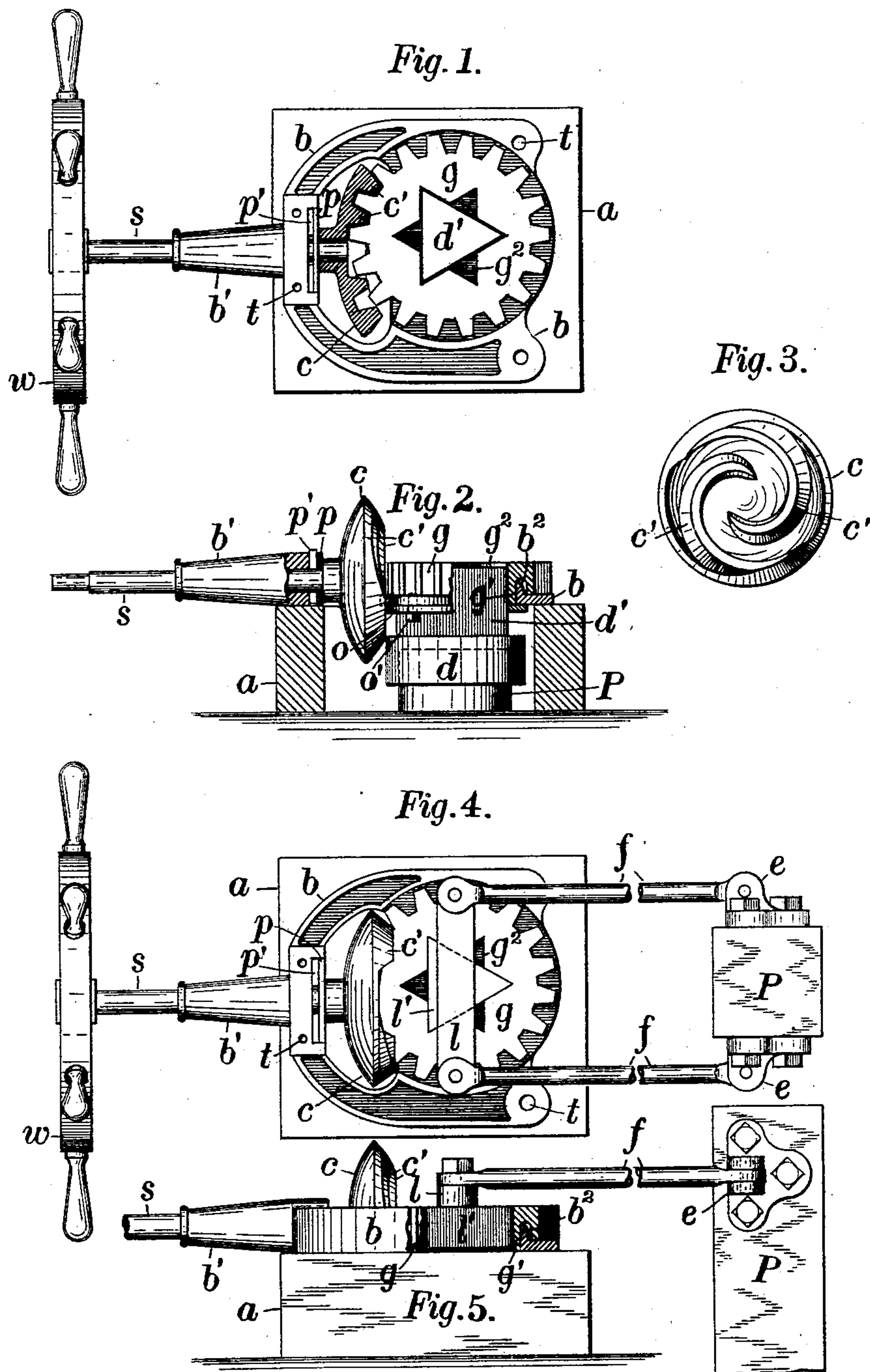


(No Model.)

J. C. & S. LAKE.  
STEERING GEAR.

No. 591,851.

Patented Oct. 19, 1897.



Attest:  
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# UNITED STATES PATENT OFFICE.

JOHN CHRISTOPHER LAKE, OF BALTIMORE, MARYLAND, AND SIMON LAKE,  
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## STEERING-GEAR.

SPECIFICATION forming part of Letters Patent No. 591,851, dated October 19, 1897.

