

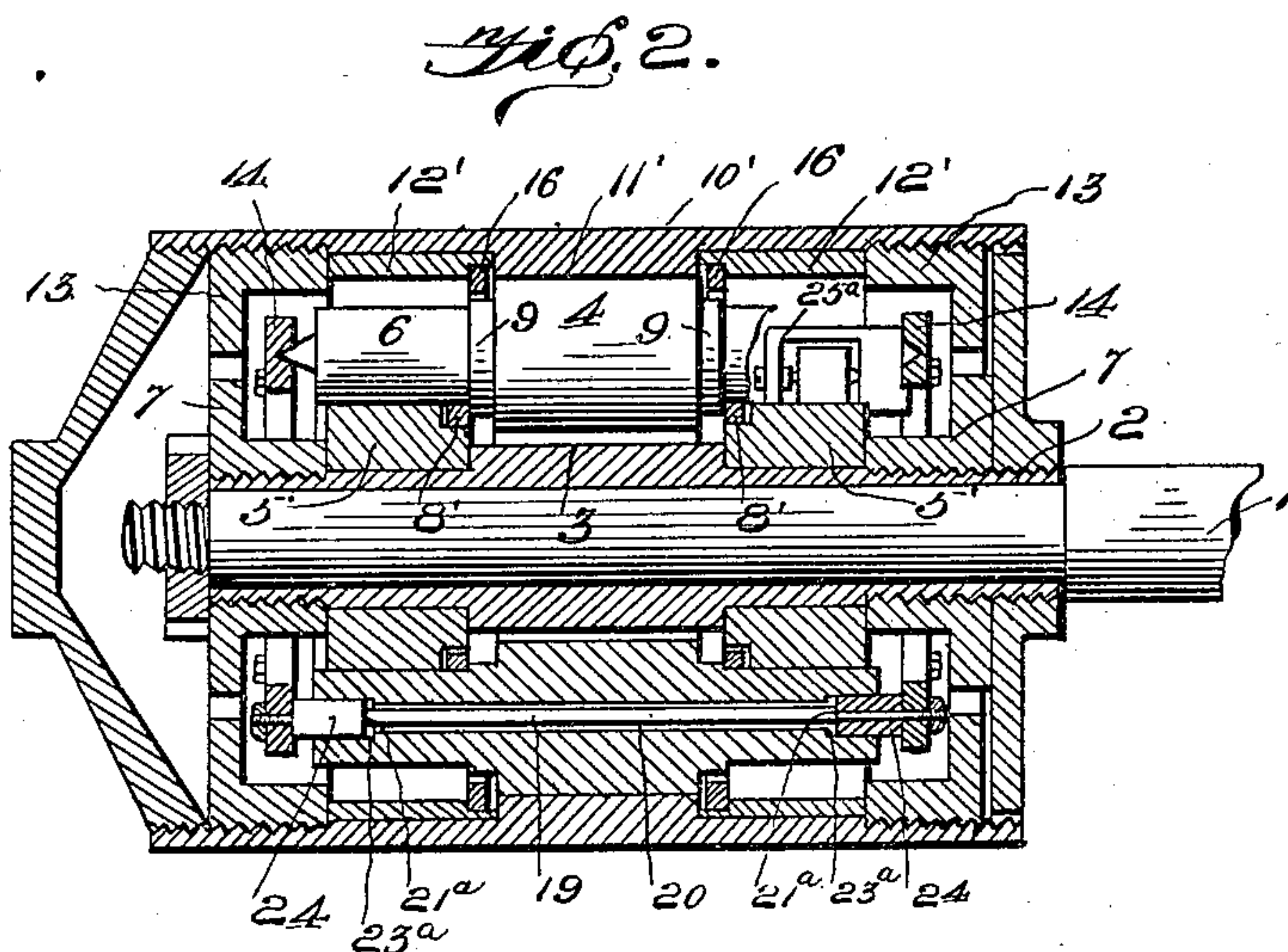
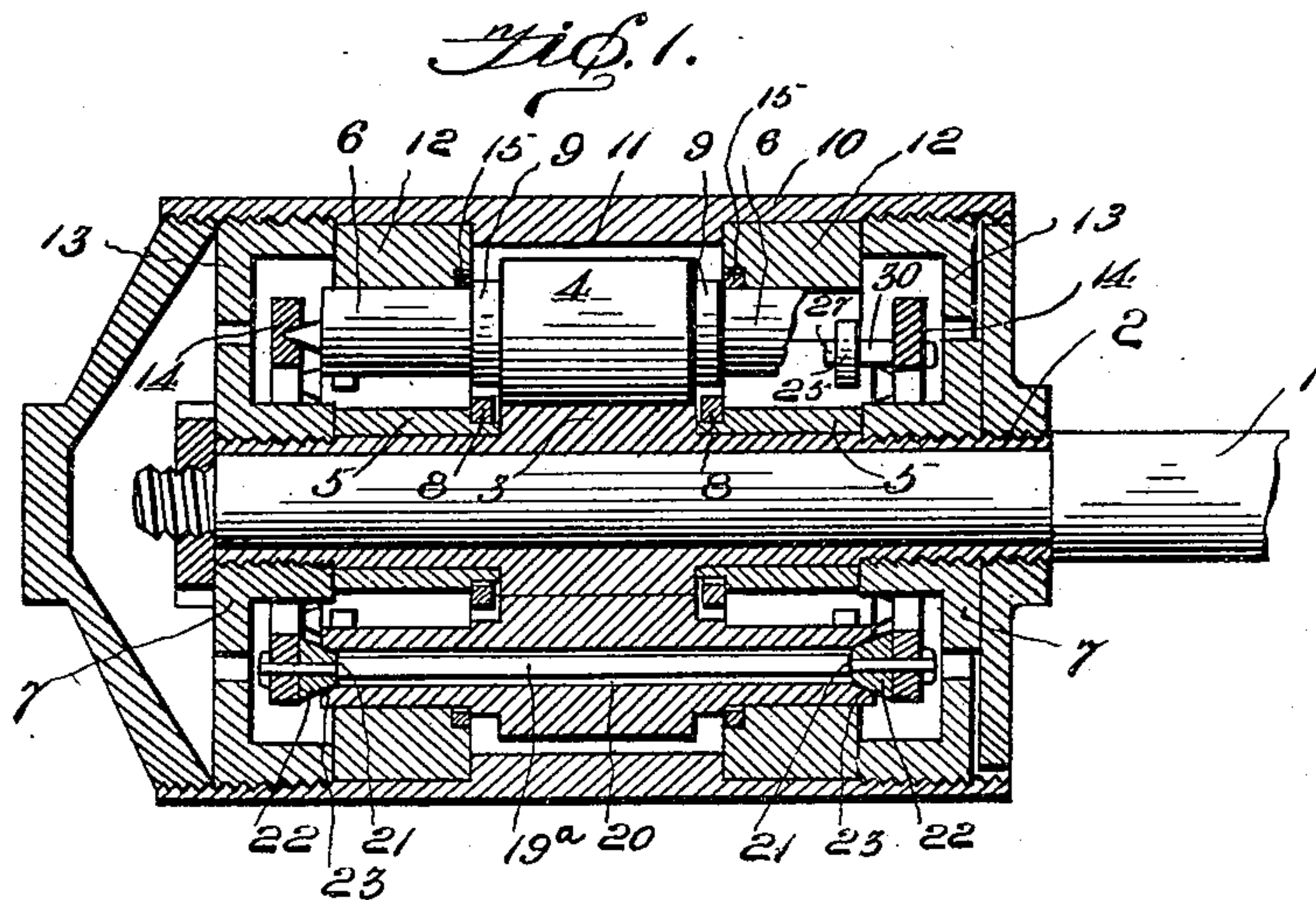
No. 725,620.

PATENTED APR. 14, 1903.

A. E. HENDERSON.
ANTIFRICTION BEARING.
APPLICATION FILED NOV. 13, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses
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W. G. Crowley.

