

C. S. LOCKWOOD.
ROLLER BEARING HAVING GROOVED ROLLS AND TENSION BAND.
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977,458.

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Fig. 1.

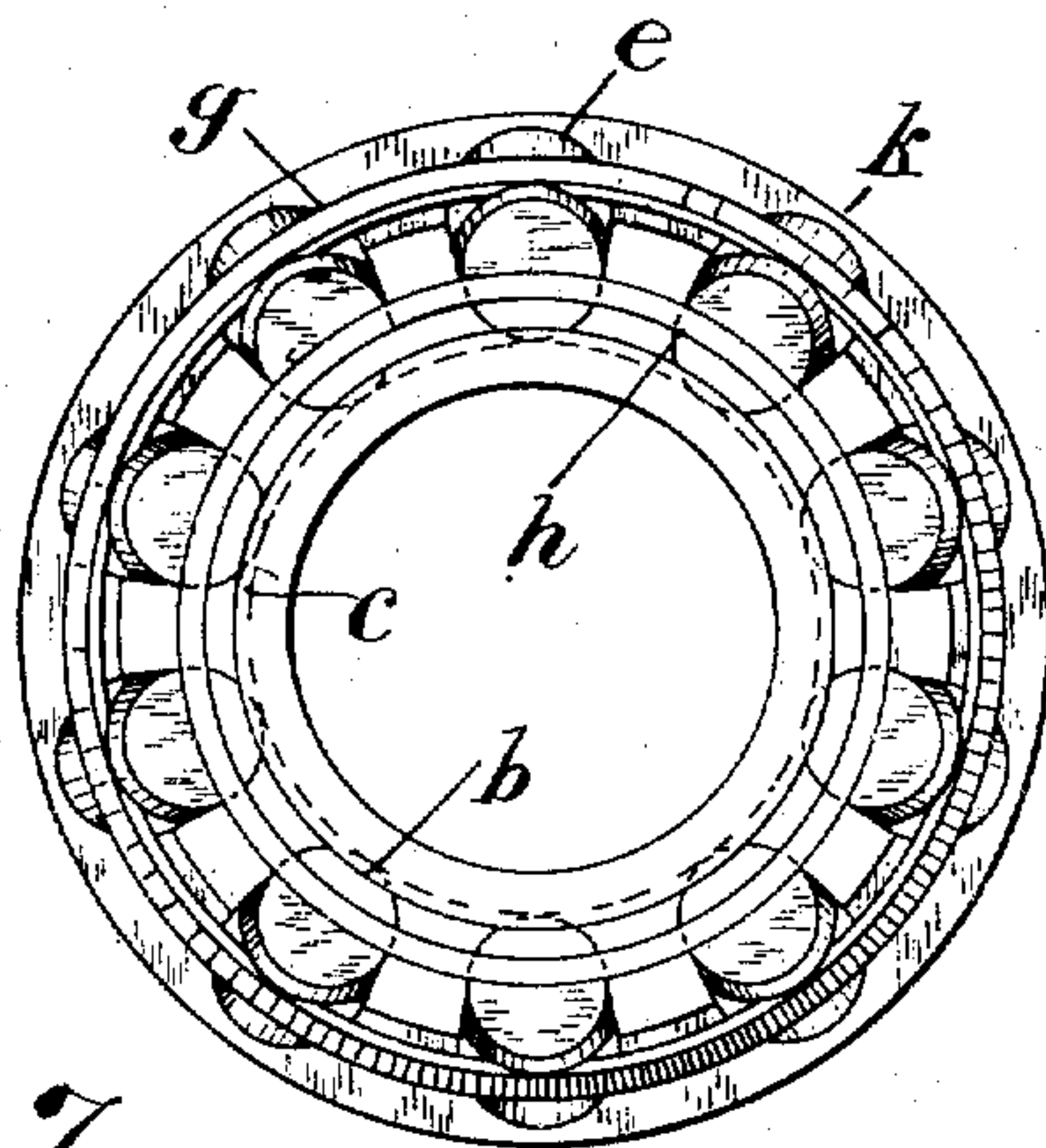


Fig. 2.

