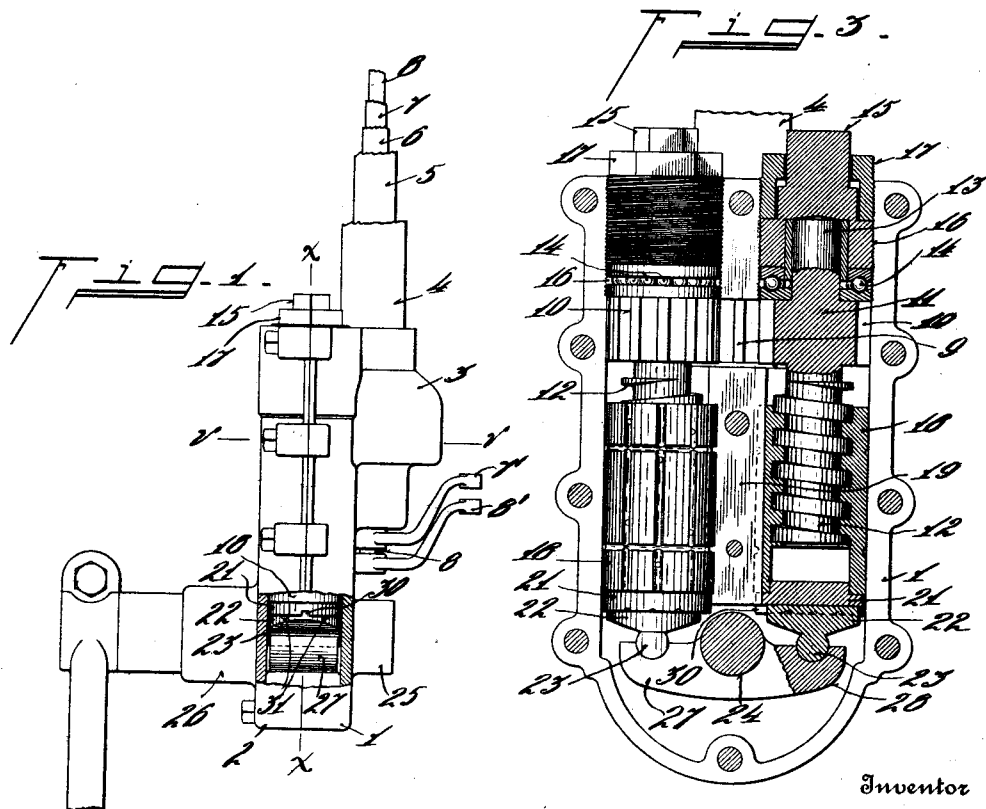
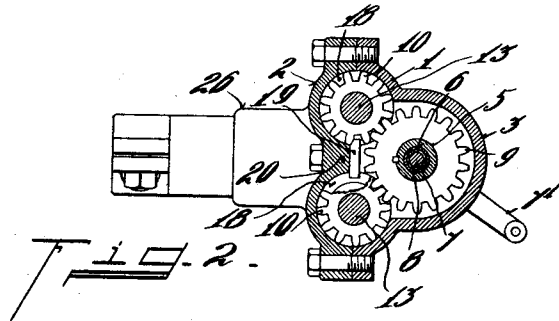


E. GNOETH.
STEERING GEAR.
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Witnesses
Oliver B. Haier
C. B. Fiedler

Inventor
Emil Gnoeth
By *Ward Wood & Nathan*
Attorneys

UNITED STATES PATENT OFFICE.

EMIL GNOETH, OF MADISONVILLE, OHIO, ASSIGNOR TO WILLIAM F. HARMON,
TRUSTEE, OF CINCINNATI, OHIO.

STEERING-GEAR.

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To all whom it may concern:

Be it known that I, EMIL GNOETH, a citizen of the United States, residing at Madisonville, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Steering-Gear, of which the following is a specification.

This invention is concerned with improvements in control apparatus and deals more especially with a device adapted to be actuated to adjust a steering wheel or rudder into any desired position.

One object within the contemplation of this invention is to provide a steering device characterized by strength, durability, simplicity and low-cost, and which is easily operated, adjustable to take up back-lash, and so constructed that the parts thereof are incased against dust and easily accessible for purposes of adjustment, repair, replacement or lubrication.