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Attorneys

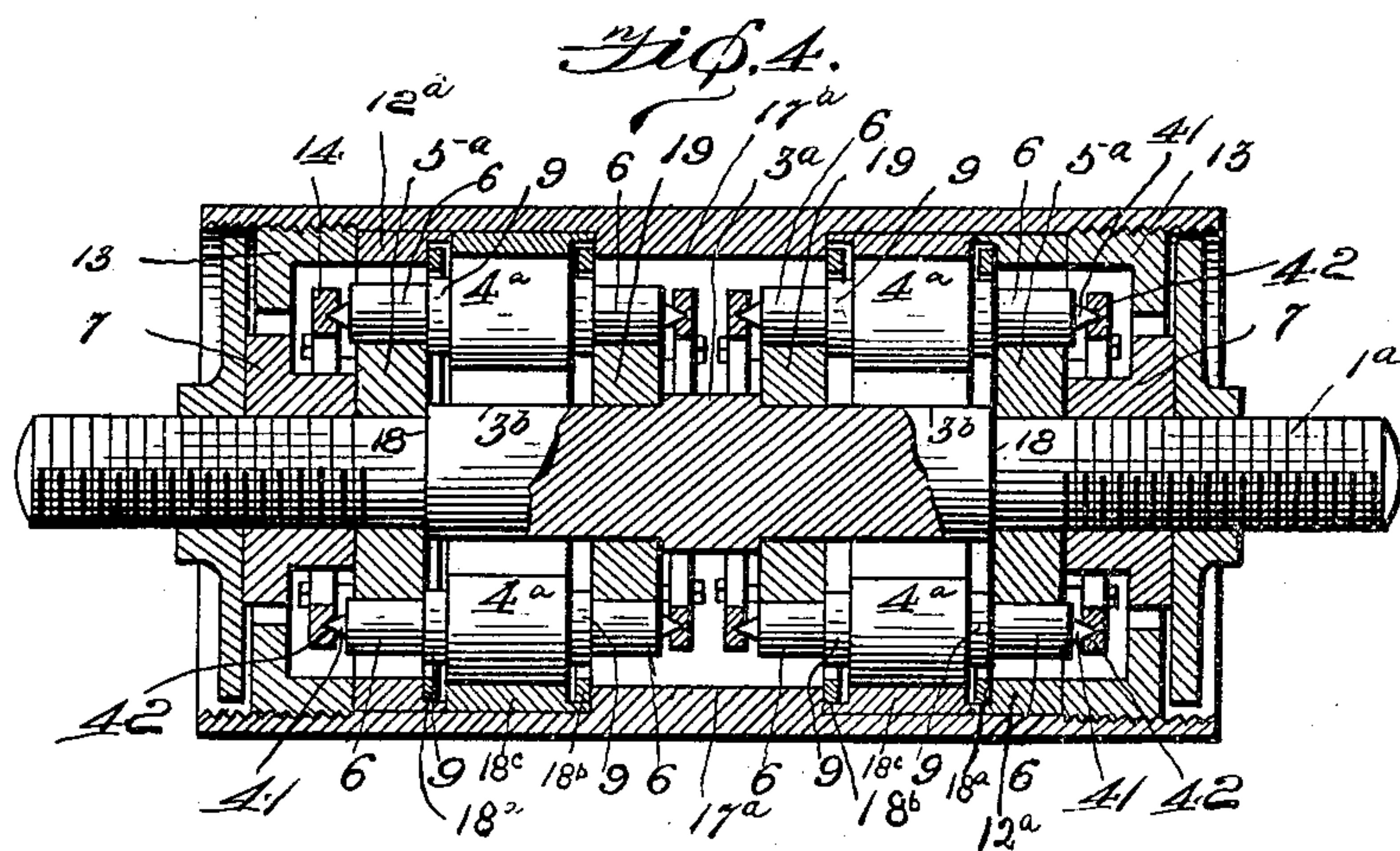
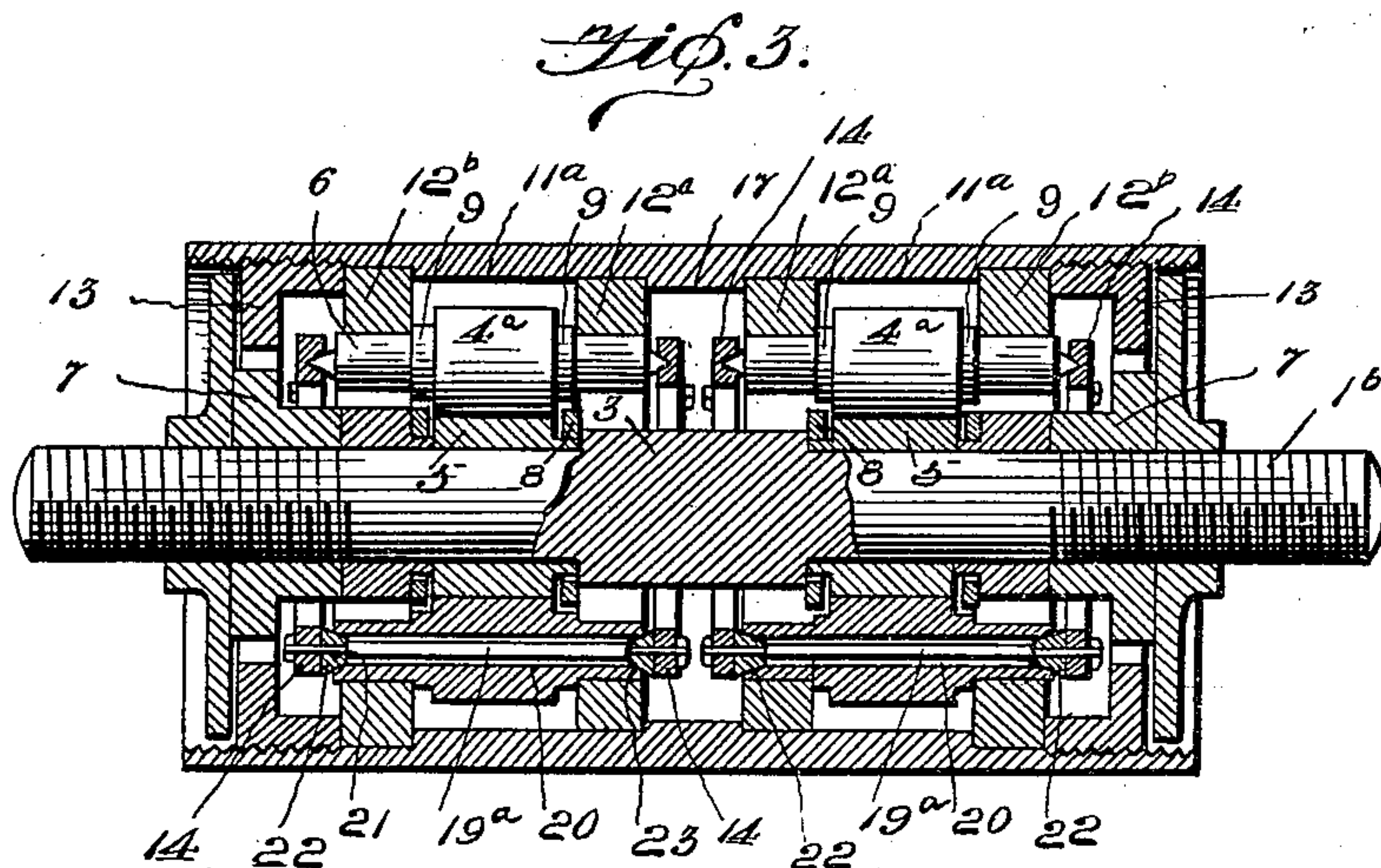
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 5.