Application filed February 24, 1897. Serial No. 624,903. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN CHRISTOPHER LAKE, residing at Baltimore, in the State of Maryland, and SIMON LAKE, residing at Atlantic Highlands, in the county of Monmouth and State of New Jersey, citizens of the United States, have invented certain new and useful Improvements in Steering-Gear, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to an improvement in that class of steering-gear for boats wherein the rudder-post is turned by means of a toothed sector connected therewith and actuated by engagement with a spiral tooth upon a cam-plate mounted upon a shaft carrying the steering-wheel for turning the same.

The object of the invention is to simplify the construction of the apparatus, to adapt it for application to a rigid frame while providing for compensation for the intermeshing members, and to render the mechanism adaptable to boats having outhanging rudders.

The invention consists partly in the provision of a circular gear-wheel for actuation by the spirally-toothed cam-plate capable of being set normally in different circumferential relations therewith, thereby offering a continuous series of toothed sectors for alternate presentation to the actuating cam-plate, and partly in a coupling device of special construction for connecting said gear-wheel to the rudder-post in such varying relations.

In the annexed drawings, Figure 1 is a plan, and Fig. 2 an elevation, of a steering apparatus embodying the present improvements, partly in section, where hatched. Fig. 3 is a face view of the spirally-toothed cam-plate carried by the steering-wheel shaft. Fig. 4 is a plan, and Fig. 5 a side elevation, of the apparatus adapted for outhanging rudders.

Referring to Figs. 1, 2, and 3, the head of the rudder-post *P* is shown surrounded by a wooden box or casing *a* open at the top and secured upon the floor or deck by suitable means. A rigid frame *b*, preferably cast in a single piece, is secured thereon by bolts *t* and provided with a laterally-projecting boss *b'*, which forms a bearing for the steering-wheel

shaft *s* transverse to the rudder-post and which carries at its outer end the steering-wheel *w* and at its inner end the circular cam-plate *c*, having the two spiral involute teeth *c'* upon its inner or operative face.

The bottom of the frame *b* is formed with a circular opening surrounded by a boss *b<sup>2</sup>*, affording a bearing for the hub *g'* of a circular gear-wheel *g*, meshing with the spiral teeth *c'* of the cam-plate *c*. The gear-wheel being disposed slightly out of line with the axis of rotation of the cam-plate *c*, the spiral teeth of the latter are made convergent toward the center of said gear and to so project from the face of the cam-plate as to make contact with the adjacent teeth of the gear *g* throughout their length, and the circular plate *c* is preferably curved or dished to conform with the external curvature of the gear *g* upon the side adjacent thereto, as indicated in Fig. 1.

By employing two spiral teeth *c'*, instead of one, as has heretofore been proposed, the pitch of the intermeshing gear may be reduced and its center disposed nearer to the axis of the cam-plate without impairing the effectiveness of the mechanism, while conducing to greater symmetry and thereby conferring a beneficial effect upon its appearance.

The rudder-post *P* is coupled to the gear *g* by means of a cap *d*, surmounting the same and provided with a boss *d'* of triangular shape projected upwardly to engage the corresponding angles of a six-pointed star-shaped aperture or socket *g<sup>2</sup>* in the hub *g'* of the gear *g*. It is obvious that the turning of the steering-wheel *w* and consequent actuation of the gear *g* through the spirally-toothed cam-plate *c* operates to move the rudder-post and rudder as desired.

The frame *b* being cast in a single piece to provide the requisite rigidity for sustaining the intermeshing members of the mechanism in the required relation, no relative adjustment of its different parts is permissible for taking up the wear of such members, for which reason the gear *g* is made circular to afford a practically continuous series of toothed sectors, only one of which may operate at a time in conjunction with the cam-plate *c*. It



will be observed that by raising the frame *b* when one of such series of teeth *g'* become impaired in effectiveness by wear and turning such gear, thus disengaged from the angular boss *d'* through an angle of sixty degrees and then reconnecting such parts, another series of gear-teeth will be presented to the cam-plate without the necessity of renewing the whole member. Thus, by the present expedient, the single circular gear-wheel constructed as above described will outlast several of the toothed sectors employed in former constructions, and at only a trifling additional expense to that required for one of such sectors.

In order to take up the wear of the spiral teeth *c'* of the cam-plate, a perforated plate or washer *p* may be applied to the shaft *s* intermediate to the hub of the cam-plate and the bearing *b'*, and suitable wedges or shims *p'* driven in between such plate *p* and the bearing to force the cam-plate toward the gear *g*.

