

(No Model.)

W. ADAIR.  
STEERING GEAR FOR VESSELS.

No. 292,611.

Patented Jan. 29, 1884.

Fig 1.

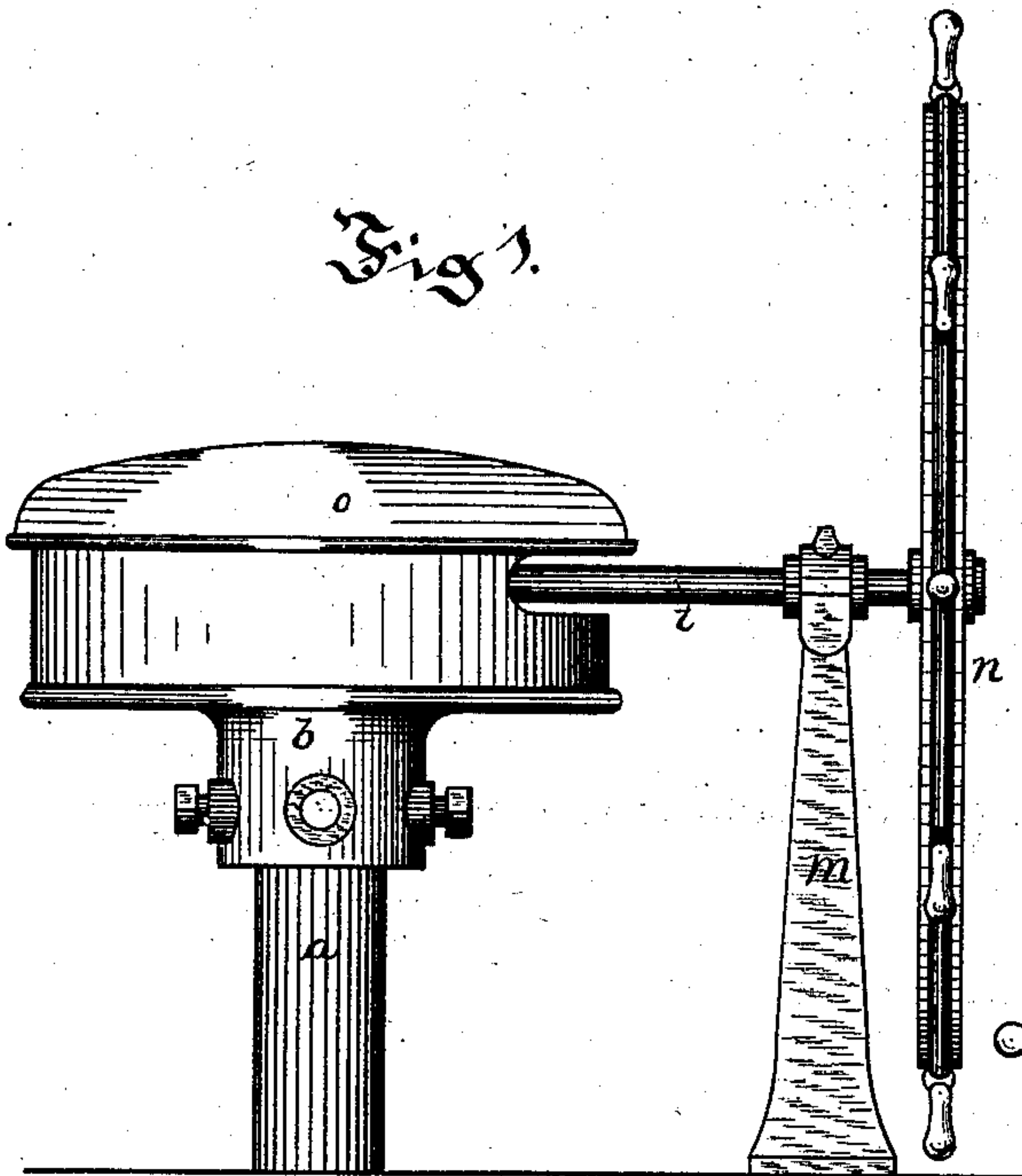


Fig 2.

