D. N. B. COFFIN, Jr.

Steering Apparatus.

No. 134,516. Patented Jan. 7, 1873.

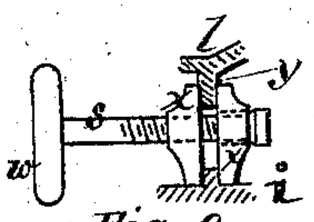

Fig. 9.

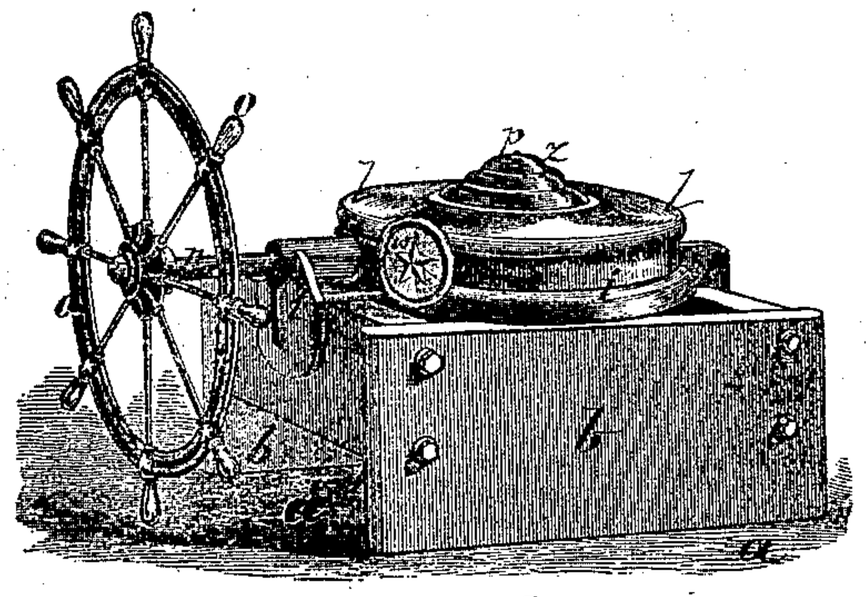

Fig. 1.

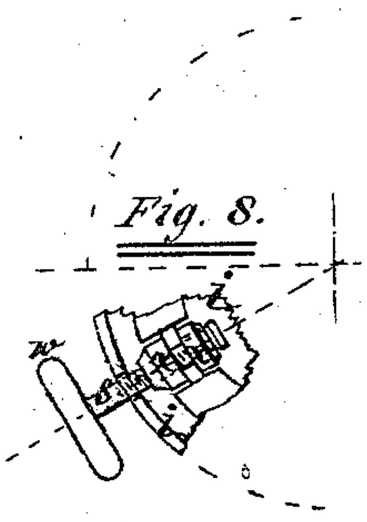

Fig. 8.

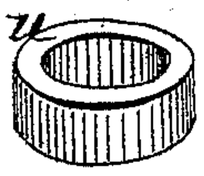

Fig. 3.

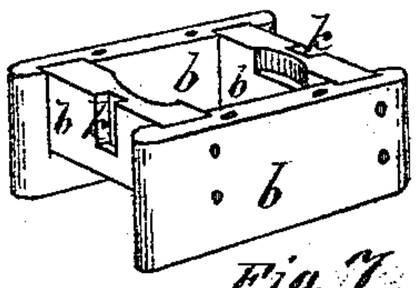

Fig. 7

Fig. 4.

Fig. 2.

Fig. 5.

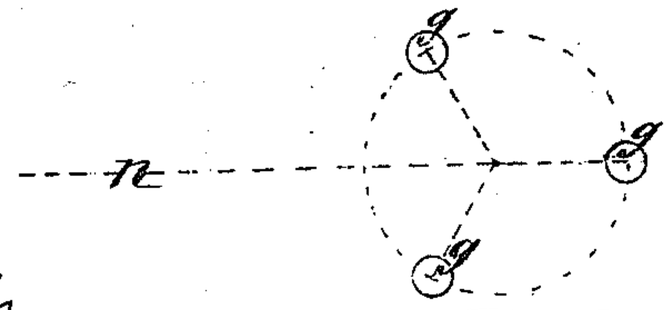

Fig. 6.

Witnesses.

Isaac Story

Benjamin Woodward

Inventor.