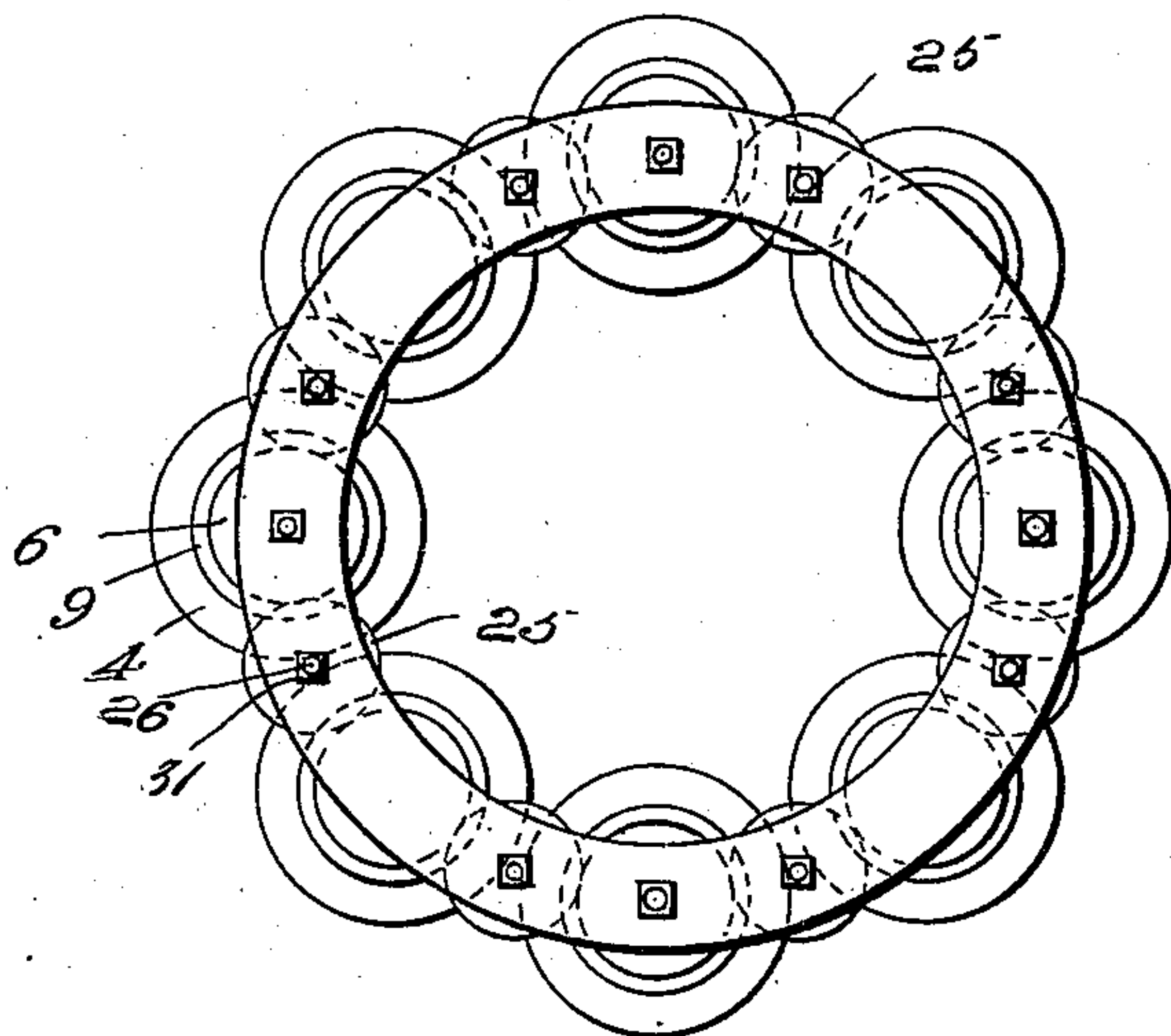


Fig. 7.

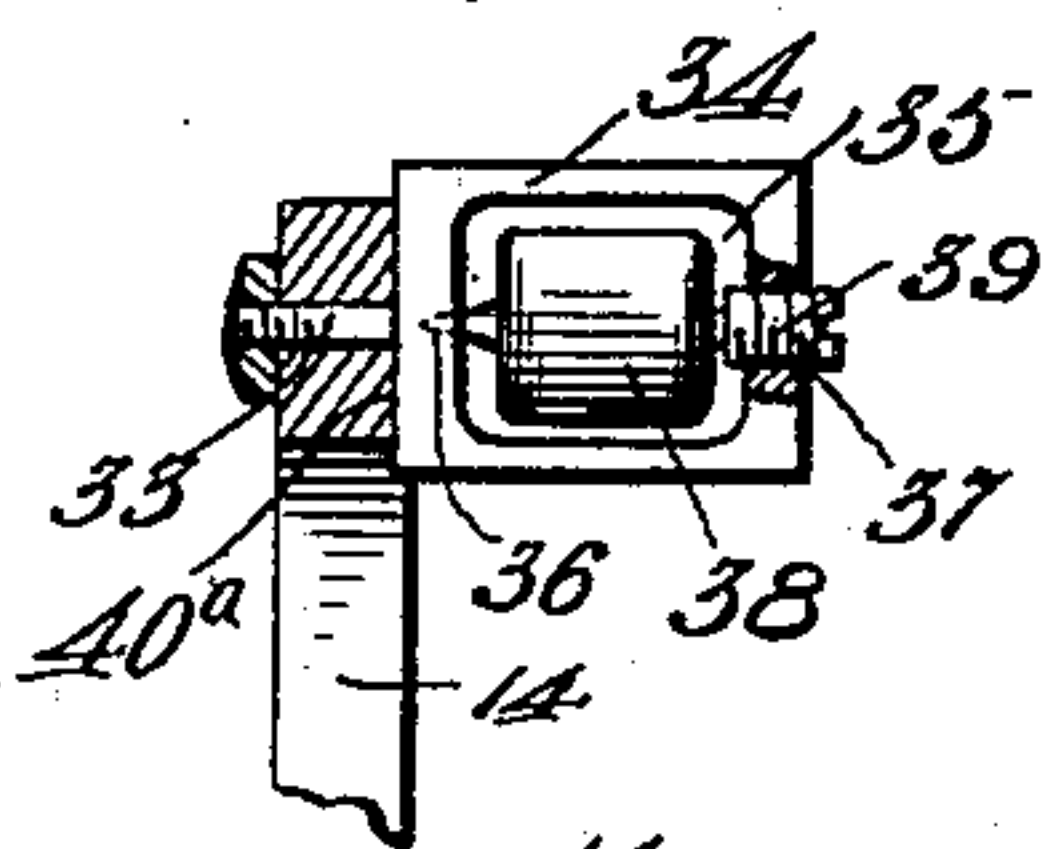


Fig. 6.