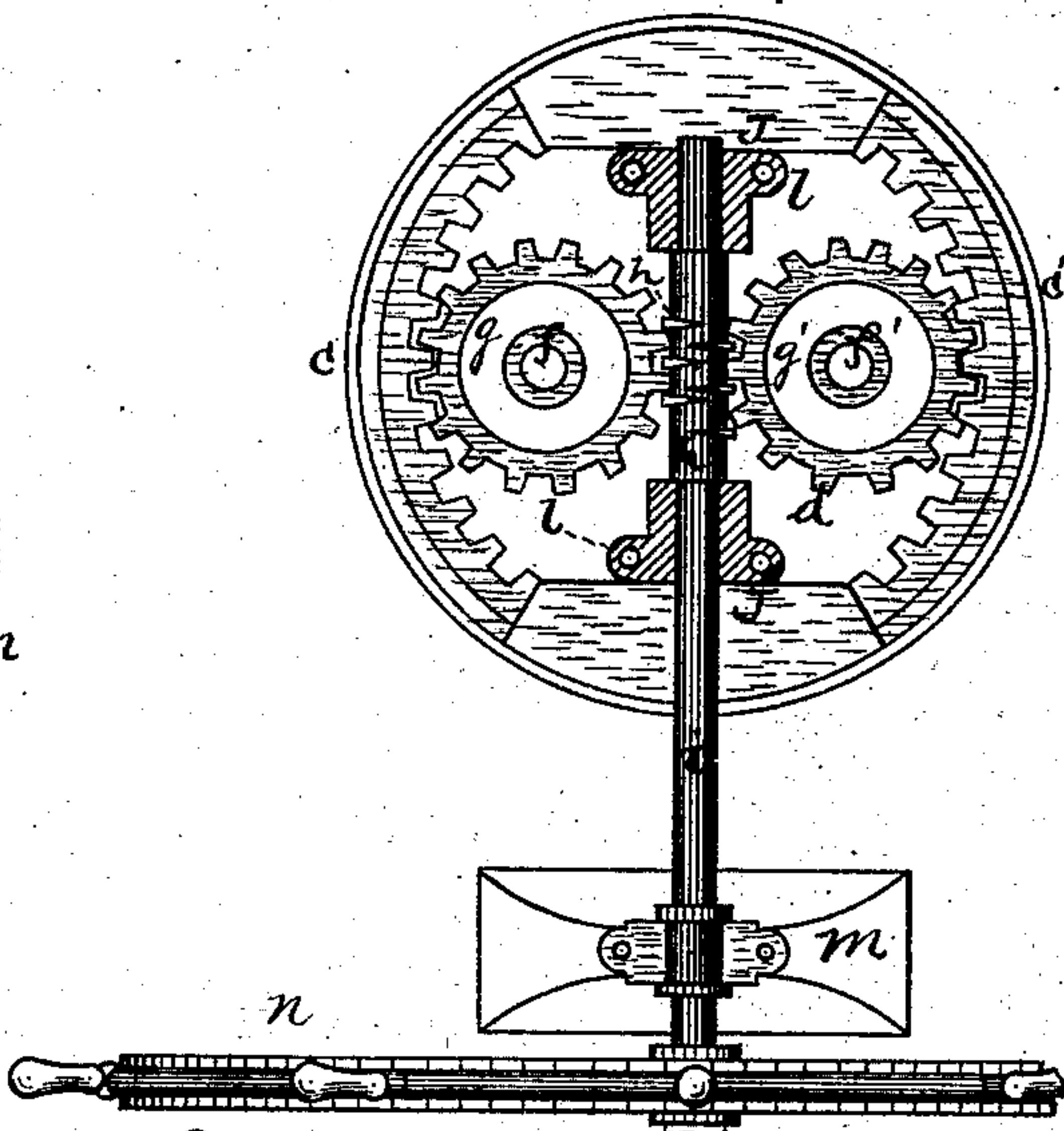


Fig 4.