David N. B. Coffin Jr.

UNITED STATES PATENT OFFICE.

DAVID N. B. COFFIN, JR., OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN STEERING APPARATUS.

Specification forming part of Letters Patent No. **134,516**, dated January 7, 1873.

To all whom it may concern:

Be it known that I, DAVID N. B. COFFIN, Jr., of the city of Boston, Massachusetts, resident of Newton, county of Middlesex and State of Massachusetts, have invented certain Improvements in Steering Apparatus, of which the following is a specification:

My invention relates to the intervening mechanism between the wheel and the rudder, as illustrated in the accompanying drawing, of which—

Figure 1 is a perspective view; Fig. 2, a sectional view, the plane of section mainly coinciding with a vertical plane passing through the axis of the wheel-shaft *n* and the axis of the rudder *c;* Fig. 3 is a perspective view of the elastic portion of the elastic gear or toothed wheel *f;* Fig. 4 is a portion of Fig. 2, showing the nut, &c., which holds the wheel on shaft *n;* Fig. 5 corresponds to Fig. 2, showing a modified construction of gears *f* and *e;* Fig. 6 indicates the preferred position of studs *g* in relation to the wheel-shaft *n;* Fig. 7 shows the wood frame *b*, on which rests the iron frame *i*, and which is made fast to the deck *a;* Fig. 8 shows a plan of a device used for setting the wheel to prevent unnecessary movement of the apparatus and rudder when the wheel is not attended to or in use; and Fig. 9 is an elevation of the same parts, and shows the two jaws *x x* embracing the flange *y* on the cover-gear *l*.

Like letters refer to the same and like parts in all the figures.

The surface of the deck is indicated at *a*. The wooden frame fastened to the deck is marked *b;* rudder-stock, *c;* rudder-band, *d;* gear attached to or cast on the rudder-band, *e;* elastic gear, *f*. Studs in the iron frame carrying the elastic gears are marked *g*. Center gear actuating the elastic gears *f* is marked *h*. The main cast or metal frame is marked *i*. Its tongues, fitting in the wood frame *b*, are marked *j*, and are free to move up and down with frame *i* in wood or metal-lined pockets or grooves *k*. A gear-wheel inverted—*i. e.*, with its teeth underneath—and forming a cover, with drooping flange for frame *i*, is marked *l*, and is fitted to the top end of gear *h* with a key and pin. The pinion *m*, keyed to the hand-wheel shaft *n*, plays into and actuates the gear *l*. The hand-wheel shaft is marked *n*, and is supported in suitable bearings in frame *i*. The hand-wheel is marked *o o*. To indicate the position of the rudder a neat cover, *p*, is provided, with a pointer, *z*, adhering to or cast upon its surface; and a rod, *q*, connects it to the rudder-stock *c*, so that it is forced to turn with the rudder. The rod *q* passes through the gear *h*, which, with its neck or shaft, is made hollow for the purpose. Oil poured in the channel around the hub of gear *l*, under pointer-cover *p*, finds its way through the oil-holes indicated in the drawing to the bearings of gears *h* and *f*, while, if the oil-hole shown at *r* be placed over the hand-wheel shaft *n* and over the screw *s*, and oil poured in, both of those parts are readily oiled. The pointer-cap *p* may be lifted freely for oiling, the rod *q* being fitted freely in the rudder-stock for that purpose. The outer bearing of shaft *n* is oiled at *t t*. The gear *f* is constructed in three parts. A hub part, turning freely on the strong studs *g*, is provided with a projecting rim. Outside of and embracing this hub, and pressed to its rim, is a spring of vulcanized rubber or other elastic material. (See Figs. 2 and 3.) Letter *u* outside of the spring is a ring of metal, provided with teeth and suitable supporting and strengthening rims.

As the wheel *o* is revolved in either direction, turning shaft *n*, the gear *m* is made to turn the gear *l*, which gives motion to gear *h*, which plays into and revolves the gear or gears *f*. Gear *f*, being elastic, gives motion with an elastic force to the gear *e* and the rudder. Two, three, or more of the gears *f* may be employed. Three is deemed to be a good number; and when this number is used the preferable arrangement of them relatively to the wheel-shaft is deemed to be that indicated in Fig. 6.

