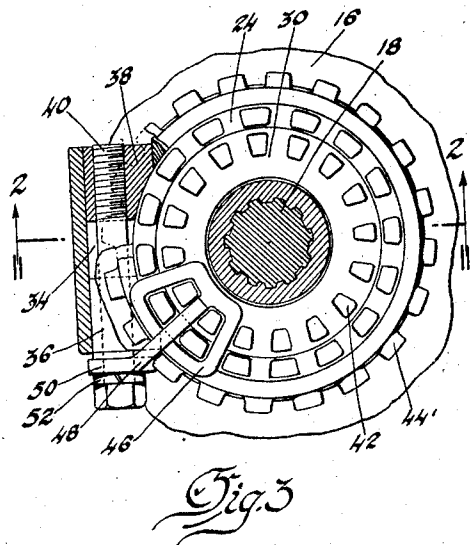
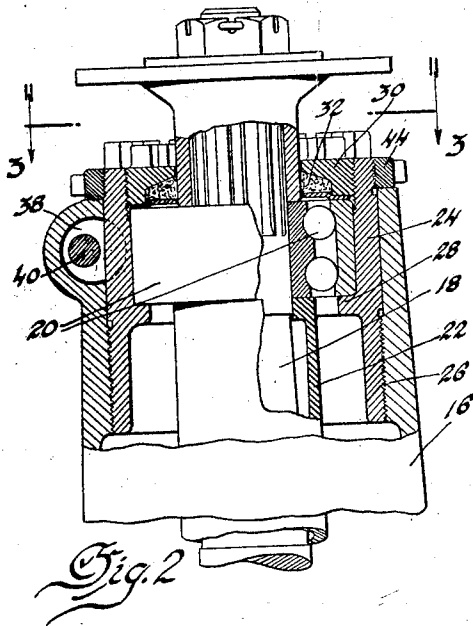
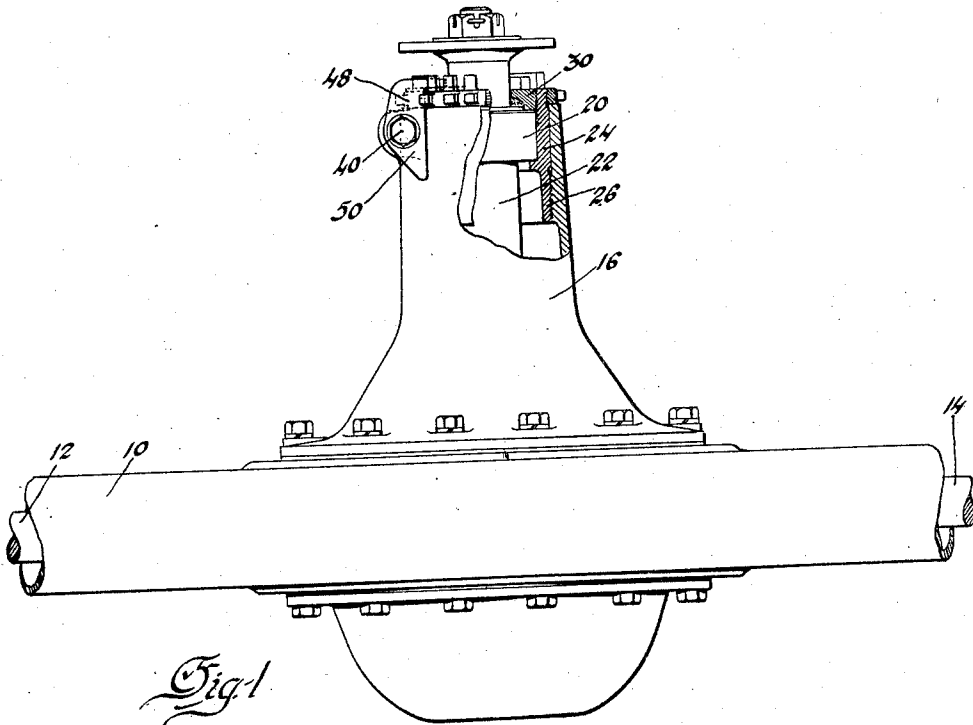


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D. D. ORMSBY
DIFFERENTIAL CARRIER
Filed Nov. 12, 1923



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UNITED STATES PATENT OFFICE.

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DIFFERENTIAL CARRIER.

Application filed November 12, 1923. Serial No. 674,407.