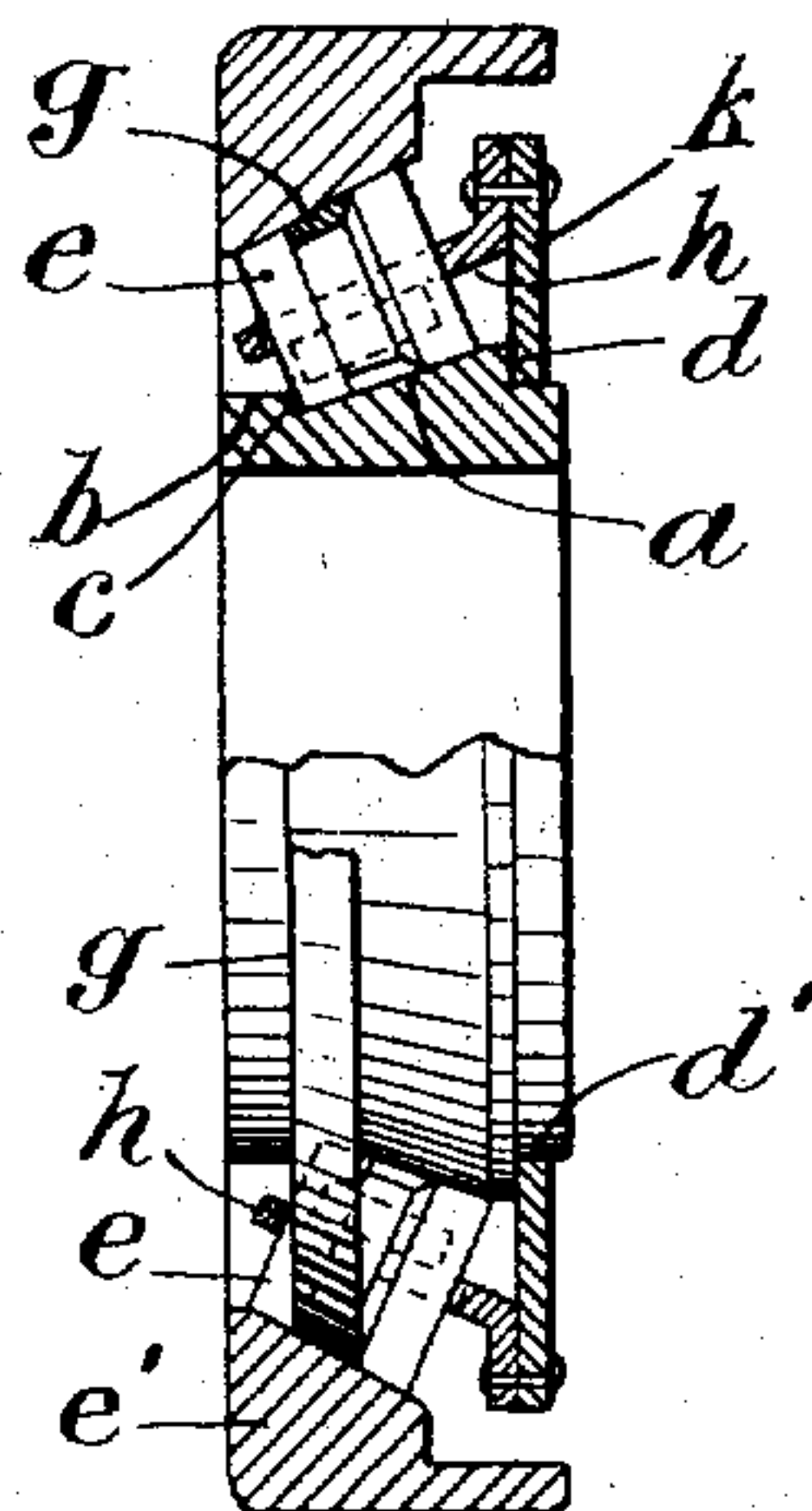


Fig. 7.