Another object is to devise a steering-gear adapted to be constructed so as to be "irreversible" to any desired extent, and which will be compact and be well adapted to be applied to automobiles without interference with the current design of other parts.

Another object is to provide a steering-gear having the foregoing characteristics and also making provision for the engine control elements so that parts thereof may telescope the steering post and leave the latter at the casing of the steering-gear without any interference therewith.

Another object is to create a steering-gear in which the steering post has an offset mounting on the main body of the casing and in which engine control members extend from the end of the steering post and project through the casing at the side of and above the lower end of the main body thereof.

Another object is to devise a steering-gear having a casing supporting an abutment directly opposite an arm on a rock-shaft, with a nut and screw intervening between said parts and positioned to exert force in a direct line between the two and thus to act in the most efficient manner.

Another object of the preferred form of this invention is to rotate the screws simultaneously by a gear meshing on the one hand with a gear on the one screw, and on the other hand with a gear on the other screw,

whereby neither screw may exert force before the other is released so that no cramping may result, even should the gears become worn.

Other objects and advantages will be in part pointed out in the following description and in part rendered apparent therefrom in connection with the accompanying drawings.

In order that this invention may be so fully disclosed as will enable those skilled in the art to embody the principles thereof in varied forms to meet various preferences, drawings of an illustrative example have been appended, and in such drawings, like characters of reference denote corresponding parts throughout the several views, of which:—

Figure 1 is a front elevation with parts broken away showing the general assembly of this structure. Fig. 2 is a horizontal section taken along line *v, v*, of Fig. 1, showing one way in which the steering post may be arranged simultaneously to drive the two actuating screws. Fig. 3 is a view partly in section and partly in elevation, taken along line *x, x*, of Fig. 1, showing further details of a preferred form of this invention.

Continuing now by way of a more detailed description, it may be preliminarily noted that while the illustrated apparatus is subject to considerable change and modification within the intended scope of the appended claims, the form shown is in many respects preferred, is essentially practical and presents many features of distinct advantage.

The operative parts of this invention are preferably inclosed in a split two-part casing composed of sections 1 and 2, so as to be protected from dust and grit and at the same time provide suitable mountings for the various parts. The section 1 may be provided with an offset housing or sub-casing 3, from the upper end of which projects a tube 4, serving as a steering post casing. Within this post casing is a tubular steering post or rod 5, that at its upper end may carry a suitable steering wheel or handle in the usual manner. Telescoped within the steering post is a non-rotatable tube 6 that enters through the lower end of such steering post and is fixed against rotation at its lower end by its attachment to a part of the offset housing or sub-casing 3 and, at its

upper end, this stationary tube 6 is intended to carry the usual stationary segment that determines the positions of the operating levers of the engine irrespective of the movements of the steering wheel. Such levers may be fixed to the tube 7 and rod 8, both of which are rotatable and pass through the lower wall of the sub-casing 3 and terminate in the operating levers 7' and 8' respectively.

The construction thus far described of the steering post and engine control members substantially follows that customarily used in automobiles, and may be modified or in part dispensed with according to circumstances. The steering post 5 in this form of my invention is arranged at its lower end simultaneously to actuate two screws, and to that end, suitable gearing is interposed between said two screws, and said gearing is operatively connected in a suitable manner with the steering post, either directly or indirectly. For example, a gear 9 is keyed to the lower end of the steering rod and is arranged within a suitable pocket provided by the sub-casing 3. This gear meshes with a gear 10, arranged on the member 11, which member preferably terminates in a screw threaded shank 12 at one end, and at its upper end in journal 13. The said upper end is provided with a ball-bearing thrust-bearing, indicated by 14, that operates on an anti-friction abutment, limiting the upward movement of the member 11 when it functions to actuate the steering mechanism. A means instrumental in adjusting said bearing up and down to take up back-lash is also provided. This means may be composed of a nut 15, having a screw threaded engagement in an opening 16, provided by the casing, said nut 15 preferably projects exteriorly of said casing, so that it may be conveniently accessible for the purposes of adjustment without making it necessary to gain access to the interior of the casing. For the purpose of preventing any alteration in the adjustment of this nut, a lock nut 17 may also be provided, and the parts are exteriorly so arranged that wrenches may be simultaneously applied to them. The member 11 is freely rotatable under the control of its connection with the steering post, and the threads on its lower end are preferably coarse, strong, and have such a pitch as will provide a suitable degree of irreversibility. Coöperating with the threaded end 12 of the member 11 is a sliding nut 18 that may be constructed of bronze or any suitable strong anti-friction material and which is accurately interiorly threaded to fit the part 12. This elongated nut 18 snugly fits in a slide-way provided by the sections of the casing and it is prevented from turning by means of an elongated spline 19, mounted on a suitable rib 20, provided by one of the casing sections

