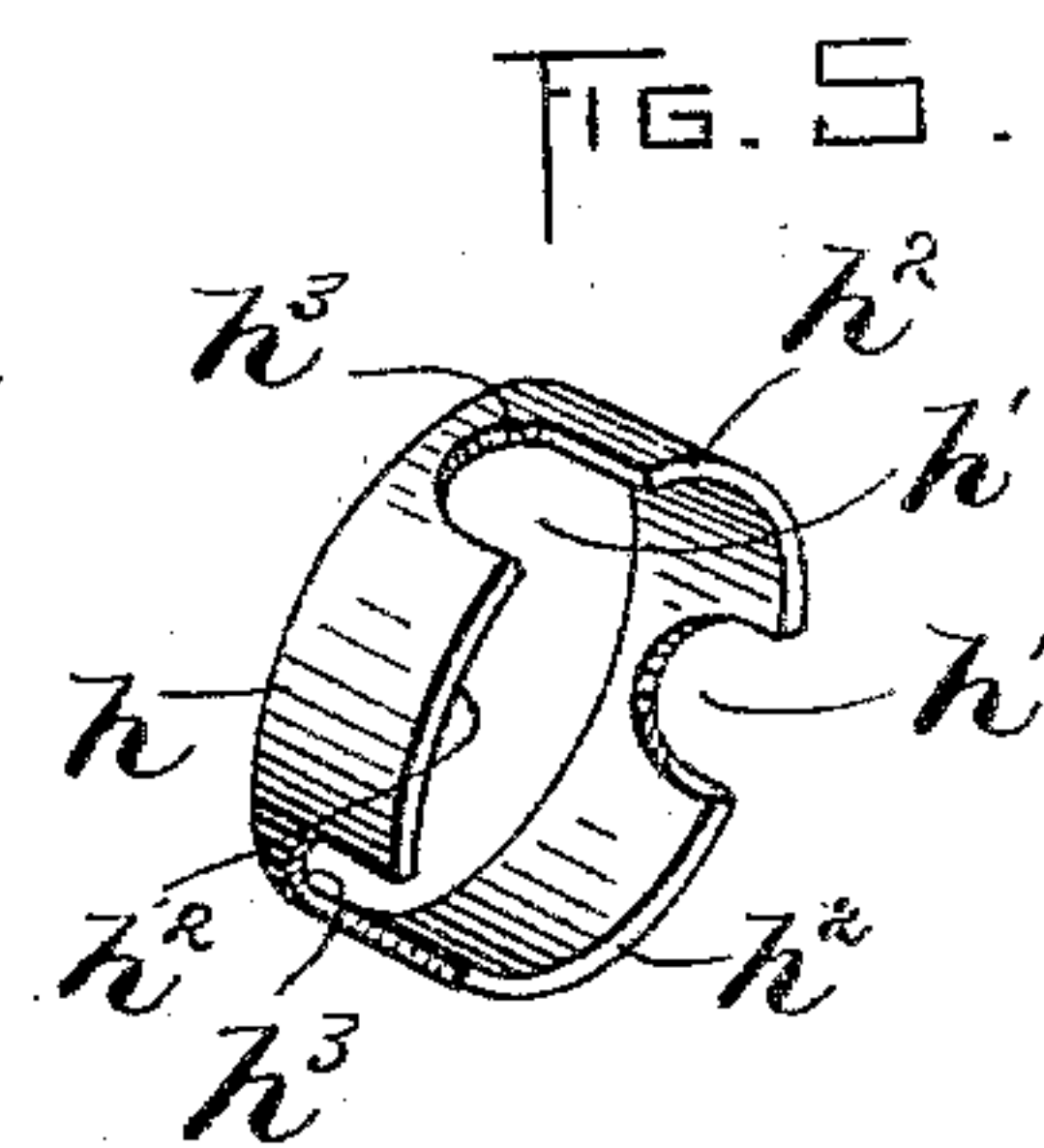