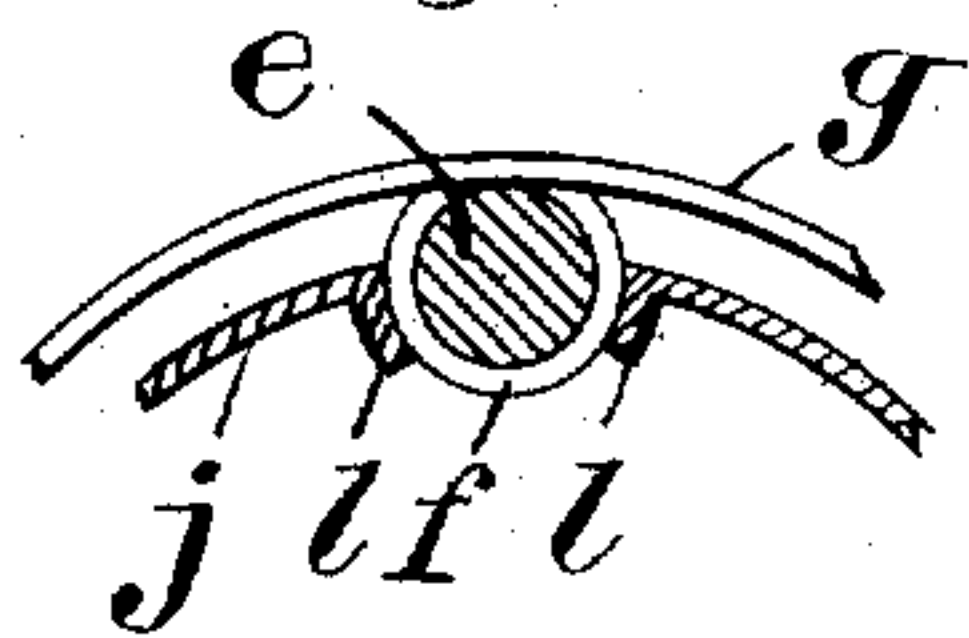


Fig. 3.