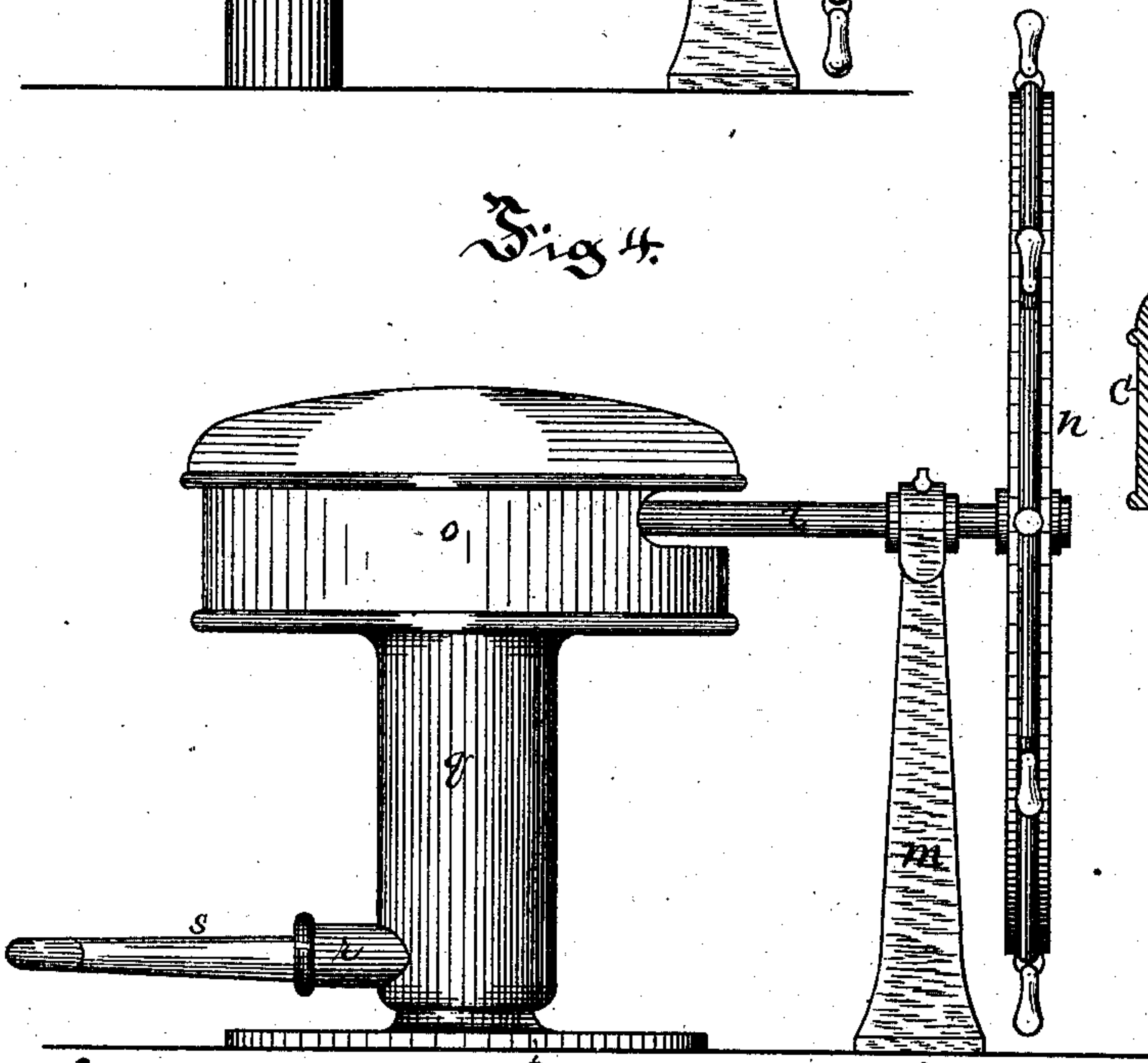
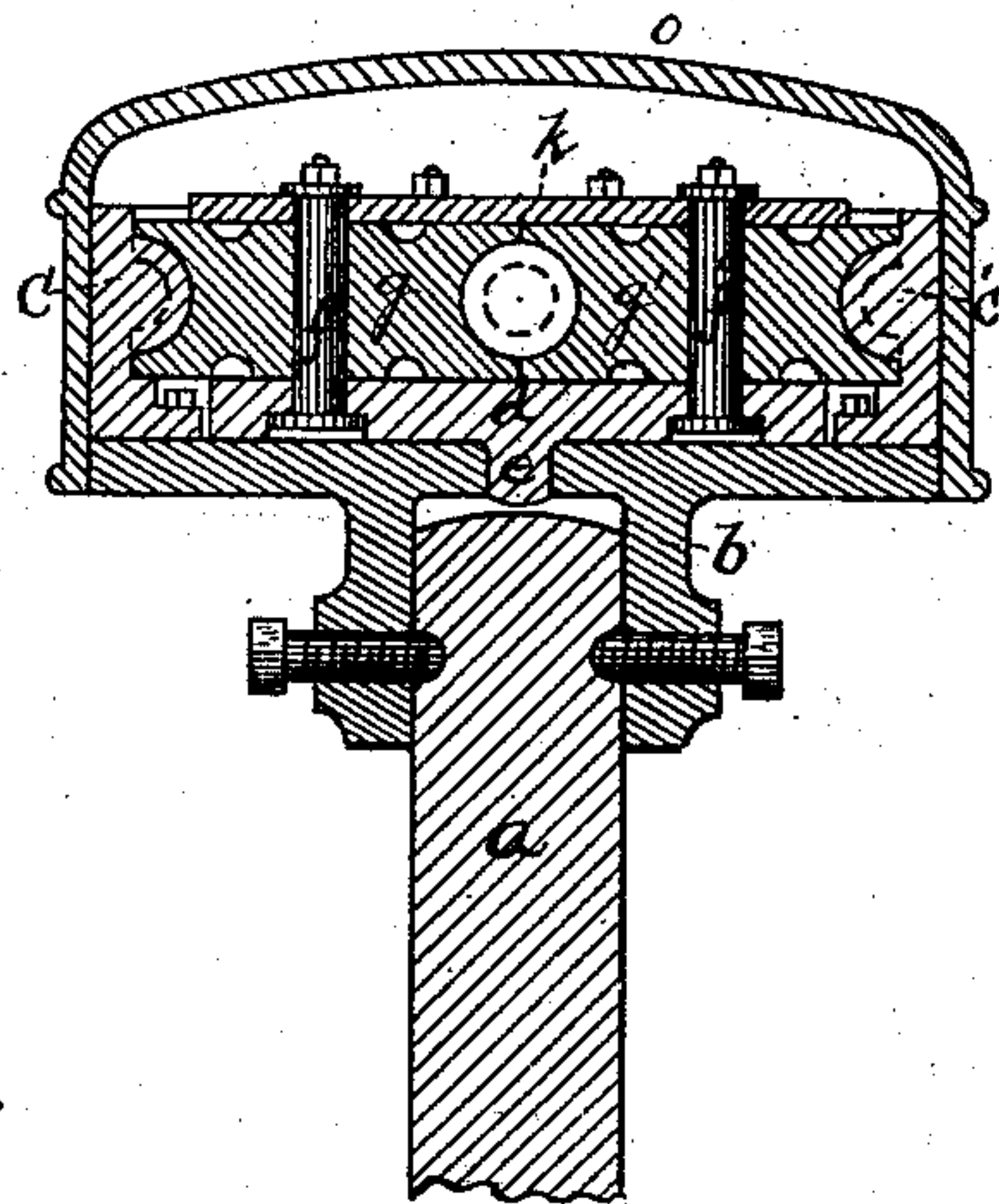