To all whom it may concern:

Be it known that I, DONALD DAMON ORMSBY, a citizen of the United States, and a resident of Syracuse, county of Onondaga, and State of New York, have invented certain new and useful Improvements in Differential Carriers, of which the following is a full, clear, concise, and exact description, such as will enable others skilled in the art to which the invention relates to make and use the same, reference being made therein to the accompanying drawings, which form a part of this specification.

This invention relates to means for locking in adjusted position members such as the adjusting sleeves of drive pinions, and is illustrated as embodied in the differential carrier of an automobile.

An object of the invention is to provide a simple construction which will avoid the necessity of splitting the carrier to secure a clamping action for holding the adjusting sleeve in any desired position.

Having this object in view, the invention contemplates providing the usual tubular carrier member with a cross-bore, shown as substantially tangent to its inner surface, in which there is arranged means for engaging and clamping in adjusted position the usual sleeve used for the purpose of adjusting the position of the drive pinion which engages the ring gear of the differential. In one desirable construction, there are a pair of draw plugs arranged in this bore which are drawn toward one another by manipulating a bolt passing through them so as to clamp them firmly against the exterior of the pinion adjusting sleeve.

Preferably, a key is provided, which may be held by the above described clamp or its equivalent, which engages the sleeve and an internal ring, which may be the usual ring holding the anti-friction bearing in place inside of the sleeve, in order to prevent possible relative movement which would loosen the parts and allow play in the anti-friction bearing. In the arrangement shown in the drawings, the key engages lugs formed on the sleeve and the internal ring, and, if desired, also lugs on an external locking ring, and is held in place by the above described clamp.

The above and other objects and features of the invention, including various novel combinations of parts and desirable particular constructions, will be apparent from the following description of one illustrative embodiment shown in the accompanying drawings, in which—

Fig. 1 is a top plan view, partly broken away, showing part of a "banjo" type rear axle;

Fig. 2 is a view showing part of Fig. 1 on a larger scale but additionally broken away to show certain parts in horizontal section; and

Fig. 3 is a section on the line 3—3 of Fig. 2 showing the relation of the above described locking key to the other parts.

In the embodiment selected for illustration, the invention is shown as applied in a rear axle construction including the usual "banjo" type housing 10 in which are arranged the live axles 12 and 14 connected in the usual manner by a differential supported by a differential carrier 16 bolted to the housing 10. While shown in a "banjo" type axle, these parts may be of any desired construction. The stub shaft 18, driven in the usual manner from the propeller shaft, is substantially coaxial with respect to the tubular carrier member 16 and is supported by a pair of anti-friction bearings, the forward one of which is shown at 20. The rear anti-friction bearing is arranged in the usual manner in engagement with the drive pinion on the end of the shaft 18, which is in mesh with the ring gear of the differential, the rear anti-friction bearing being slidably arranged in an internal flange in the tubular housing 16 and held in place by a spacing sleeve 22. The shaft and its bearings are arranged to be adjusted axially of the shaft to provide the proper mesh between the pinion and the ring gear by turning an adjusting sleeve or bushing 24 threaded into the tubular carrier member 16 at 26, the sleeve 24 being provided with an internal flange 28 which supports the anti-friction bearing 20. The anti-friction bearing is held against the flange 28 by a ring 30 threaded into the sleeve and which is preferably arranged to compress a packing 32. All of the above described parts are illus-

trated as being of substantially the usual construction, except as further described below, and extended description thereof is therefore considered unnecessary.

5 Heretofore it has been considered necessary to split the tubular carrier member 16 in order to utilize a binding or clamping screw to tighten it upon the sleeve 24 to hold it in adjusted position. When this is
10 done, after the tubular member 16 is bored out to provide an accurate internal surface, there is great difficulty in avoiding distortion in providing the clamping slot and in tightening up the clamping screw. Accord-
15 ing to the present invention, such possible distortion is avoided by leaving the end of the tubular carrier member 16 solid and providing a cross-bore 34 substantially tangential with respect to the inner surface of the
20 member 16 and formed in an enlargement near the end of the latter, in which may be arranged means engaging the sleeve 24 for clamping it in adjusted position without the
25 possibility of any distortion of the various parts. Since the carrier member 16 is not split, it has continuous peripheral engagement with the sleeve 24 at both sides of the cross-bore. In the particular arrangement
30 shown in the drawings, there is a perforated draw plug 36 and a cooperating draw plug 38 which is tapped to receive a clamp bolt 40 which can be tightened to draw the plugs 36 and 38 firmly against the exterior of the
35 sleeve 24. The draw plugs 36 and 38 have clamping surfaces curved on arcs having the same radius as the exterior surface of the sleeve and the interior surface of the carrier member. Preferably, the sleeve 24 and the
40 ring 30 are provided with lugs 42, and, if desired, a locking ring 44 threaded on the outside of the sleeve 24 in engagement with the end of the tubular member 16 may be
45 provided with radially extending lugs 44', all of the lugs being so arranged that when the parts are in any desired adjusted position, particular ones of the lugs may be brought into alignment with each other. The lugs are engaged, to hold the parts in
50 such adjusted positions, by a key 46 having a pair of radially arranged openings seating over lugs 42 and having a stem portion 48 engaging between adjacent lugs 44', which key may conveniently be held in place by having a perforated head 50 through
55 which passes the clamping bolt 40. If desired, suitable spring lock washers 52 may be provided.