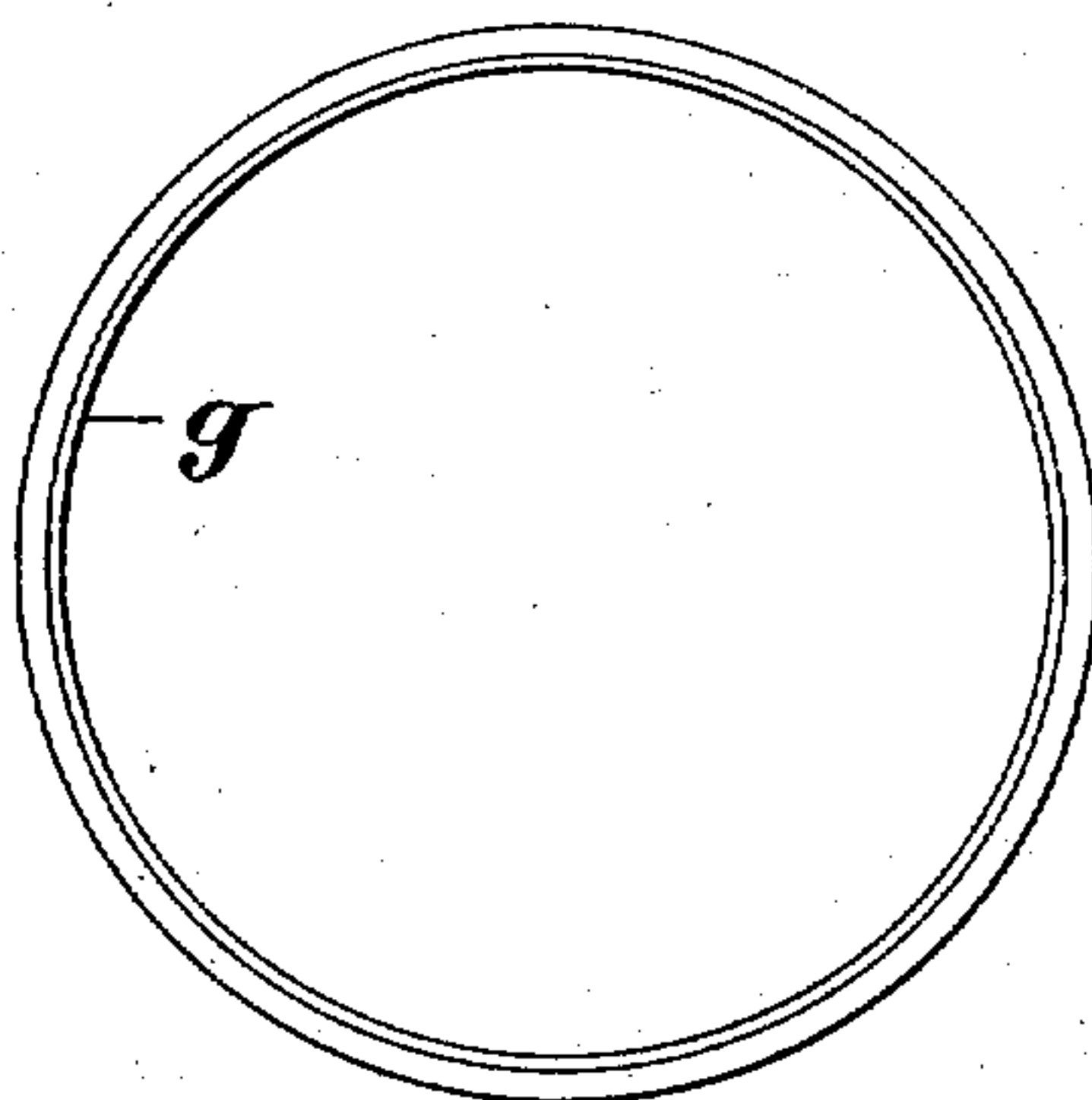


Fig. 5.