2. The nut has a suitable axially extending slot in its periphery for engagement with this splined piece 19. At its lower end the nut 18 has a thrust bearing, as in the form of a block 21, preferably provided with a slide bearing surface on its exposed end, against which slidably bears a block 22. This block 22 terminates in a knuckle or fulcrum 23 having a rounded periphery that actuates the steering shaft as will be described. The block 22 may be splined, as to the block 21, as indicated by 30, in a direction transverse to the axis of the knuckle 23, to retain it against lateral displacement. The nut 18 is preferably peripherally provided with grooves for permitting flow of grease or oil to the surfaces requiring lubrication, and similar grooves 31 may be formed in the bearing faces of the block 22, and in other parts.

In the lower end of the casing is arranged a rock shaft 24, which is journaled at one end, as to a casing boss 25, and is also journaled to a hub 26, provided by the casing section 2, through which it projects. This rock shaft provides oppositely extending arms 27, 28, that are preferably formed integrally therewith, as by being forged therewith, and the arm 28 provides a suitable recess for the knuckle 23, thereby providing an ample area of bearing surface between these parts. These arms are made of considerable cross sectional area, and sufficiently massive to withstand all ordinary strains that may be imposed thereon. Extended upwardly from the opposite arm 27 is a mechanism preferably duplicating that heretofore described, and it is so arranged that, when the screw threaded end 12 operates to move the nut 18 downwardly, the corresponding screw thread on the duplicate mechanism will operate to move its nut upwardly and conversely. This duplicate mechanism may or may not include an abutment adjustment, such as that heretofore described. This arrangement may be made irreversible to any desired extent by properly predetermining the pitch of the threads on the screws, and the apparatus may be made practically free of any back-lash, either arising from wear or existing in its initial construction, by simply operating the screw 15 or its duplicate, or both, as the case may be. This will be understood by observing that, if the screw 15 be turned to move downwardly, the movement will be transmitted from one part to another up to the abutment on the other side, so that any play or looseness between any of these parts may be taken up to any desired extent. It will thus be seen that this invention is well adapted to achieve the objects and advantages enumerated in the foregoing in an essentially practical way, and by means of parts, none of which require unusual or ex-

pensive machine operations in their production.

It is noteworthy that any excessive backlash may be taken up, without moving the abutment adjusting nut to an extreme position, by removing a screw and reinserting its gear advanced a tooth or so in mesh with its cooperating gear.

Having described my invention, I claim:—

1. A device of the nature disclosed, combining a casing, a rock shaft journaled therein and having oppositely extending arms, a pair of abutments mounted in said casing, each oppositely distanced from said arms, a nut and screw intervening between one of said abutments and one of said arms, a second nut and second screw similarly arranged between the other abutment and arm, and means for elongating the one nut and screw and simultaneously shortening the other nut and screw to rock said shaft.

2. A device of the nature disclosed, combining a casing, a rock shaft journaled therein and having oppositely extending arms, a pair of abutments mounted in said casing, each oppositely distanced from said arms, a nut and screw intervening between one of said abutments and one of said arms, a second nut and second screw similarly arranged between the other abutment and arm, means for adjusting the position of said abutment to vary the extent of play in said parts, and means for elongating the one nut and screw and simultaneously shortening the other nut and screw to rock said shaft.

3. A device of the nature disclosed, combining a casing, a rock shaft journaled therein and having oppositely extending arms, a pair of abutments mounted in said casing, each oppositely distanced from said arms, a nut and screw intervening between one of said abutments and one of said arms, one of said parts being restrained against rotation and the other against translation, a second nut and second screw operatively arranged between the other abutment and arm, means for adjusting the position of said abutment to vary the extent of play in the parts, and means for elongating the one nut and screw and simultaneously shortening the other nut and screw to rock said shaft.