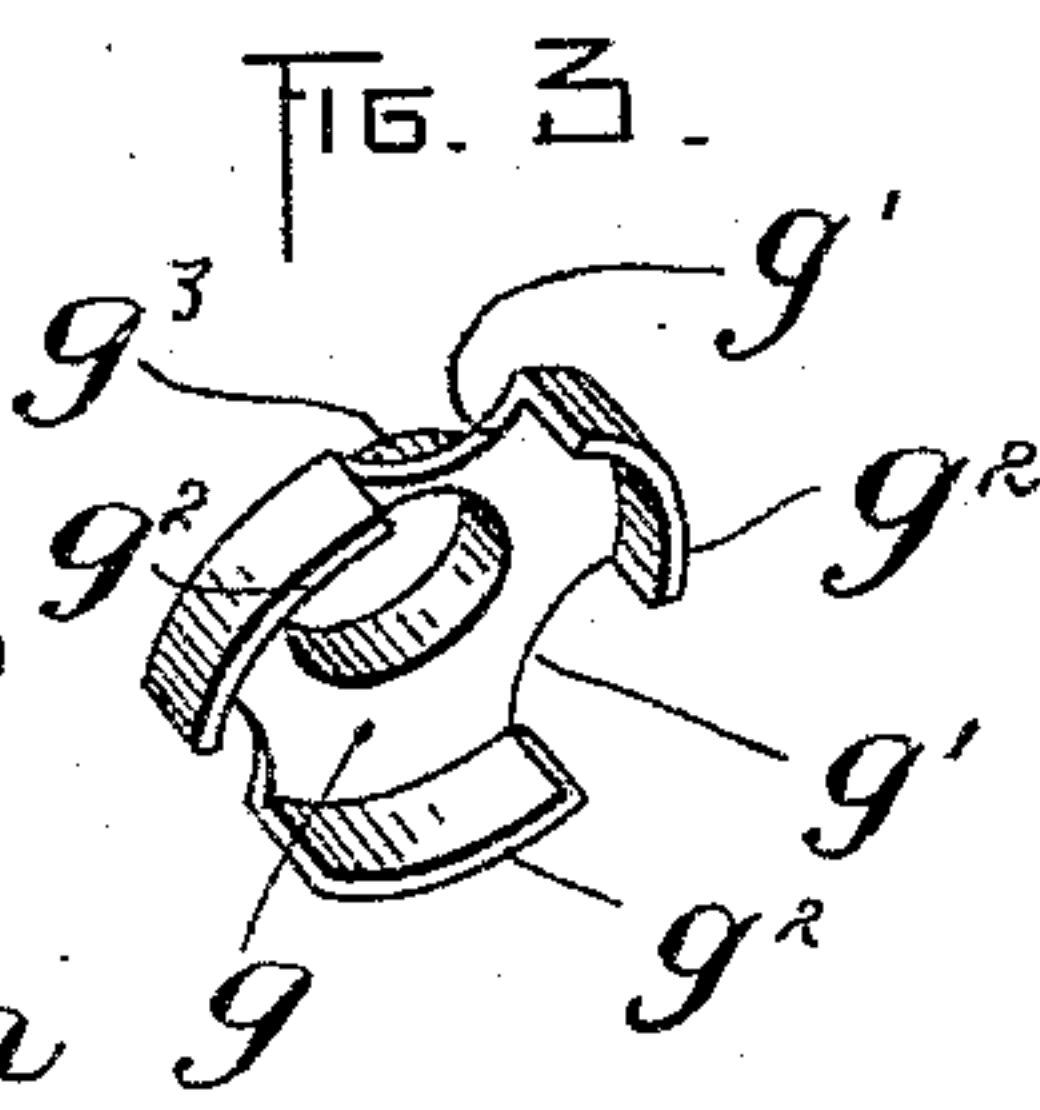