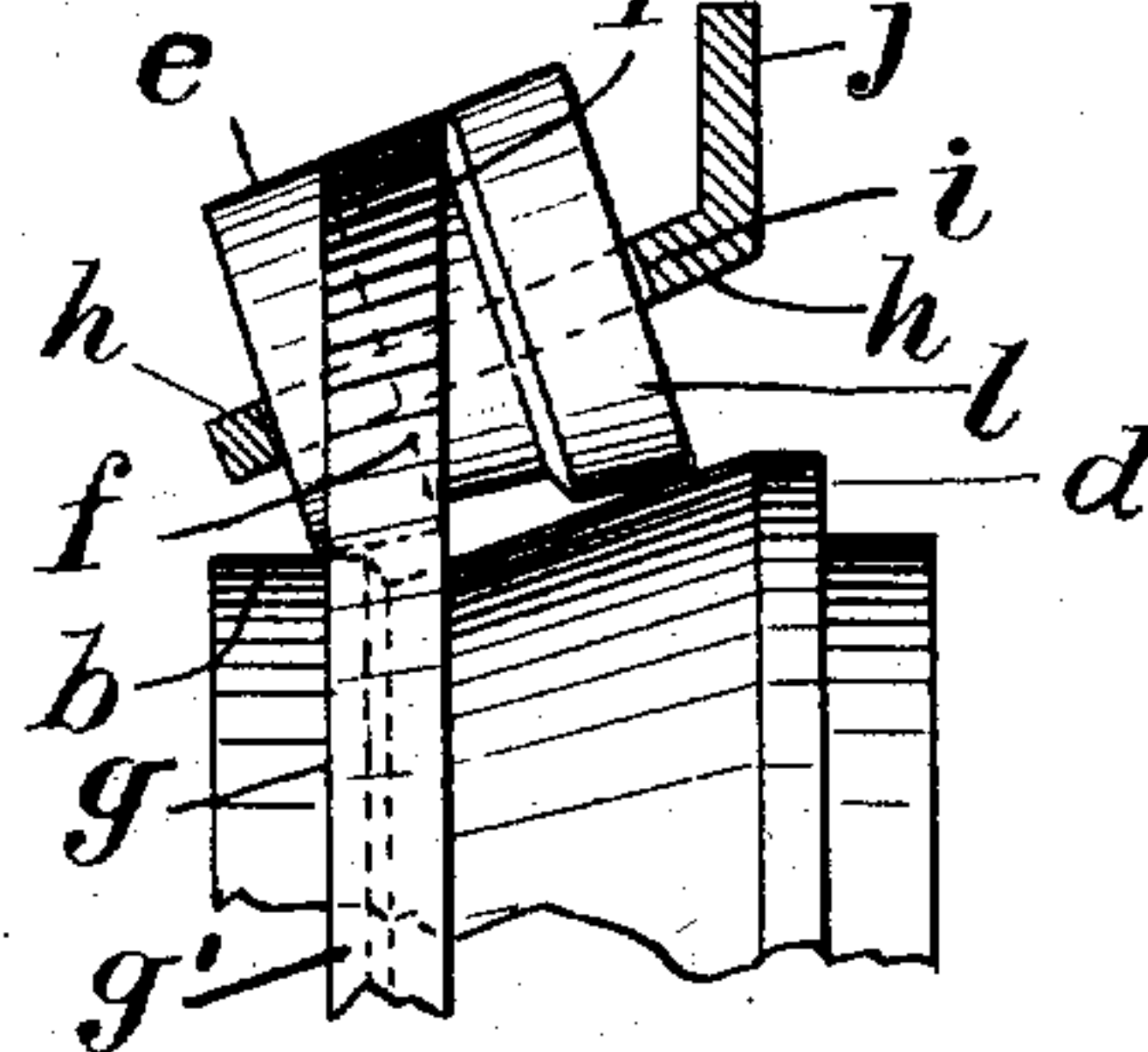


Fig. 6.