It will be seen that the various parts may be readily adjusted, and when so adjusted
60 are firmly held in position by tightening the bolt 40, while at the same time it is unnecessary to provide any slot in the tubular member 16, so that there is no possibility of distortion of this part either in forming the
65 slot or in tightening the clamping parts,

While one illustrative embodiment of my invention has been described in detail, it is not my intention to limit its scope to that particular embodiment or otherwise than by the terms of the appended claims. 70

I claim:

1. A differential carrier comprising, in combination, a tubular carrier member having a cross-bore substantially tangential with respect to its inner surface, a pinion
75 adjusting sleeve threaded inside of the tubular member, said tubular carrier having continuous peripheral engagement with said sleeve at both sides of the cross-bore, draw
80 plugs arranged in said bore in engagement with the sleeve, and means for drawing said plugs toward one another to clamp the sleeve in adjusted position.

2. A differential carrier comprising, in combination, a tubular carrier member
85 which is solid at its end and which has a cross-bore substantially tangential with respect to its inner surface, a pinion adjusting sleeve threaded inside of said tubular member, clamping plugs arranged in the cross-
90 bore and having curved portions in engagement with said sleeve, and a clamping bolt for operating said clamping plugs to clamp the sleeve to the tubular member in any desired adjusted position. 95

3. A differential carrier comprising, in combination, a carrier member, a pinion adjusting sleeve threaded inside of said carrier member, an anti-friction bearing inside
100 of said sleeve, a ring threaded inside of said sleeve and holding the bearing, a member for clamping the sleeve in adjusted position in the tubular member, and a key held by said member and engaging the sleeve and the ring to prevent them from turning. 105

4. A differential carrier comprising, in combination, a tubular carrier member, a pinion adjusting sleeve threaded inside of
110 said carrier member, a member for clamping the sleeve in adjusted position in the tubular member, a locking ring threaded on the sleeve in engagement with the end face of the carrier member, and a key held
115 by said clamping member and engaging the sleeve and the ring to prevent them from turning.

5. A differential carrier comprising, in combination, a tubular carrier member, a pinion adjusting sleeve threaded inside of
120 said carrier member, an anti-friction bearing supported by the sleeve, a ring threaded into the sleeve and holding the bearing, a locking ring threaded on the sleeve in engagement with the end face of the tubular
125 member, and a single key engaging the sleeve and the two rings to prevent relative angular movement.

6. A locking device comprising, in combination, an internally and externally 130

threaded sleeve having a series of projecting lugs on its end, rings threaded inside and outside of said sleeve and formed with corresponding lugs, and a key arranged to engage the lugs of the two rings and the sleeve to prevent relative angular movement.

7. A device of the class described comprising, in combination, a tubular member, a sleeve inside of said tubular member formed with internal and external threads, means for clamping the sleeve in the tubular member, rings threaded inside and outside of the sleeve, and a key held by the clamping means engaging both rings and the sleeve to prevent relative angular movement thereof.

8. A device of the class described comprising, in combination, a tubular member, a sleeve mounted inside of the tubular member, a clamp held by the tubular member

and engaging the sleeve to hold it in adjusted position, a ring threaded inside of the sleeve, and a key held by the clamp and engaging both the sleeve and the ring to prevent movement thereof.

9. A differential carrier comprising, in combination, a tubular carrier member having a continuous peripheral end portion and an enlargement at one side adjacent to said end portion, a pinion adjusting sleeve threaded inside of said tubular member, and clamping means arranged in said enlarged portion for clamping said pinion adjusting sleeve in adjusted position without distortion of the tubular carrier member.

In testimony whereof I affix my signature.

DONALD DAMON ORMSBY.