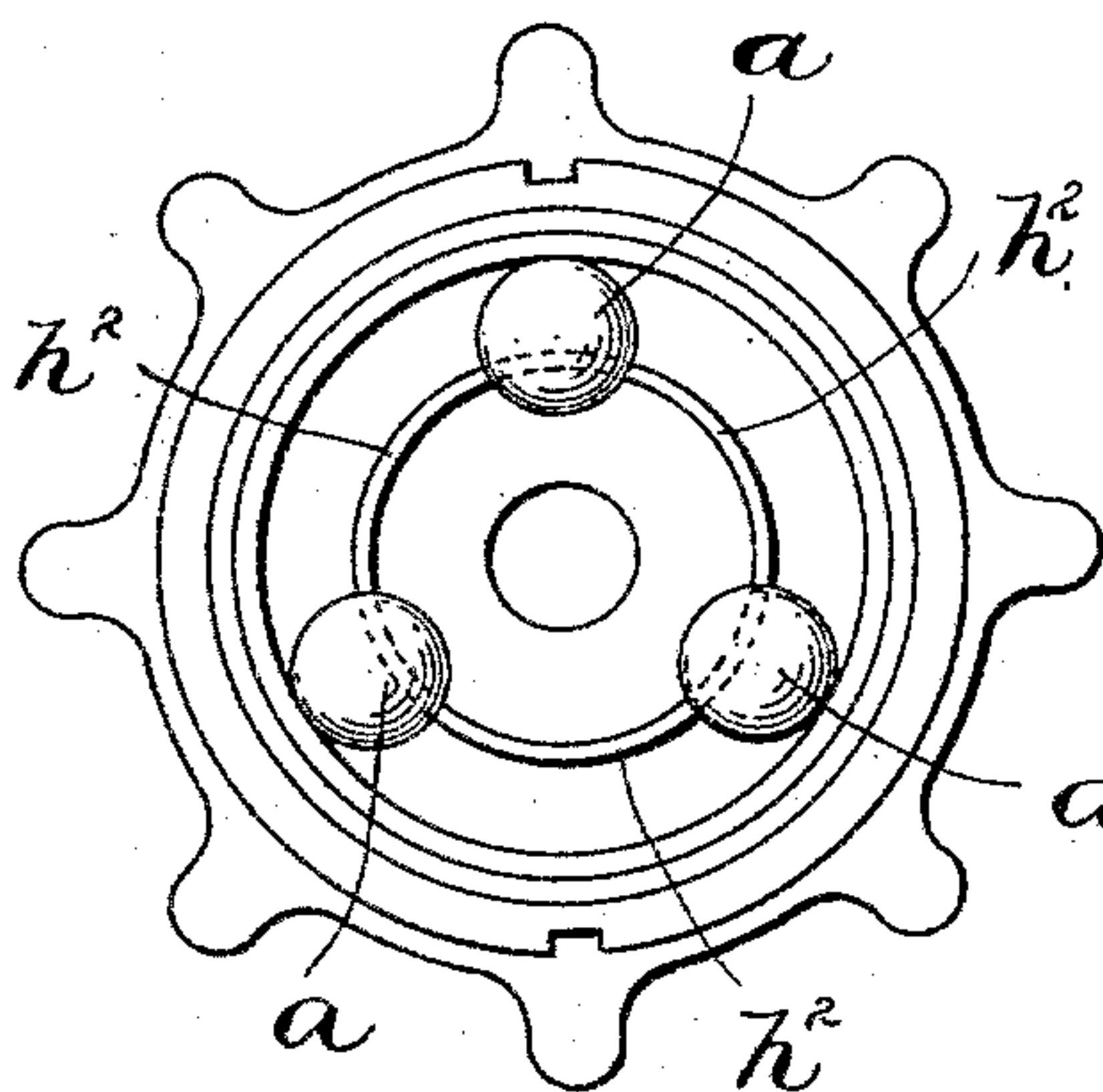
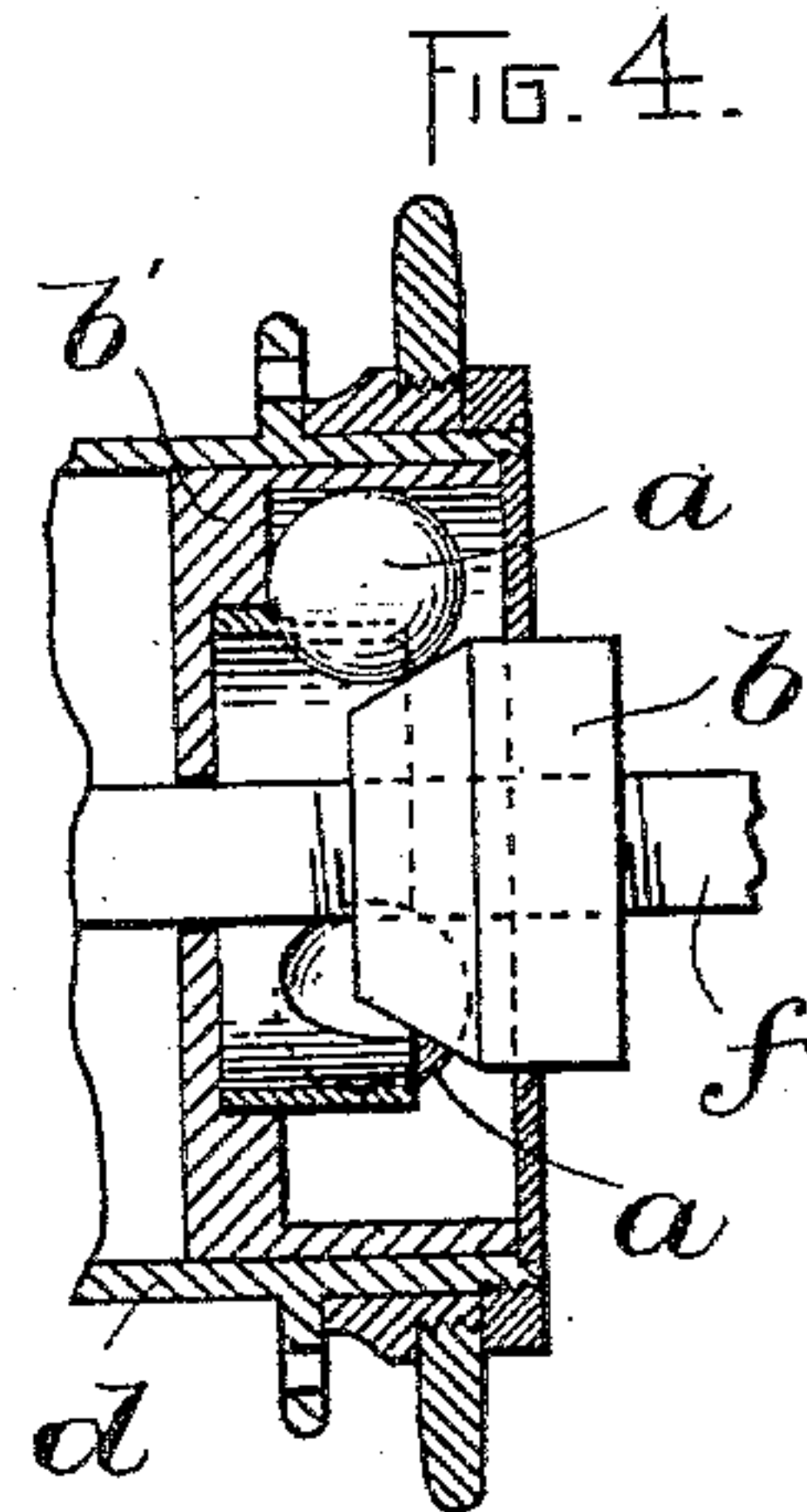