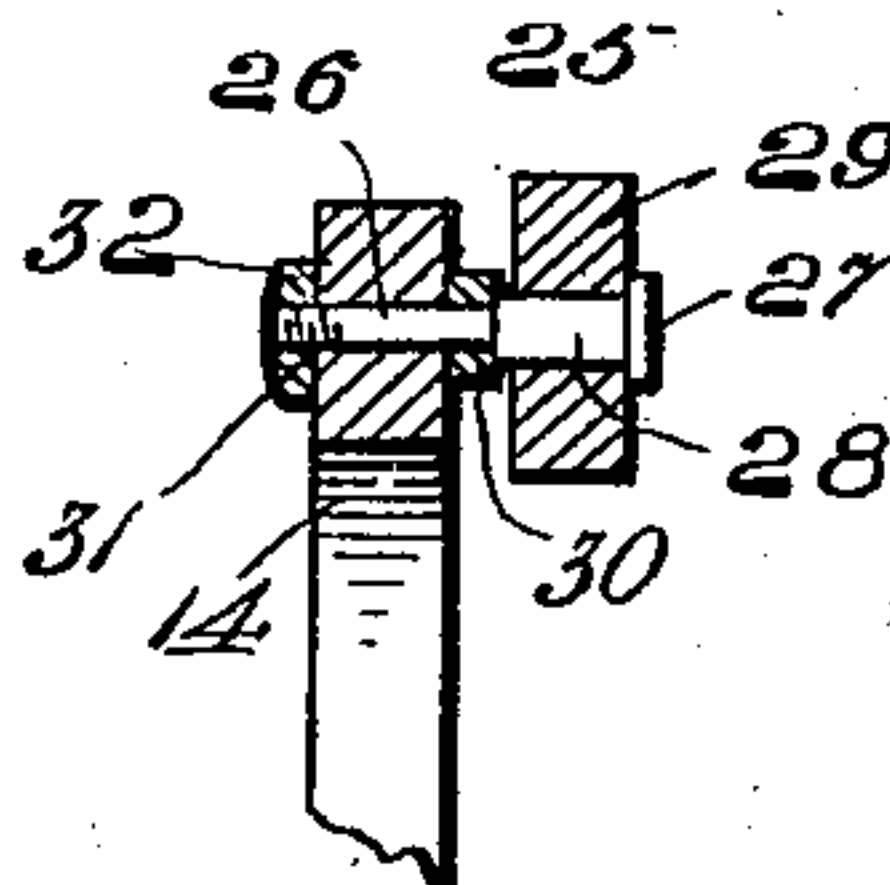


Fig. 8.

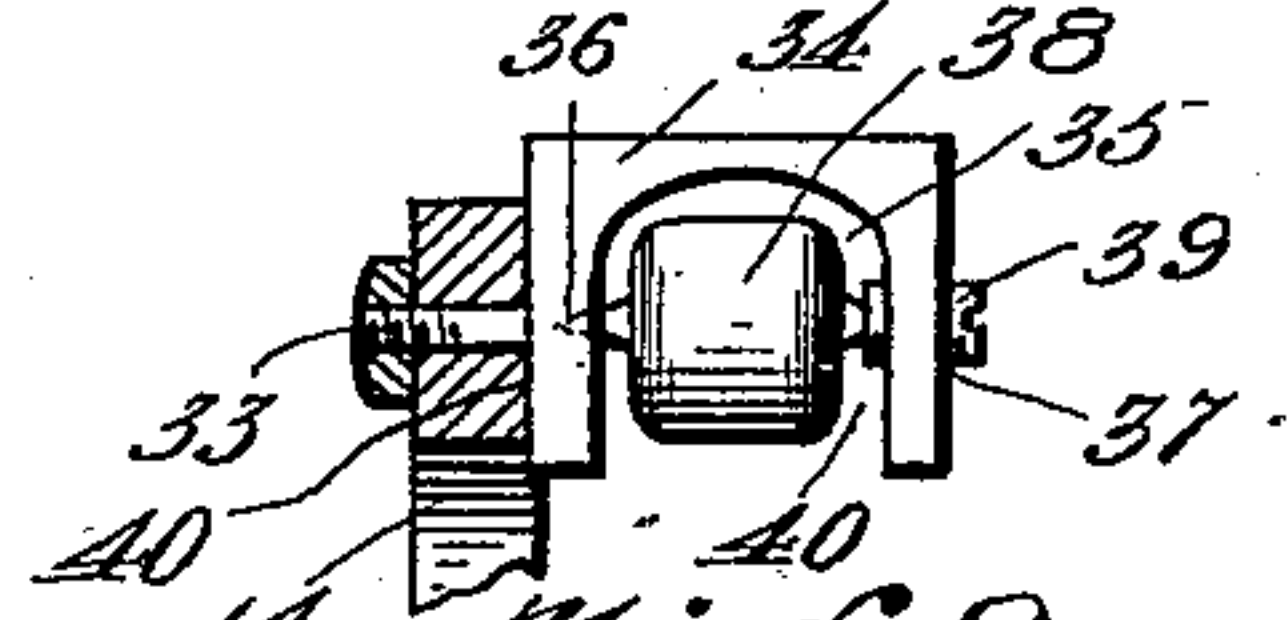


Fig. 9.

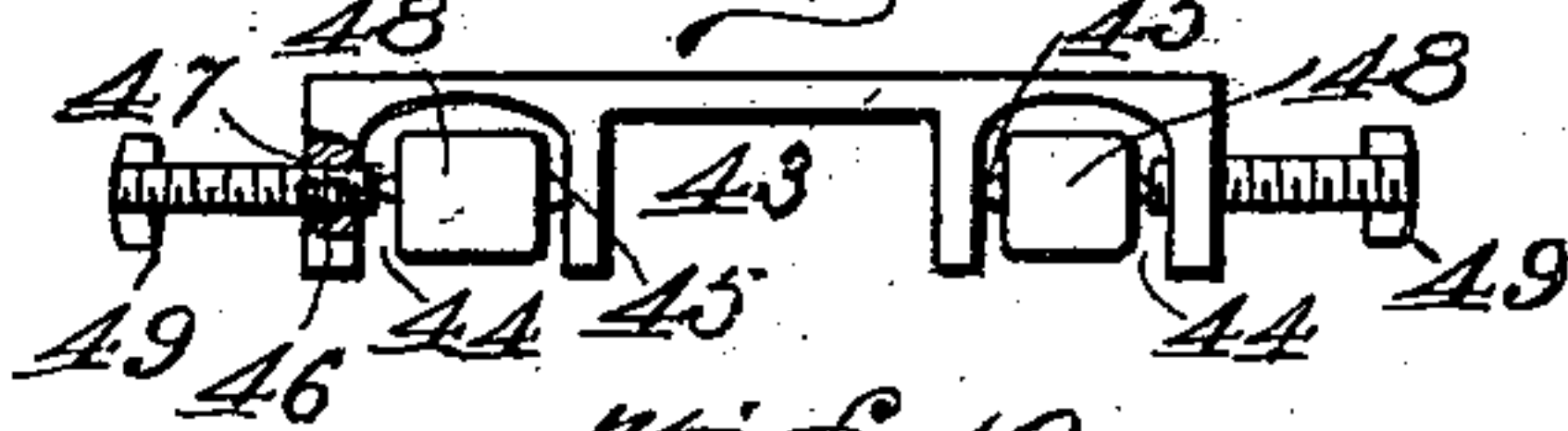


Fig. 10.