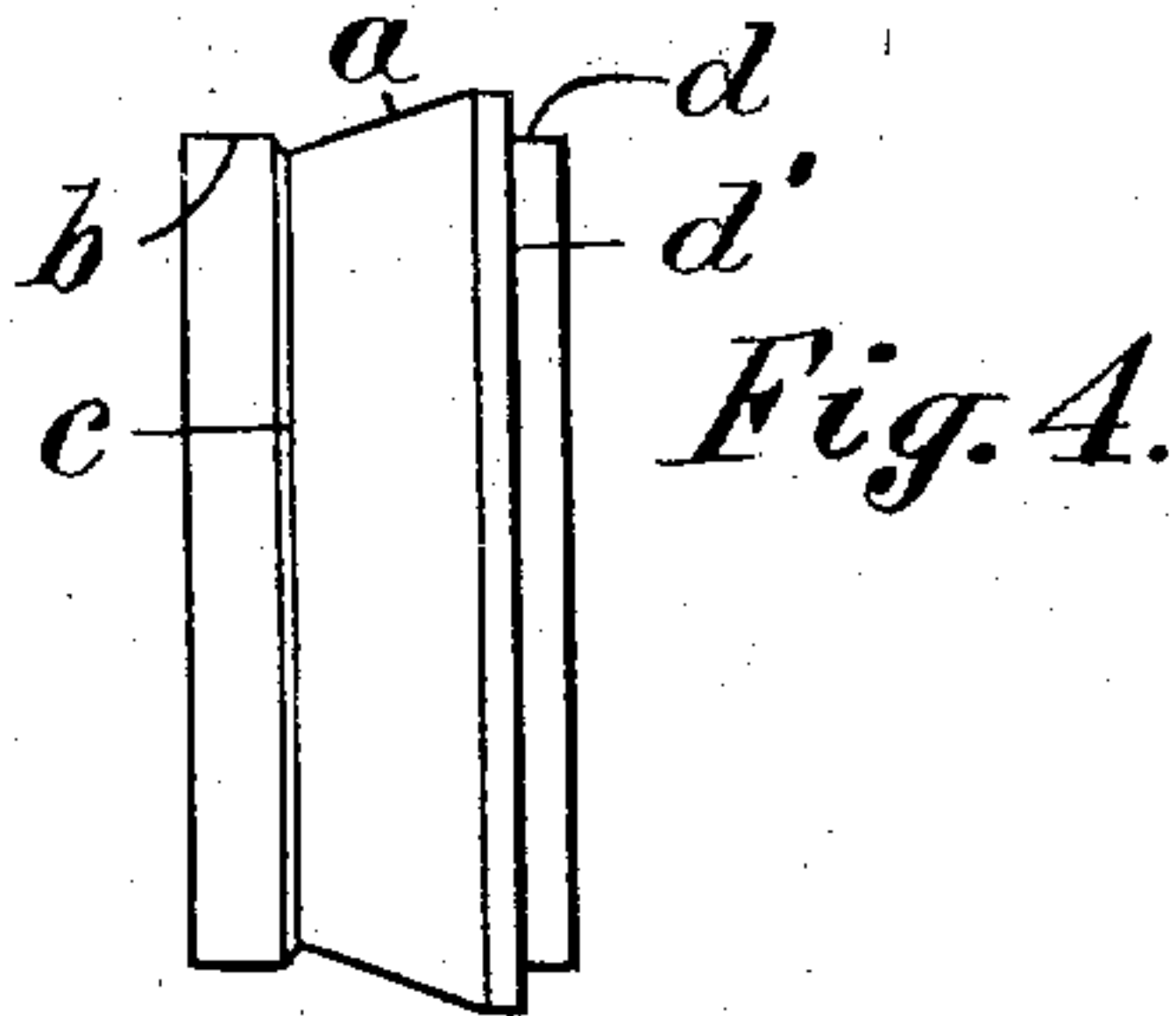
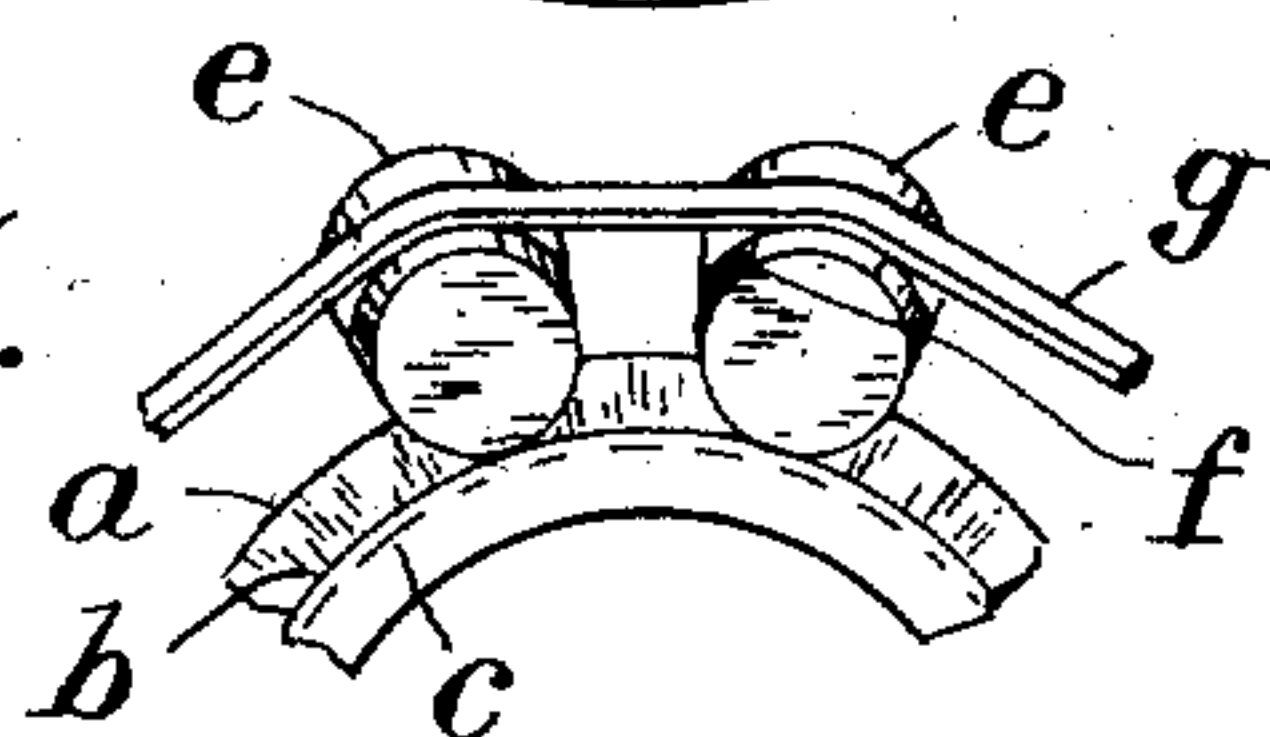


Fig. 4.