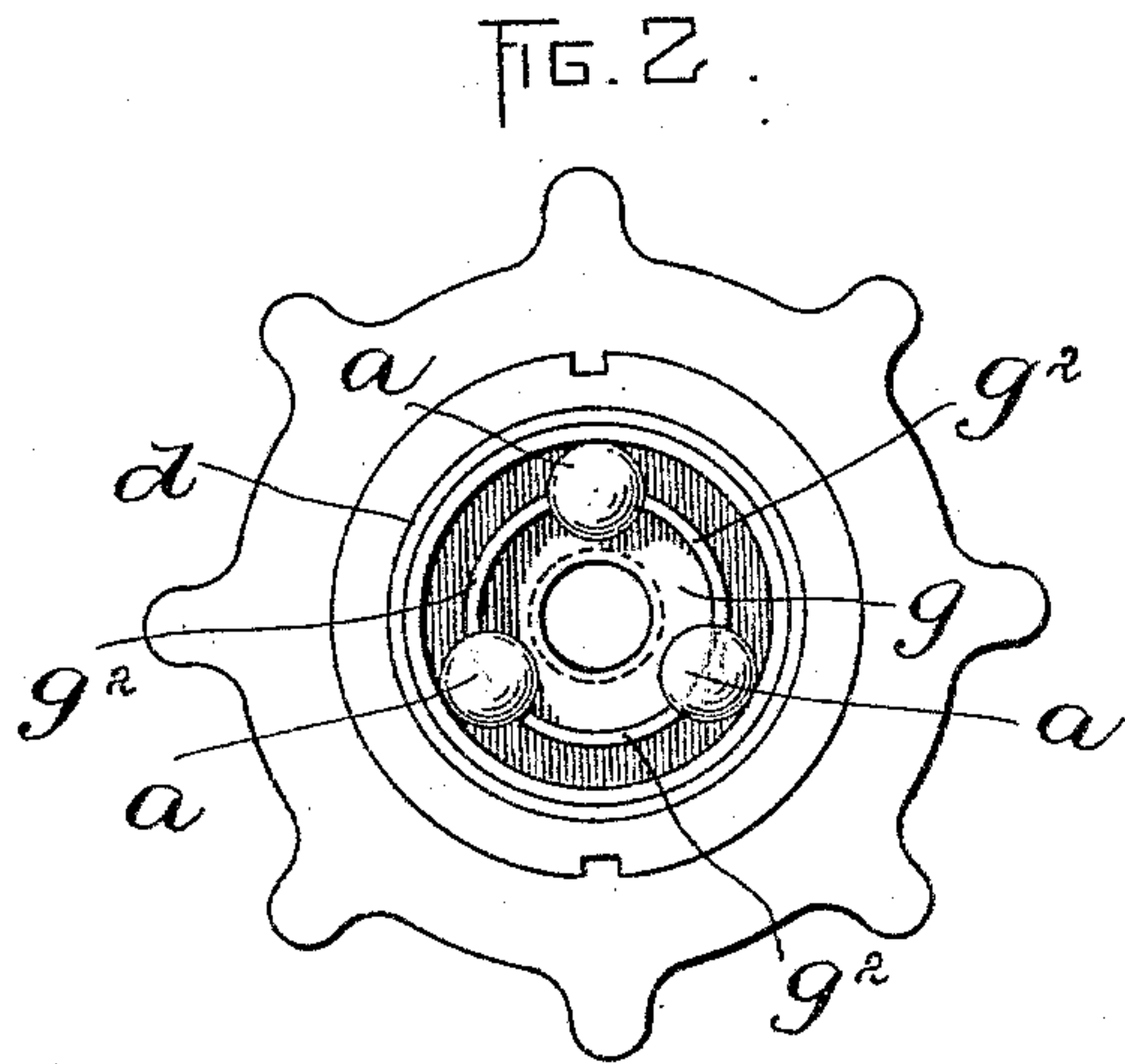