In cases wherein it is impracticable to apply the gearing above described directly to the head of the rudder-post, as in boats provided with outhanging rudders, the mechanism may be applied as indicated in Figs. 4 and 5. In this form of the improvement the casing containing the actuating-gearing is fixed to the floor or deck a little forward of the rudder-post the head of which is provided with lateral ears *e* bolted thereto and connected by links *f* with the ends of a lever *l*, provided upon its under side intermediate to the ends with an angular boss *l'*, which is fitted to and inserted within the angular socket *g<sup>2</sup>* in the gear-hub *g'* similarly to the boss *d'* of the cap *d* previously described. It is obvious that in this form of the improvement the intermediate member *g* is capable of being set in different circumferential relations with the cam-plate *c* and boss *l'* in a manner similar to that described with relation to the construction illustrated in Figs. 1 and 2.

While the socket *g<sup>2</sup>* and the member engaging the same are illustrated in the drawings as of angular form, it is obvious that such feature of said parts is not essential to their effective operation, such members being required to be capable merely of being locked together in the relations above described, so as to present different series of teeth of the gear *g* alternately to the spirally-toothed cam-plate.

By forming the operative face of the cam-plate *c* with an annular cavity or recess embracing the adjacent portion of the periphery of the gear *g* and providing the same with the two parallel spiral teeth *c'*, having their origin at diametrically opposite points thereon and inclined throughout their length toward the center of the gear *g*, it will be observed that both of such teeth are adapted to mesh simultaneously with consecutive peripheral teeth of said gear, so as to afford double the amount of contact provided by a single spiral tooth and to transmit the power received by the

steering-wheel to two of the teeth of the gear *g* instead of one, as formerly, thereby proportionately reducing the liability of breaking out such gear-teeth. It is obvious that the cam-plate, as thus constructed, may be effectively used in conjunction with a toothed sector in lieu of the circular gear shown and described herein.

As indicated in Fig. 2, the gear *g* may be retained in place within the frame *b* by means of a ring *o*, secured to the bottom of the hub *g'* by bolts *o'*, with its edge projected slightly beyond the same to engage the under side of the frame *b*.

Having thus set forth the nature of the invention, what we claim herein, and desire to secure by Letters Patent, is—

1. The combination, with the rudder-post and a suitable frame sustained adjacent thereto, of a steering-wheel shaft mounted upon said frame transverse to the rudder-post and carrying at one end the steering-wheel and at the other end a cam-plate provided with spiral teeth as described, a circular gear-wheel mounted within said frame adjacent to and meshing with said spirally-toothed cam-plate, and means for coupling said gear to the rudder-post in different circumferential relations to said cam-plate, as herein set forth.

2. The combination, with the rudder-post and a suitable frame sustained adjacent thereto, of a steering-wheel shaft mounted upon said frame transverse to the rudder-post and carrying at one end the steering-wheel and at the other end a cam-plate provided with spiral teeth as described, a circular gear-wheel mounted within said frame adjacent to and meshing with said spirally-toothed cam-plate and provided with a central hub having a perforation or socket, and a boss fitted to and locked within said socket and connected to the rudder-post to turn therewith, as herein set forth.

3. The combination, with the rudder-post and a suitable frame sustained adjacent thereto, of a steering-wheel shaft mounted upon said frame transverse to the rudder-post and carrying at one end the steering-wheel and at the other end a cam-plate provided with spiral teeth as described, a circular gear-wheel mounted within said frame adjacent to and meshing with said spirally-toothed cam-plate and provided with a central hub having a perforation or socket, a lever provided upon the underside intermediate to its ends with a boss fitted to and locked within said socket, lateral ears secured to the head of the rudder-post, and links connecting said lateral ears with the ends of the said lever, as herein set forth.

4. The combination, with the rudder-post and a suitable frame sustained adjacent thereto, of the steering-wheel shaft *s* mounted upon said frame and carrying at one end the steering-wheel *w* and at the other end the cam-plate *c* with spiral teeth *c'*, the circular gear-wheel *g* with central hub *g'* formed with star-shaped perforation or socket, and an angular boss fit-



ted to and adapted to engage the angles of said socket and connected to the rudder-post to turn therewith, as and for the purpose set forth.

5 5. The combination, with the rudder-post and a suitable frame sustained adjacent thereto, of a toothed gear mounted within said frame, the steering-wheel shaft *s* mounted upon said frame slightly out of line with said gear and carrying at one end the steering-wheel *w* and at the other end the cam-plate *c* with its operative face formed with an annular cavity or recess conforming in curvature with and adapted to embrace a portion  
10 of said gear as described, said cam-plate be-

ing provided with two parallel spiral teeth *c'* having their origin at diametrically opposite points and each inclined throughout toward the center of said gear and adapted to mesh therewith, and a connection from said toothed gear to the rudder-post, as and for the purpose set forth. 20

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

JOHN CHRISTOPHER LAKE.

SIMON LAKE.

Witnesses:

JOHN SHERMAN,

HENRY J. MILLER.