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UNITED STATES PATENT OFFICE.

CHARLES S. LOCKWOOD, OF NEWARK, NEW JERSEY, ASSIGNOR TO HYATT ROLLER BEARING COMPANY, OF HARRISON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

ROLLER-BEARING HAVING GROOVED ROLLS AND TENSION-BAND.

977,458.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES S. LOCKWOOD, a citizen of the United States, residing at 289 Market street, Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Roller-Bearings Having Grooved Rolls and Tension-Bands, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to a roller bearing having tapering rolls fitted to a conical hub and embraced by a conical casing so that the rolls may efficiently sustain end thrust, and the object of the invention is to hold the rolls elastically in place upon the hub while permitting a slight expansive movement of the rolls thereon. This object is attained by forming each roll with a shallow groove upon its periphery about the middle of its length, and fitting to the series of rolls an elastic band of greater width than thickness, which embraces the rolls at the several grooves, so as to prevent any material expansive movement of the rolls.

The tension band is so proportioned that any end movement of the rolls tends to straighten the curvature of the band between the peripheries of adjacent rolls, which permits a slight elastic movement of the rolls when subjected to sufficient strain. The rolls are kept in a suitable path upon the hub to retain the tension band in the grooves, by an inwardly-facing shoulder formed upon a collar at the smaller end of the hub; the smaller ends of the rolls contacting with such shoulder in their normal movement about the hub. The space between a conical hub and conical casing is of tapering form, so that end thrust upon the hub tends to force the rolls upwardly upon their respective conical seats, and the elasticity of the tension band produces an elastic resistance to such upward movement and prevents the rolls from yielding materially, while it yields sufficiently to avoid abrupt shocks when the hub is subjected to sudden thrust. The elasticity of the tension band also performs another important function, as it yields sufficiently to permit the crowding of the series of rolls upon the hub over the slightly elevated collar which forms the shoulder at the smaller end of the hub, while embraced by the band.

The invention will be understood by reference to the annexed drawing, in which—

Figure 1 is an elevation of the bearing with the casing removed; Fig. 2 is a longitudinal section, where hatched, at the middle line of Fig. 1, the upper half only of the hub being shown in section; Fig. 3 is an elevation of the tension band; Fig. 4 is an elevation of the hub; Fig. 5 represents one side of the hub and one of the rolls with a portion of the tension band showing the application of the rolls to the hub; Fig. 6 is an elevation of part of the hub, the rolls and tension band, showing diagrammatically the yielding of the tension band; and Fig. 7 is a cross section of one of the rolls and part of the cage at the forward edge of the tension band.

The hub is illustrated separately in Fig. 4 where it is shown with conical seat *a* and a collar *b* at its smaller end proportioned to form a slight inwardly-facing shoulder *c*. The larger end of the hub is rabbeted, forming an outwardly-facing shoulder *d* and a seat *d'* upon the hub. A series of rolls *e* is fitted to the hub and encircled by a casing *e'* having a tapering seat fitted to the exterior of the rolls. Each roll *e* is formed with a peripheral groove of greater width than depth having a flat edge *f* and a beveled edge *f'*, and a tension band *g* is fitted to the grooves and to the said edges and encircles all of the rolls, so as to retain them upon the hub in contact with the shoulder *c*. The tension band as shown in Fig. 3 is a continuous ring and not divided or split at any point, and it is therefore enabled to resist great strain applied internally. The outer edge *g'* of the tension band is beveled inwardly to the plane of the edge *f* upon the groove, as shown in Fig. 5, where the parts are enlarged to show the form more clearly.