4. A steering-gear of the nature disclosed, combining a casing, a rock shaft journaled at one end of said casing and having oppositely extending arms, a pair of members abutting said arms and mounted to slide without rotating in said casing, a second pair of members rotatably mounted in said casing, each having a screw threaded engagement with the companion sliding member, abutments limiting the longitudinal movement of said second members, gears connecting said second members whereby they may be simultaneously rotated, and a steering post connected to rotate said second

member whereby said sliding members may be translated in opposite directions to rock said shaft.

5. A steering-gear of the nature disclosed combining a casing, a rock shaft journaled at one end of said casing and having oppositely extending arms, a pair of members abutting said arms and mounted to slide without rotating in said casing, a second pair of members rotatably mounted in said casing, each having a screw-threaded engagement with the companion sliding member, abutments limiting the longitudinal movement of said second members, means for adjusting the position of one of said abutments for varying the extent of backlash in said parts, gears connecting said second members whereby they may be simultaneously rotated, and a steering post connected to rotate said second members whereby said sliding members may be translated in opposite directions to rock said shaft.

6. A steering-gear of the nature disclosed combining a casing, a rock shaft journaled at one end of said casing and having oppositely extending arms, a pair of members abutting said arms and mounted to slide without rotating in said casing, a second pair of members rotatably mounted in said casing, each having a screw-threaded engagement with the companion sliding member, abutments limiting the longitudinal movement of said second members, means for adjusting the position of one of said abutments for varying the extent of backlash in said parts, gears connecting said second members, whereby they may be simultaneously rotated, said gears being in axial parallelism therewith to enable said members to be adjustably shifted without disturbing the pitch lines of said gears, and a steering post connected to rotate said second members whereby said sliding members may be translated in opposite directions to rock said shaft.

7. A steering-gear of the nature disclosed, combining a steering post, a casing, a pair of members arranged adjacent one another in said casing, a rock shaft having oppositely extending arms, instrumentalities for enabling said post positively to force one member toward one arm and to permit the other member to retreat in an opposite direction, or conversely, and blocks intervening between said arms and members, said blocks being pivoted on said arms and having a sliding large area abutment with said member.

8. A steering gear of the nature disclosed, combining a steering post, a casing, a pair of members arranged adjacent one another in said casing, a rock shaft having oppositely extending arms, instrumentalities for enabling said post positively to force one member toward one arm and to permit the other member to retreat in an opposite direction,

or conversely, and blocks intervening between said arms and members, said blocks each having a flat large area face slidably bearing on the end face of a member and
 5 also having an elongated rounded fulcrum seated in a corresponding recess in an arm.

9. A steering-gear of the nature disclosed combining a steering post, a casing, a pair of elongated tubular interiorly threaded
 10 members arranged adjacent one another in said casing peripherally provided with grease-grooves and splined against rotation to said casing, a rock shaft having oppositely
 15 extending arms, instrumentalities for enabling said post positively to force one member toward one arm and to permit the other member to retreat in an opposite direction, or conversely, and blocks intervening between
 20 said arms and members, said blocks each having a flat large area face slidably bearing on the end face of a member and also having an elongated rounded fulcrum seated in a corresponding recess in an arm.

10. A steering-gear of the nature disclosed, combining a steering post, a casing, a pair
 25 of members arranged adjacent one another in said casing, a rock shaft having oppositely extending arms, instrumentalities for enabling said post positively to force one member
 30 toward one arm and to permit the other

member to retreat in an opposite direction, or conversely, blocks intervening between said arms and members, said blocks being
 pivoted on said arms and having a sliding large area abutment with said members, and
 35 means restricting movement of said blocks transversely to said arms.

11. A steering-gear of the nature disclosed, combining a steering post, a casing, a pair
 40 of members arranged adjacent one another in said casing, a rock shaft having oppositely extending arms, instrumentalities for enabling said post positively to force one member toward one arm and to permit the other
 45 member to retreat in an opposite direction, or conversely, blocks intervening between said arms and members, said blocks each having a flat large area face slidably bearing on the end face of a member and also
 50 having an elongated rounded fulcrum seated in a corresponding recess in an arm, and means preventing side shift of said block on its fulcrum.

In testimony whereof, I have hereunto set my hand.

EMIL GNOETH.

Witnesses:

OLIVER B. KAISER,
 CLARENCE B. FOSTER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."