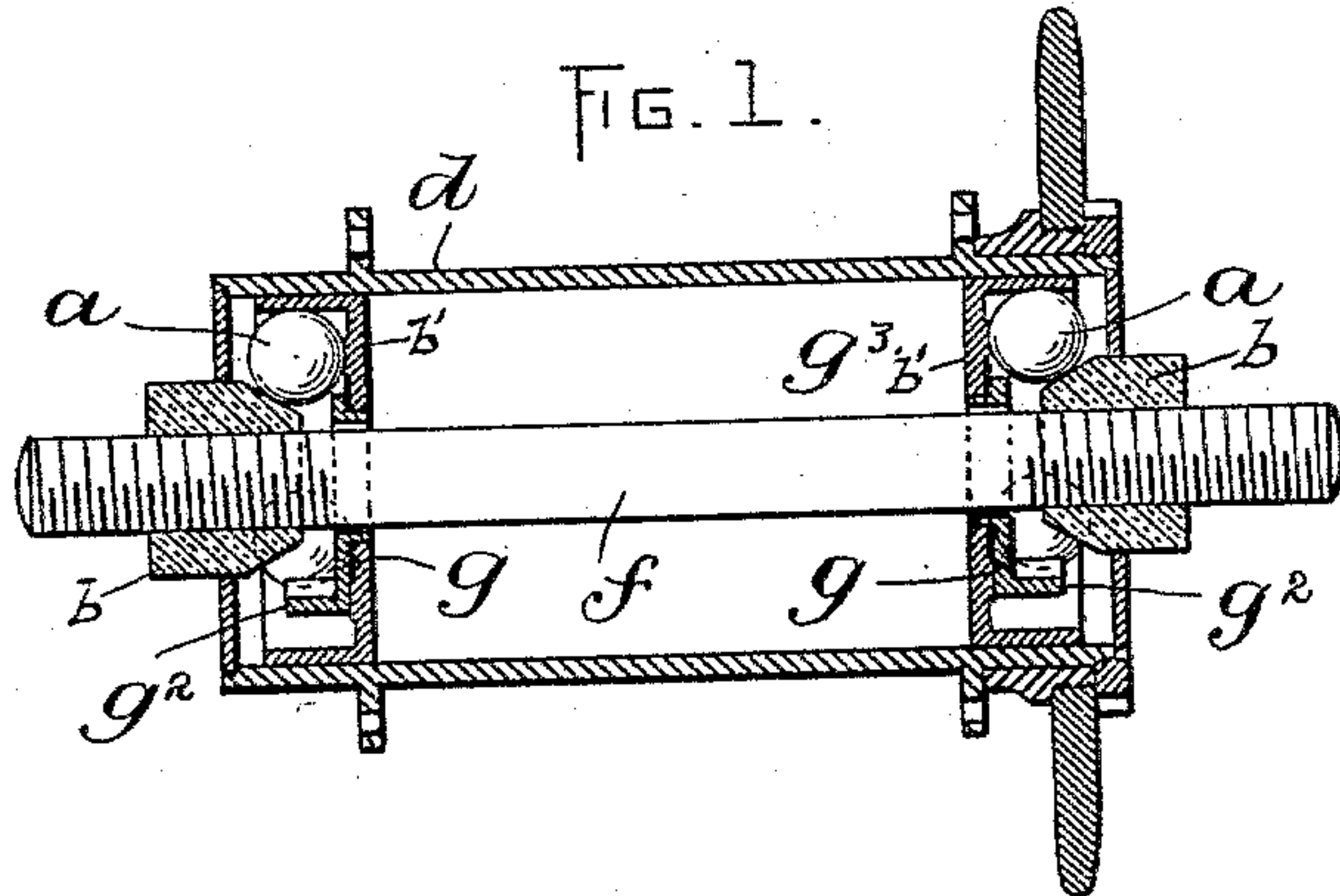