A cage having a conical shell *h* is provided with apertures *i* to receive the rolls *e*, and with a ring *j* at its larger end which, after the parts are assembled upon the hub, is secured by rivets to a flange *k*, which fits movably upon the seat *d'* against the shoulder *d*, when the rolls are in contact with the shoulder *c*, the cage thus guiding the rolls in their proper path upon the hub. Lugs *l* are formed upon the cage at the edges of the apertures *i* and projected inwardly at right angles to the cage to permit the insertion of the rolls from the inside, after which the

lugs are bent to fit the sides of the rolls loosely, as shown in Fig. 7.

It is obvious that the tension band cannot be applied to the rolls after they are assembled upon the hub, and it is therefore necessary to fit the rolls within the cage and apply the tension band to the grooves, before the hub is inserted in the rolls.

In assembling the cage with the rolls, the tension band is first placed over the cage, the rolls inserted through the apertures from the inner side of the cage and engaged with the tension band, and the lugs *l* upon the cage are then bent to prevent the escape of the rolls, thus making the band, the cage, and the rolls a unitary structure which can be handled without the derangement of its parts. The rolls can then be forced over the collar *b* at the smaller end of the hub, as shown in Fig. 5, the tension band yielding, or in some measure straightening between the several rolls as indicated in Fig. 6, to permit such expansion of the rolls.

The tension band operates when the rolls have been slipped over the collar to draw them into their normal position upon the hub with their smaller ends in contact with the shoulder *c*.

In Fig. 6, two of the rolls are shown and the tension band stretched straight between the rolls, although the band is normally of equal curvature at all points, as shown in Fig. 3. Such flattening of the curvature between the several rolls is resisted elastically by the metal of the band, which is made of greater width than thickness so as to be flexed in some degree between the rolls when sufficient force is applied. Such flexure of the band is not in practice so great as that shown in Fig. 6, where the band is represented tangential to the rolls merely to illustrate the nature of the flexure and not its extent. The construction of the band enables it to elastically resist expansion of the rolls with increasing resistance as the rolls move upwardly upon the hub, and forms a rigid obstacle to their movement beyond a certain limit, as the ring embraces the series of rolls positively, and is not split or divided to permit its yielding indefinitely. In this respect it differs materially from rings which have been split upon one side and applied to rolls in a manner similar to my divided ring, for the mere purpose of holding rolls upon a hub while assembling the parts of the bearing. In such a construction, the split in the ring permits it to be readily expanded for slipping over a series of rolls after they are assembled upon the hub, which is not possible with an un-

divided ring, such as is required in the present construction to definitely limit the outward expansion of the rolls.

It will be observed that the tension band is applied to the rolls intermediate their ends, so that any retarding effect which the band may have upon the rolls does not tend to twist the rolls out of their normal relation to the hub, which sometimes results when a guiding device is applied to one end only of the rolls.

The present construction is especially adapted to what is termed a "high-duty bearing" in which a heavy load must be sustained by relatively short rolls, for want of space to apply a long bearing; and such short rolls have a greater tendency than long rolls to twist out of line within the bearing.

By applying the tension band to the middle of the roll, it has no tendency to retard one end of the roll more than the other, and thus produces no tendency to twist the rolls out of place.

Having thus set forth the nature of the invention what is claimed herein is:

1. In a roller bearing, the combination, with a conical hub having an inwardly facing shoulder near its smaller end, of a series of tapering rolls fitted to such hub with their smaller ends against such shoulder and having each a shallow groove about the middle of its length, and an undivided annular flexible tension band fitted to such groove and arranged and operated to hold the rolls against the said shoulder and to elastically resist certain expansive movements of the rolls upon the hub, and positively prevent the expansion of the rolls beyond a certain limit.

2. In a roller bearing, the combination, with a conical hub having an inwardly-facing shoulder near its smaller end, of a series of tapering rolls fitted to such hub and having each a groove at the middle of its length, an annular flexible tension band of greater breadth than thickness fitted to such grooves, and a cage having a conical shell with apertures to admit the rolls, and a flange upon the cage engaging such hub, to guide the cage and rolls in their movement.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES S. LOCKWOOD.

Witnesses:

WILLIAM D. BROWN,
IVY W. ASLIN.