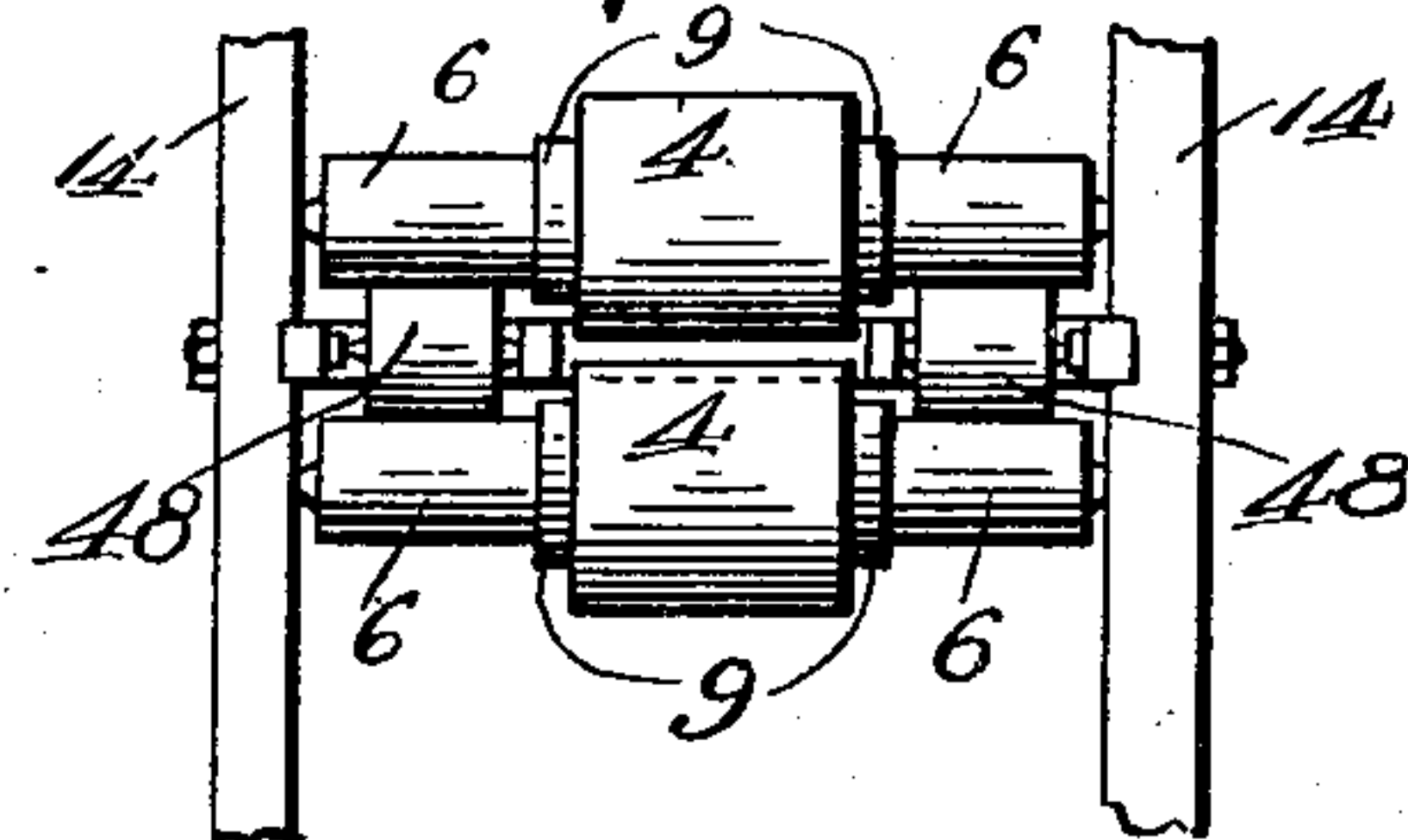


Fig. 11.

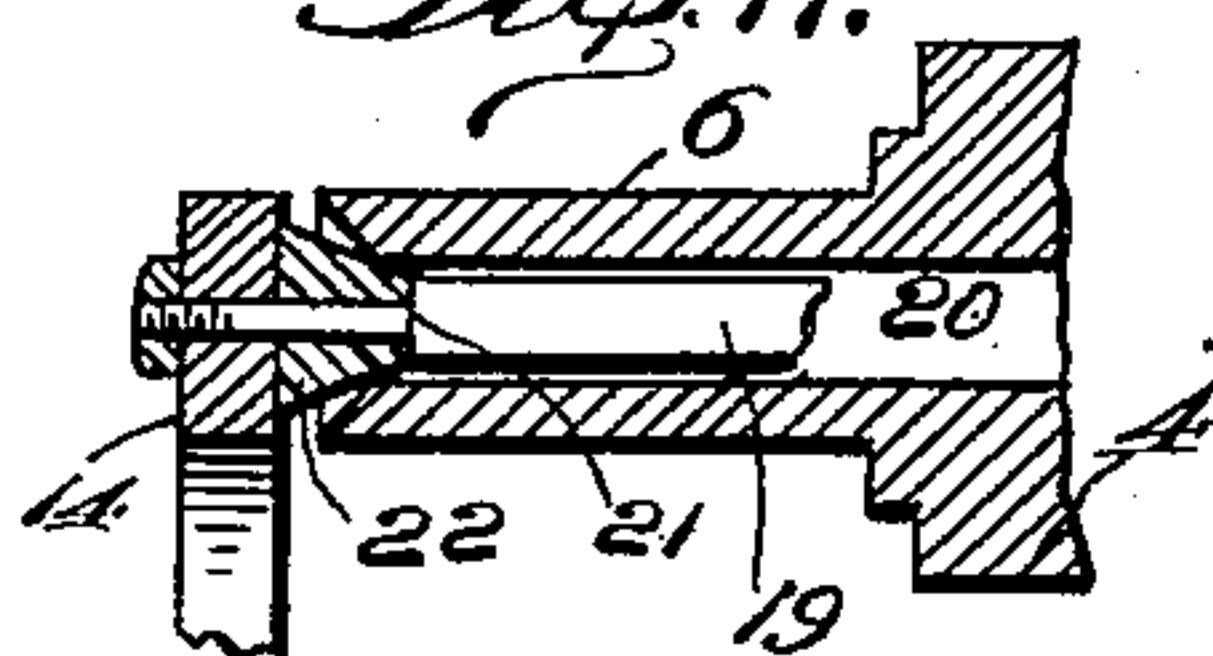
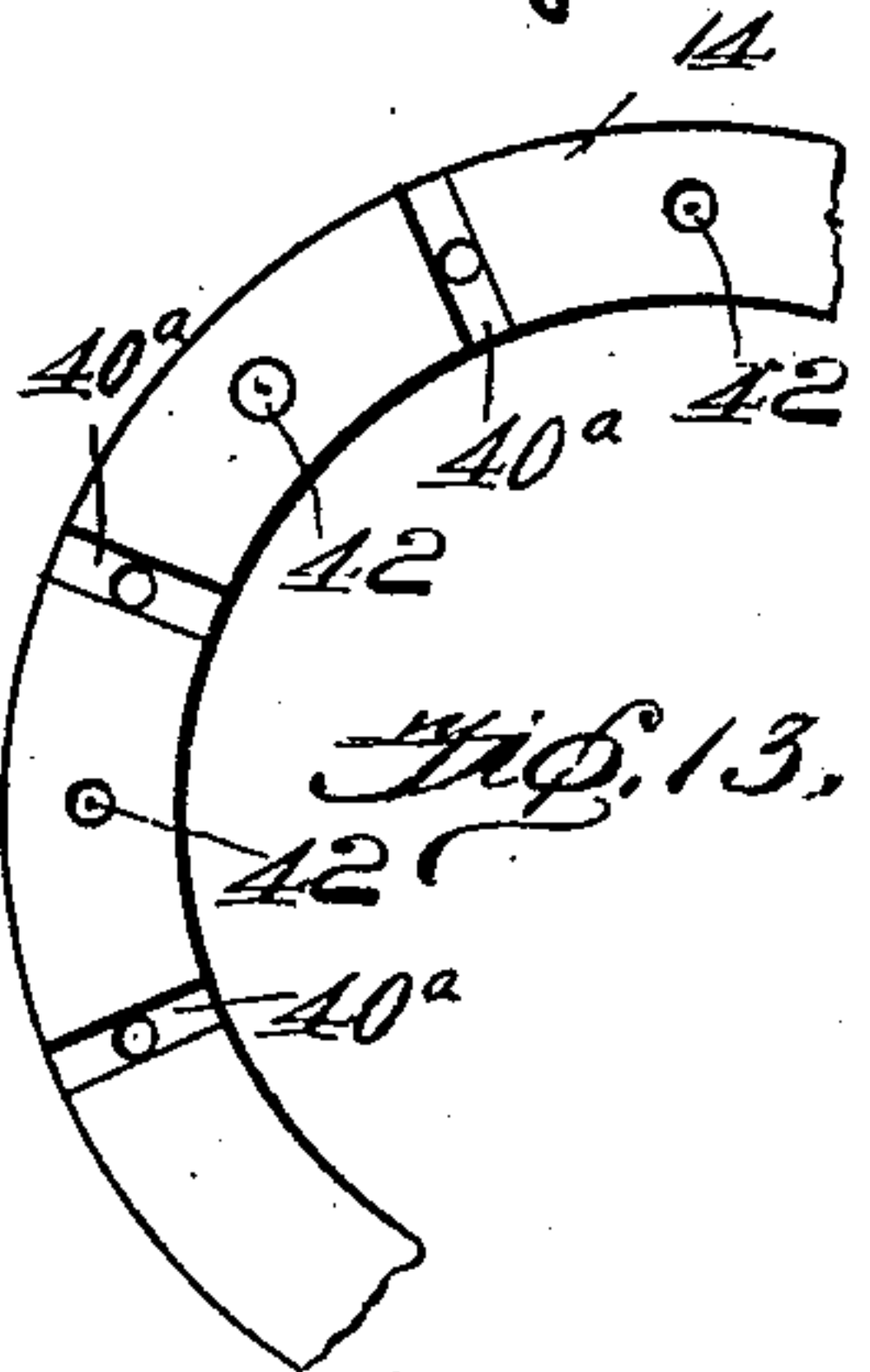
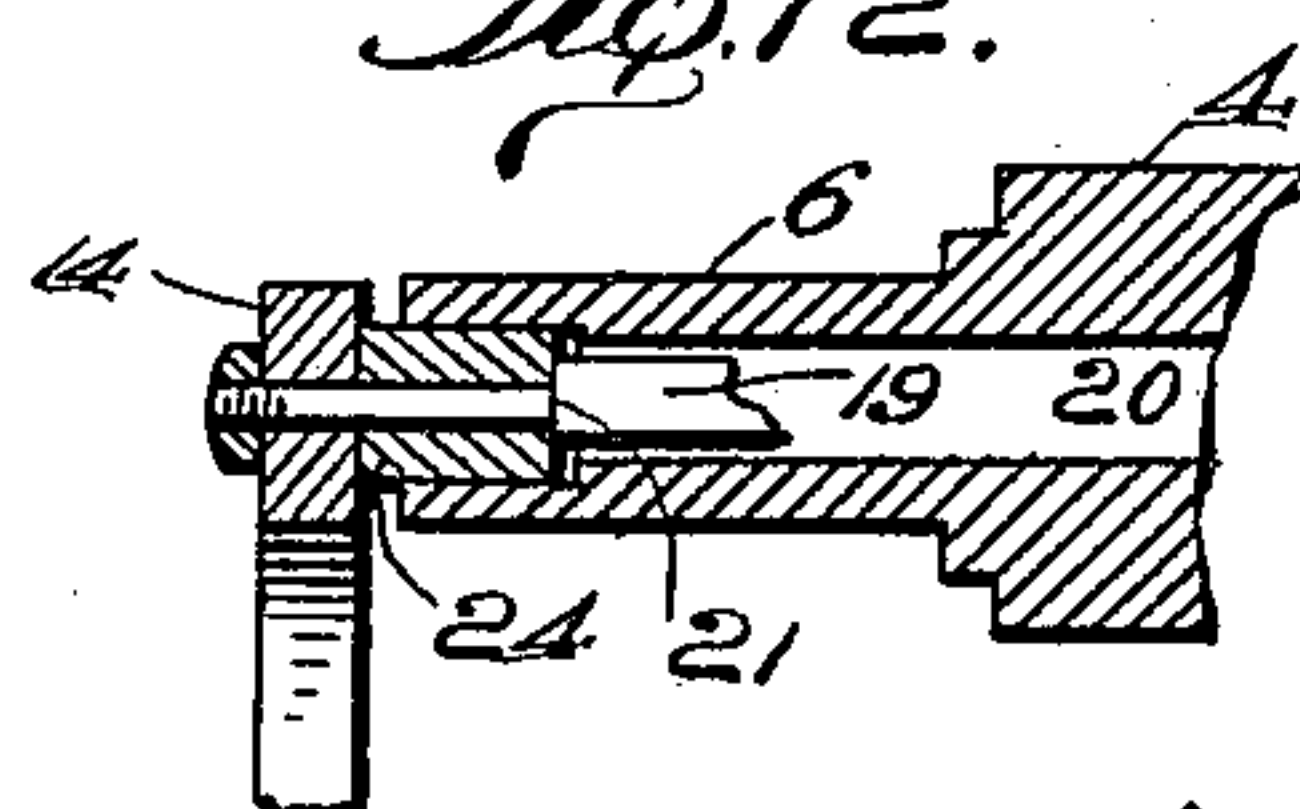