(No Model.)

G. M. TINKER.
BALL BEARING.

No. 597,444.

Patented Jan. 18, 1898.



WITNESSES:

A. D. Harrison
P. W. Pezzetta.

INVENTOR:

George M. Tinker
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Attys.

UNITED STATES PATENT OFFICE.

GEORGE M. TINKER, OF WALTHAM, MASSACHUSETTS, ASSIGNOR TO THE AMERICAN WALTHAM MANUFACTURING COMPANY, OF SAME PLACE.

BALL-BEARING.

SPECIFICATION forming part of Letters Patent No. 597,444, dated January 18, 1898.

Application filed September 17, 1897. Serial No. 651,969. (No model.) Patented in England August 1, 1896, No. 17,120; in France August 4, 1896, No. 258,623, and in Belgium December 2, 1896, No. 124,916.

To all whom it may concern:

Be it known that I, GEORGE M. TINKER, of Waltham, in the county of Middlesex and State of Massachusetts, have invented certain
5 new and useful Improvements in Ball-Bearings, (for which patents have been granted in the following countries: Great Britain, dated August 1, 1896, No. 17,120; France, dated August 4, 1896, No. 258,623, and Belgium, dated
10 December 2, 1896, No. 124,916,) of which the following is a specification.

This invention relates to ball-bearings such as those employed for the wheels and crank-axes of bicycles, and more particularly to
15 bearings having an annular series of balls and a separating device between the balls to hold them apart from each other. Bearings of this class are shown in Letters Patent of the United States No 570,428, granted to Elmer C. Howe October 27, 1896.

The particular object of the present invention is to provide an improvement in the separator employed in bearings such as those shown in the said patent; and to this end the
25 invention consists in the novel features of construction and arrangement which I shall now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents
30 a longitudinal section of a bicycle-wheel hub with the axle in elevation. Fig. 2 represents an end elevation of the same. Fig. 3 represents a perspective view of the separator detached. Fig. 4 represents a longitudinal section of a bicycle-hub, in which another form
35 of my invention is employed for separating the balls. Fig. 5 represents a perspective view of the second separator. Fig. 6 represents an end elevation of a hub provided with
40 the modified form of separator.