Fig 3.



Witnesses.  
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# UNITED STATES PATENT OFFICE.

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## STEERING-GEAR FOR VESSELS.

SPECIFICATION forming part of Letters Patent No. 292,611, dated January 29, 1884.

Application filed October 10, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM ADAIR, a subject of the Queen of Great Britain, residing at Liverpool, in the county of Lancaster, England, have invented a new and useful Improvement in Steering-Gears, of which the following is a specification.

My invention relates to that class of steering apparatus for giving motion to the rudders of ships and navigable vessels in which the horizontal shaft of the steering-wheel is provided with worm-gear which operates one or more pinions, from which the power is transmitted by gearing to the rudder-head. In the apparatus as heretofore constructed the horizontal worm-shaft was necessarily supported at each end by bearings which were separate from and incapable of vertical movement with the rudder-head, and on account of the construction of the gearing employed the apparatus was also necessarily made large, and for these reasons occupied more space on deck than was sometimes desirable. It also necessitated the employment of separate gear-wheels to mesh with the worm on the shaft, and the gearing rigidly connected to the rudder-head, so that it lacked the quality of compactness, and required a large number of parts.

The object of my invention is to form compact apparatus having few parts for this purpose, the apparatus being so constructed as to be self-contained, and to occupy little space, and easily operated to impart the motion to the rudder, either directly or from a distance, as amid-ships.

To enable others skilled in the art to make and use my invention, I will describe its construction and operation, referring to the accompanying drawings, in which—

Figure 1 is an elevation, Fig. 2 a plan with the cover removed, and Fig. 3 a vertical section, of my steering-gear applied directly to the rudder-head. Fig. 4 is a side elevation of my steering-gear modified, so as to give motion to the rudder from a distance.