Fig. 12.



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UNITED STATES PATENT OFFICE.

ALBERT ENNIS HENDERSON, OF TORONTO, CANADA, ASSIGNOR TO TORONTO
ROLLER BEARING COMPANY, LIMITED, OF TORONTO, CANADA.

ANTIFRICTION-BEARING.

SPECIFICATION forming part of Letters Patent No. 725,620, dated April 14, 1903.

Application filed November 13, 1902. Serial No. 131,169. (No model.)

To all whom it may concern:

Be it known that I, ALBERT ENNIS HENDERSON, a subject of the King of Great Britain, residing at Toronto, in the county of York, Province of Ontario, Canada, have invented certain new and useful Improvements in Antifriction-Bearings, of which the following is a specification.

This invention relates to improvements in antifriction-bearings; and the main object of my invention is the provision of a bearing whose bearing-rollers have their greatest-diametered portions contacted by the revolving bearing-surfaces and having their smaller portion contacted by the stationary bearing-surfaces, or vice versa, and also means carried by the bearing-rollers for holding them properly spaced.

Another object of my invention is to mount the bearing-rollers and their cage so that the end thrust of the bearing may be taken up by the rollers and that the revolving motion of the cage may be slower in proportion to the revolution of the revolving bearing-surface of the bearing.

To attain these objects, the invention consists of a roller-bearing embodying novel features of construction and combination of parts, substantially as described herein.

In the accompanying drawings, Figure 1 is a sectional view of my bearing as applied to a journal and boxing, the journal being the revolving part. Fig. 2 is a similar view, except that the boxing is the revolving part of the bearing. Fig. 3 is a similar view applied to a bicycle crank-hanger. Fig. 4 is a sectional view of the bearing as applied to a bicycle hub and axle. Fig. 5 is an end view of one of the entire cages. Figs. 6, 7, 8, 9, 10, 11, 12, and 13 are detail views of modified forms of tie-rods used in combination with the cage and also bearing-rollers and retaining-rings.

Referring to the drawings, the numeral 1 in Figs. 1 and 2 designates the journal, having mounted thereon the sleeve 2, which allows all of the bearing elements to be removed from the journal. Centrally located of the sleeve is the enlarged portion 3, which in Fig. 1 contacts the enlarged portion 4 of

the bearing-rollers, but which in Fig. 2 forms only an abutting means for the two rings 5'. These rings 5' in Fig. 2 form bearing-surfaces for the reduced ends 6 of the bearing-rollers, while in Fig. 1 they form abutting rings 5 for the flanged-end nuts 7 and also means for retaining the thrust-rings 8. I reduce and shoulder the inner ends of the rings 5 and 5' and mount thereon the rotatable thrust-rings 8 and 8' for the enlarged portion 4 and the shoulders 9 and 9' of the bearing-rollers, as shown in Figs. 1 and 2, respectively.

In the boxing 10 and 10' I employ the central lining sleeve or ring 11 and 11', which is integral. In Fig. 2 the sleeve 11' contacts the portion 4 of the bearing-rollers and, as shown in Fig. 1, forms a spacing and holding means for the two rings 12, which are opposed to the rings 5 and substantially the same length. In Fig. 1 these rings 12 contact the reduced portions 6 of the bearing-rollers, while in Fig. 2 the rings 12' form spaces for the flanged nuts 13, which are flanged oppositely to the nuts 7, so as to, in conjunction with said nuts, provide recesses for the reception of the retaining-rings 14 of the bearing-rollers. In Fig. 1 I provide thrust-rings 15 upon the inner ends of the rings 12 for the shoulders 9 of the bearing-rollers, while in Fig. 2 I place thrust-rings 16 upon both ends of the bearing-linings 11' for the ends of the portion 4 of the bearing-rollers.

In Fig. 3 the numeral 3^b designates a modification of the enlarged portion 3, as shown in Figs. 1 and 2.