The same reference-characters indicate the same parts in all the figures.

Referring to the drawings, *aa* represent the balls, which are interposed between the cones
45 *b b* on the axle *f* and the cups *b' b'* on the hub *d*. The cups and cones forming the ball-track may be arranged in any of the well-known relations; but for a wheel-bearing I prefer the arrangement shown in the drawings, where

the cups are sunk in the hubs and the cones 50 are screwed on the axle.

In carrying out one form of my invention I provide separators consisting of rings broken or notched to form projections *g*² to extend horizontally between the balls into the ball-
55 receiving spaces between the cones and the cups. The rings are formed with inwardly-projecting flanges or plates *g*, which are notched, as at *g'*, and which themselves lie flat against the vertical faces of the cups *b'*. The
60 separators are prevented from longitudinal displacement in the direction of the cups *b'* by their contact with the transverse faces or bottoms of said cups. They are further provided, as here shown, with horizontal annular
65 shoulders *g*³, fitting loosely in the central apertures of said cups, which shoulders serve to prevent radial or transverse displacement of the separators and finally the inner edges of the notches *g'*, which rest lightly against
70 the balls *a*, serve to prevent displacement of the separators in the direction of said balls. It is to be noted that the plates *g* are placed out of the path of the balls and perform no
75 part in separating them, the separation being performed entirely by the projections *g*², which contact with the balls about half-way between the cups and the cones. The pro-
80 jections *g*² are not necessarily exactly parallel with the axle *f*, but should extend in a general direction longitudinally thereof. The separators are of course loosely mounted and free to revolve around the axle with the balls. It is not essential, however, that the
85 separator be provided with the plate *g* and with the annular flange or shoulder *g*³, since it may be constructed as portrayed in Figs. 4, 5, and 6. In these last-mentioned figures the separator is illustrated as being a ring *h*,
90 notched at *h'* to form projections *h*² to extend between the balls into the ball-path. The inner edge of each separator by contacting with the vertical face of one of the cups is held against longitudinal movement or displacement, and by reason of the notches be-
95 ing smaller in cross-diameter than the diameter of the balls the edges of the shoulders engage the balls and are held thereby against

radial or transverse displacement, as will be readily understood. The rings are beveled at h^3 to receive the balls loosely in the notches and thereby decrease the friction.

5 The above construction of separators is found in practice to be greatly superior to the separators now in use. The latter are found in practice to wear away in the portions between the balls, denoting that there is undue friction upon them; but an extended use
10 of those constructed in accordance with my present invention indicates that the friction upon the separators is almost negligible.

In the bearings illustrated in the accompanying drawings there are three balls in each race, but it will be understood that the number of the balls is not material.

I claim—

1. In a ball-bearing, in combination with
20 an axle, a cup, and a cone, balls mounted to travel in the annular space between said cup and cone, and a separator bearing against the cup, and having portions which extend between the balls in a direction substantially
25 parallel with the axle.

2. In a ball-bearing, in combination with a cup and a cone, balls mounted to travel in the annular space between said cup and cone, and a separator consisting of a ring adapted
30 to lie against the transverse portion of the cup and having projections extending between the balls.

3. In a ball-bearing, in combination with an axle, a cup, and a cone, balls mounted to travel in the annular space between said cup and cone, and a separator comprising a notched plate adapted to lie against the transverse portion of the cup, and having projections between the notches, extending between the balls in a direction substantially parallel to the axle, and an annular shoulder on said plate fitting loosely into the central aperture of the cup. 35 40

4. In a ball-bearing, in combination with an axle, a cup, and a cone, balls mounted to travel in the annular space between said cup and cone, and a separator comprising a notched ring, adapted to lie against the transverse portion of the cup, and having projections between the notches, extending between the balls in a direction substantially parallel to the axle, said balls being greater in diameter than said notches, whereby said separator is maintained in position by the engagement of the edges of the notches with the balls. 45 50 55

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 16th day of August, A. D. 1897.

GEO. M. TINKER.

Witnesses:

B. A. GOODELL,
C. A. SKERRY.