In Figs 1, 2, and 3, *a* is the rudder-head; *b*, bed-plate secured to the rudder-head by set-screws, keys, or other suitable means; *c c'*, toothed quadrants, formed with the said bed-plate *b*, or secured thereto by means of bolts and nuts; *d*, sole-plate pivoted to *b* at its cen-

ter *e*, directly over the vertical axis of the rudder-head *a*. The said sole-plate *d* is free to revolve on its central pivot, *e*, on the said bed-plate, forming, as hereinafter shown, bearings for the horizontal shaft, and it can rise and fall with the rudder-head in case of any vertical or jarring motion thereof. It is fitted or formed with two studs or pins, *f f'*, on which are loosely pivoted the combined worm and gear wheels *g g'*, these wheels being of such diameter as to gear into the toothed segments *C C'* and into the worm or endless screw *h* on the shaft *i*, extending between said wheels. The outer edges of the gear-wheels mesh with the segments, while the faces between these edges are made concave, and provided with the worm-gear, the worm *h* fitting within the concave faces of the wheels, and the same wheels, therefore, receiving the power from the shaft *I* and transmitting it to the segments. The screw or worm is right and left handed, or is what is commonly called "diamond-threaded." The said shaft *i* is carried by bearings *j*, forming part of the sole-plate *d* and cover-plate *k*. The cover-plate *k* is connected to the sole-plate *d* by the studs or pins *f f'* and by bolts *l*, passing through the bearings *j*. The top and bottom plates, *k d*, pins or studs *f f'*, bearings *j*, and bolts *l* form a frame carrying the wheels *g g'* and shaft *i*, all capable of revolving freely on the center pivot, *e*.

*m* is a standard secured to the ship's deck, and provided with a bearing in which the outer end of the shaft *i* rests; *n*, steering-wheel secured to the shaft *i*. As the shaft is journaled in the bearings *j j* on the sole-plate, it is evident that the bearing on the standard *m* is only necessary to support the wheel and hold the plate from turning with the bed-plate. The opposite end of the shaft *i* might, if desired, be carried to a standard and be provided with a steering-wheel. The cover *o* is supported on the bed-plate *v* and turns with it.

It will be obvious that if motion is given to the wheel *n* in the direction shown by the arrow, the wheels *g g'* will also be moved as shown, and drive round the quadrants *C C'*, and with them the bed-plate *b* and rudder-head *a*. A reverse motion of the steering-wheel will give opposite motion to the rudder.



Fig. 4 is a view of apparatus for giving motion to the rudder from amid-ships or other suitable position; *p*, standard or carrier firmly secured to the deck of the ship or vessel. The bed-plate *b* is here formed with a sleeve, *q*, which fits over the standard *p*, so as to allow of its revolving thereon; *r*, socket cast with or secured to the sleeve *q* for carrying a lever-arm, *s*, to which are attached the rudder-chains or other connections for giving motion to the rudder. Instead of providing the bed-plate with a sleeve fitting around the fixed standard, it might be made with a cylindrical carrier fitting within a hollow standard or in bearings.

It will be obvious that a quadrant or wheel might be used in place of the socket *r*, and that india-rubber or other buffers might be attached to the bearings or other parts of the apparatus, to reduce rigidity and prevent strains or shocks being communicated too abruptly from the rudder to the steering-wheel. One quadrant and wheel only may be used, if preferred, but not so advantageously except as regards cheapness. In this case a diamond thread on the screw would not be required.

The apparatus is simple in construction, has few parts, is easily operated, and much more compact than the steering-gear heretofore employed.

I claim—

1. The combination of the bed-plate *b*, having the quadrants *C C'*, sole-plate *d*, pivoted on said bed-plate and carrying the horizontal worm-shaft *i*, and gearing connecting the worm-shaft and quadrants, substantially as and for the purposes set forth.

2. The combination of the bed-plate *b*, having the quadrants *C C'*, sole-plate *d*, pivoted on said bed-plate and carrying the horizontal worm-shaft *i*, and combined worm and spur gear wheels *g g'*, pivoted on said sole-plate and connecting said shaft and quadrants, substantially as and for the purposes set forth.

3. The combination of the bed-plate *b*, having the quadrants *C C'*, sole-plate *d*, pivoted on said bed-plate and carrying the horizontal worm-shaft *i*, combined worm and spur gear wheels *g g'*, connecting said shaft and quadrants, standard *m*, and steering-wheel *n*, substantially as and for the purposes set forth.

4. The combination of the fixed standard *p*, bed-plate *b*, having the sleeve *q*, fitting over said standard, sole-plate *d*, pivoted on said bed-plate, and gearing connecting the horizontal shaft *i* and bed-plate, substantially as and for the purposes set forth.

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Witnesses:

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