In Figs. 3 and 4 I mount two sets of bearing-rollers 4^a in practically the same manner as in Figs. 1 and 2, respectively, except that I dispense with the sleeve 2, which I would state at this time can be dispensed with in all figures mounting the various parts upon the journal 1, axle 1^a, and crank-hanger shaft 1^b.

In Fig. 3 I have dispensed with the thrust-rings 15, as these rollers are so small as not to necessitate the thrust-rings at this point. The linings 11^a in this form are formed integral with the boxing, having mounted thereon the rings 12^a and 12^b and having the central

inwardly-projecting shouldered portion 17 to properly space said rings 12^a and 12^b, and thus prevent inward movement of both sets of bearing-rollers.

5 In Fig. 4 I dispense with the thrust-rings 8, but provide a central annular shoulder 3^a and oppositely-extending portions 3^b, terminating in the shoulder 18. The rings 19 surround the portion 3^b and abut against the shoulder
10 3^a, which prevents the inward movement of the bearing-rollers, while the shoulder 18 forms an abutting means for the rings 5^a.

I employ the thrust-rings 18^a and 18^b, the former of which fits in a recess formed at the
15 inner end of the rings 12^a, the bearing-sleeve 18^c forming the inner abutment for said rings 18^a, while in the inner ends of the bearing-sleeve 18^c I provide a recess to receive the thrust-rings 18^b, the shouldered ends of the
20 portion 17^a forming the inner abutment to limit the movement of said thrust-rings 18^b.

As shown in Figs. 1 and 3, the tie-rods 19^a for the cage pass through the bore 20, which is formed in each alternate roller. Shoulders
25 21 are formed on the tie-rods, and conical washers 22 abut against the face of this shoulder and the inside of the rings and provide means for adjusting the bearing-rings 14 relatively to the bearing-rollers and at the
30 same time provide a conical bearing for rollers mounted upon the rods, said rollers being formed with a conical recess 23 in each end, thus confining the friction of the bearing-roller upon the tie-rod to the conical bearing-
35 surfaces at each end of the roller. Figs. 2 and 12 show a slightly-modified construction, where a straight form of journal 24 is shown instead of conical—that is, the shoulders 21^a are formed on the tie-rods and the washer
40 or journal 24 fits in the cylindrical recess 23^a of the bearing-roller.

In Figs. 1 and 5 I employ the antifriction spacing device 25, which is more clearly shown in Fig. 6. This spacing device con-
45 sists of the supports 26, provided with the head 27, the journal 28 for the roller 29, and the reduced portion upon which is mounted the washer 30, which abuts against the shoulder of the journal and the face of the ring
50 and in conjunction with the head forms abutting shoulders for the roller. The reduced end is threaded and is adapted to pass through or be secured within the opening 31 in the rings 14 and may be more securely held there-
55 in by means of the nut 32. It will be noted that this spacing device is carried by the rings upon the inner faces thereof and is adapted to have its roller in contact with the reduced portions 6 of adjacent bearing-rollers.

60 In Fig. 2 I have shown the spacing device 25^a mounted in operative position, its construction being shown in detail in Fig. 7. In Fig. 7 I employ the support 33, which carries the frame 34, provided with an aperture or slot
65 35, having a depression 36 and the aligned

openings 37 for the reception of the rollers 38. In the openings 37 I adjustably mount the threaded pin 39, which has a depression in its inner face to engage one pintle of the roller and retain the other pintle in the de-
70 pression 36, so as to adjustably mount the roller in the frame. In Fig. 8 I cut away the frame 34 upon its lower edge, so as to form a notch 40 for the reception of the roller, which is adjustably journaled in the frame in the
75 same manner as in Fig. 7. These frames fit in radial grooves 40^a in the inner face of the rings to prevent the frame from twisting. The bearing-rollers not mounted on the tie-rods and all the rollers, as shown in Fig. 4,
80 are provided with pintles 41, which are journaled in conical recesses 42 upon the inner faces of the retaining-rings.

In Fig. 4 I employ the tie-rod, as shown in detail in Figs. 9 and 10. This tie-rod in plan
85 view is substantially rectangular, being provided with the central cut-away portion 43, so as to properly space the enlarged portion of the bearing-rollers. Upon opposite sides of the portion 43 I provide apertures 44, hav-
90 ing upon their inner edges conical bearings 45 and upon opposite sides thereof and extending through the tie-rod to its ends the threaded openings 46 for the reception of the threaded adjustable pins 47, which adjustably
95 hold the spacing-rollers 48 in place. These journals also extend through the retaining-rings and by means of the nuts 49 hold the retaining-rings relatively to the bearing-rol-
100 lers. The shoulders 9 of the bearing-rollers instead of being formed integral with the bearing-rollers may be rotatably mounted thereon, thus dispensing with mounting the thrust-rings upon the rings 5^a, as shown in
105 Fig. 2, and the rings 12, as shown in Fig. 1.

From the foregoing description, taken in connection with the drawings, it is evident that I provide an improvement in roller-bear-
110 ings in which the bearing elements are so arranged as to greatly reduce the friction in all points of contact, this reduction being obtained by means of novel means.

What I claim as new is—

1. In a roller-bearing, the combination of bearing elements, means for retaining the
115 bearing elements in their relative positions, spacer-carrying means connected to the retaining means, and adjustably-mounted spacers for the bearing elements carried by said carrying means.
120

2. In a roller-bearing, the combination of retaining-rings, bearing-rollers, tie-rods for holding the retaining-rings relatively to the bearing-rollers, and spacers adjustably
125 mounted between the bearing-rollers.

3. In a roller-bearing, the combination of retaining-rings, bearing-rollers, tie-rods for holding the retaining-rings relatively to the bearing-rollers, spacer-carrying means inde-
130 pendent of the tie-rods connected to the inner

faces of the retaining-rings and projecting so as to be adjacent to the ends of the bearing-rollers, and spacers carried by said means adapted to contact adjacent bearing-rollers.

5 4. In a roller-bearing, the combination of retaining-rings, tie-rods, bearing-rollers held relatively to the retaining-rings by the tie-rods, independent means connected to and projecting beyond the inner faces of the re-
10 taining-rings to carry spacers for the bearing-rollers, said means being between and near the ends of the bearing-rollers, and spacers carried by said means.

15 5. In a roller-bearing, the combination of retaining-rings, tie-rods, bearing-rollers held relatively to the retaining-rings by the tie-rods, means connected to and projecting beyond the inner faces of the retaining-rings to carry spacers for the bearing-rollers, and
20 spacers adjustably mounted in said means.

25 6. In a roller-bearing, the combination of retaining-rings, bearing-rollers, tie-rods passing through alternate bearing-rollers and holding the retaining-rings relatively to the bearing-rollers, spacer-carrying means independent of the tie-rods projecting from the inner faces of the retaining-rings toward the center of the bearing-rollers, and antifriction-spacers carried by said means.

30 7. In a roller-bearing, the combination of retaining-rings, tie-rods, bearing-rollers held relatively to the retaining-rings by the tie-rods, each tie-rod having a bearing-roller journaled thereon, spacer-carrying means
35 connected to and projecting from the inner sides of the retaining-rings toward the center of the bearing-rollers, and antifrictional spacers for the bearing-rollers carried by said means.

40 8. In a roller-bearing, the combination of retaining-rings, tie-rods, bearing-rollers held relatively to the retaining-rings by the tie-rods, each tie-rod having a bearing-roller mounted thereon, and spacers for the bearing-rollers adjustably mounted and carried
45 by the retaining-rings.

50 9. In a roller-bearing, the combination of retaining-rings, tie-rods, bearing-rollers having enlarged central portions and reduced ends forming bearing-surfaces for the rollers, one of said bearing-rollers being mounted on each tie-rod, spacer-carrying means connected to the inner faces of the retaining-rings and projecting between the bearing-rollers
55 so as to terminate outside of the ends of the enlarged portions of the bearing-rollers, and spacers adjustably mounted in said carrying means adapted to contact adjacent bearing-surfaces of the reduced ends of the bearing-
60 rollers.