By this arrangement of the elastic gears *f*, when the rudder-stock sets aft—*i. e.*, in the direction opposite to the wheel, (see Figs. 2 and 6,) which it generally does as a result of the overhanging of the rudder aft of its pintles—the two forward elastic gears, acting as elastic rollers as well as gears, and against the gear *e*, become an efficient support or guide for the rudder-stock. To secure the better effect of this function of the elastic gears I ex-

tend the upper flanges of gears *f* and *e* equally upward, as shown in Fig. 5, that they may roll together for this purpose.

It will be noticed that the frame *i* is free in case the rudder grounds and is lifted thereby to rise with it, and unless it is lifted entirely out of grooves *k*, (see Figs. 2 and 7, &c.,) will come back safely to its place. The elasticity introduced into the gears *f* not only gives great elasticity to the action of the steering apparatus, thereby obviating the "kicking" of the wheel as the sailors call it, and improves the rudder supporting or guiding function of these gears, but also produces a better result in sailing, by equalizing the pressure of the rudder against the water in guiding the movement of the vessel through the water, and so keeping her more steadily on her course, with less retarding effect. It also secures the united action and consequently insures the united strength of the two, three, or more gears *f* and their studs, thereby rendering the apparatus extraordinarily secure against the danger of "carrying away" the rudder or steering apparatus. The superior efficiency of the spring element in these gears and applied in this way will be apparent when it is considered that each stud-gear is a lever acting between gear *h* (the power) and gear *e*, (the load,) and that this lever has interposed between it and its fulcrum-stud *g* the broad and lengthy surface of rubber (or other spring *u*) available as an elastic cushion, the cushion occupying nearly half the circumference of the hub portion of the gear.

So far as my experiments have been prosecuted the elasticity and ease of action appears to exceed all known devices heretofore applied for this purpose. The apparatus is more compact than any of equal strength and power heretofore in use.

To set the apparatus and hold the rudder in position without attendance at the wheel, the circular rim *y* is formed on the under side of cover-gear *l*. Two jaws, *x*, like a vice with a screw to set and relieve them upon this rim, are arranged in a suitable socket or shoulders formed on frame *i*, as see Figs. 1, 8, and 9. The jaws, when screwed up, grasp the rim or flange *y* with a friction-grip, and while they hold sufficiently for all practical purposes, will generally slip when a heavy surge comes upon the rudder before any breaking strain is reached. A small wheel, *w*, serves as a means for turning the screw *s* to set or relieve the apparatus.

For the purpose of steering forward instead of aft I place a chain-wheel upon the shaft *n*, near its outer bearing in frame *i*, and a similar one upon the wheel-shaft in the forward wheel-house, and connect the two by chains passing around each chain-wheel and down upon or beneath the deck, around suitable sheaves or pulleys, and connecting with rods or wire-rope running fore and aft in suitable "fair-leaders" for connecting the same. To make the application of the chains and chain-wheels so as to leave the shaft *n* free to be lifted with its chain-wheel and frame *i*, the chain may pass under rather than over the chain-wheel and be held up in connection by passing over two sheaves or pulleys, one on the port and the other starboard of the wheel, and high enough to keep the chain in contact with any portion of the periphery not exceeding one-half.

The parts may be made of the usual metals and materials, so far as not otherwise mentioned, commonly employed for this class of machines.

Claim.

I claim—

1. The arrangement and combination of the shaft *n*, gear *m*, gear *l*, gear *h*, gear or gears *f*, gear *e*, and frame *i*, substantially as described.

2. The elastic gears *f*, constructed and applied substantially as and for the purpose set forth.

3. The frame *i* furnished with the tongues *j*, in combination with the frame *b* and its grooves *k*, the same being constructed and arranged substantially as described, and for the purpose set forth.

4. The inverted toothed wheel *l*, constructed and applied, in combination with the frame *i* and gear *m*, so as to perform the double function of gear and cover, substantially as and for the purpose set forth.

5. The screw *s* and jaws *x x*, in combination with the frame *i*, wheel *l* and its flange *y*, when arranged to operate substantially as and for the purpose set forth.

6. The cover *p* provided with the attached pointer and connecting-rod *q*, in combination with the hollow gear *h* and rudder-stock *c*, substantially as and for the purpose set forth.

DAVID N. B. COFFIN, JR.

Witnesses:
ISAAC STORY,
BENJAMIN WOODWARD.