10. In a roller-bearing, the combination of retaining-rings, tie-rods, bearing-rollers having enlarged central portions and reduced ends forming the bearing-surfaces for the
65 rollers, one of said rollers being mounted on

each tie-rod, and spacers carried by the retaining-rings adapted to contact adjacent surfaces of the reduced portions of the bearing-rollers and terminating in the space between the reduced ends of the bearing-rollers. 70

11. In a roller-bearing, the combination of retaining-rings, tie-rods, bearing-rollers having enlarged central portions and reduced ends forming bearing-surfaces for the rollers, one of said bearing-rollers being mounted on
75 each tie-rod, and spacers for the bearing-rollers carried by the retaining-rings and projecting inward to be in contact with the adjacent faces of the reduced ends of the bearing-rollers. 80

12. In a roller-bearing, the combination of retaining-rings, tie-rods, bearing-rollers having enlarged central portions and reduced ends, said bearing-rollers being held relatively to the retaining-rings by the tie-rods, spacer-carrying means mounted upon the inner faces of the retaining-rings and terminating within the space between the reduced ends of the bearing-rollers, and antifriction-spacers carried by said means. 85 90

13. In a roller-bearing, the combination of retaining-rings, tie-rods, bearing-rollers having enlarged central portions and reduced ends forming bearing-surfaces for the rollers, one of said bearing-rollers being mounted on
95 each tie-rod, and adjustably-mounted spacers for the bearing-rollers carried by the rings.

14. In a roller-bearing, the combination of a stationary part, a revoluble part, bearing-rollers having enlarged central portions in
100 contact with the revoluble part and reduced ends in contact with the stationary part, retaining-rings for the bearing-rollers, tie-rods for holding the retaining-rings relatively to the bearing-rollers, each tie-rod carrying a
105 bearing-roller, spacer-carrying means carried by the retaining-rings and terminating within the space between the reduced portions of the bearing-rollers, and antifriction-spacers adjustably mounted in said means. 110

15. In a roller-bearing, the combination of retaining-rings, tie-rods, bearing-rollers having enlarged central portions and reduced ends forming bearings for the rollers, a bearing-roller being mounted on each tie-rod, spacer-supports carried by the rings upon their inner faces and adapted to terminate within the space between the reduced ends of the bearing-rollers, and spacers carried by the supports to contact adjacent faces of the
120 reduced ends of the bearing-rollers.

16. In a roller-bearing, the combination of retaining-rings, tie-rods, bearing-rollers having enlarged central portions and reduced ends, a bearing-roller being mounted on each
125 tie-rod, supports carried by the rings upon their inner faces, and spacers adjustably mounted in said supports to contact adjacent bearing-rollers.

17. In a roller-bearing, the combination of 130

retaining-rings, bearing-rollers having enlarged central portions and reduced ends forming bearing-surfaces for the rollers, tie-rods for holding the retaining-rings relatively to the bearing-rollers, a bearing-roller being mounted on each tie-rod, supports carried by the retaining-rings upon their inner faces, and spacing-rollers adjustably mounted in the supports to contact adjacent bearing-rollers.

18. In a roller-bearing, the combination of a revoluble part, a stationary part, bearing-rollers having enlarged central portions in contact with the revoluble part and reduced ends in contact with the stationary part, means for retaining the bearing-rollers in their relative positions, spacer-carrying means, and spacers for the bearing-rollers adjustably mounted in said means.

19. In a roller-bearing, the combination of a revoluble part, a stationary part, bearing-rollers having enlarged central portions in contact with the revoluble part and reduced ends in contact with the stationary part, retaining-rings for holding the bearing-rollers relatively to each other, and spacers for the bearing-rollers carried independently of the tie-rods and terminating within the space between the reduced ends of the bearing-rollers.

20. In a roller-bearing, the combination of a revoluble part, a stationary part, bearing-rollers having enlarged central portions in contact with the revoluble part and reduced ends in contact with the stationary part, retaining-rings for the bearing-rollers, tie-rods for holding the retaining-rings relatively to the bearing-rollers, each tie-rod carrying a bearing-roller, and adjustably-mounted spacers for the bearing-rollers carried by the retaining-rings and terminating within the space between the reduced ends of the bearing-rollers.

21. In a roller-bearing, the combination of a revoluble part, a stationary part, bearing-rollers having enlarged central portions in contact with the revoluble part and reduced ends in contact with the stationary part, retaining-rings for the bearing-rollers, tie-rods for holding the retaining-rings relatively to the bearing-rollers, each tie-rod carrying a bearing-roller, spacer-supporting means carried by the retaining-rings and terminating within the space between the reduced ends of the bearing-rollers, and spacers for the bearing-rollers carried by said supporting means.

22. In a roller-bearing, the combination of a revoluble part, a stationary part, bearing-rollers having enlarged central portions in contact with the revoluble part and reduced ends in contact with the stationary part, retaining-rings for the bearing-rollers, tie-rods for holding the retaining-rings relatively to the bearing-rollers, each tie-rod carrying a bearing-roller, means carried by and project-

ing from the inner face of the retaining-rings for supporting the spacers, and spacers for the bearing-rollers adjustably mounted in said means.

23. In a roller-bearing, the combination of a revoluble part, a stationary part, bearing-rollers provided with enlarged central portions and reduced ends, the enlarged portions contacting the revoluble part and the reduced ends contacting the stationary part, rotatably-mounted thrust means for the bearing carried by the revoluble and stationary parts, retaining-rings for the bearing-rollers, tie-rods for the retaining-rings, and spacers for the bearing-rollers carried by the retaining-rings and terminating within the space between the reduced ends of the bearing-rollers.

24. In a roller-bearing, the combination of retaining-rings, bearing-rollers, tie-rods for holding the retaining-rings relatively to the bearing-rollers, each tie-rod carrying a bearing-roller, each alternate bearing-roller being mounted on the tie-rods and provided with a central bore having an enlargement at its ends, washers mounted upon the inner faces of the retaining-rings surrounding the tie-rods and entering the enlarged portion of the bore of the bearing-rollers to form journals therefor, and spacers for the bearing-rollers carried by the retaining-rings and terminating within the space between the reduced ends of the bearing-rollers so as to contact the surfaces of the reduced ends of adjacent bearing-rollers.

25. In a roller-bearing, the combination of two retaining-rings, bearing-rollers, tie-rods for holding the retaining-rings relatively to the bearing-rollers, each alternate bearing-roller being carried by the tie-rod and provided with a central bore terminating in enlarged ends, washers surrounding the tie-rods adapted to enter the ends of the rollers to form journals for the rollers, and antifriction-spacers for the bearing-rollers carried by the retaining-rings and terminating within the space between the reduced ends of the bearing-rollers.

26. In a roller-bearing, the combination of bearing-rollers having different-diametered portions, retaining-rings for the bearing-rollers, tie-rods for holding the retaining-rings relatively to the bearing-rollers, spacer-supports carried upon the inner faces of the retaining-rings and terminating within the space between the smaller-diametered portions of the bearing-rollers, and antifrictional spacers carried by the said supports to contact the smaller-diametered portion of the bearing-rollers.

27. In a roller-bearing, the combination of bearing-rollers having different-diametered portions, retaining-rings for the bearing-rollers, tie-rods for holding the retaining-rings relatively to the bearing-rollers, and antifrictional spacers adjustably mounted upon the

inner faces of the retaining-rings to contact adjacent bearing-rollers upon their reduced portions.

28. In a roller-bearing, the combination of
5 bearing-rollers, retaining-rings for the bearing-rollers, tie-rods for holding the retaining-rings relatively to the bearing-rollers, spacers for the bearing-rollers, and supports for the spacers carried by the retaining-rings; each

support being provided with a bearing for one end of the spacer, and an adjustably-mounted bearing for the opposite end of the spacer.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT ENNIS HENDERSON.

Witnesses:

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W. G. CROWLEY.