

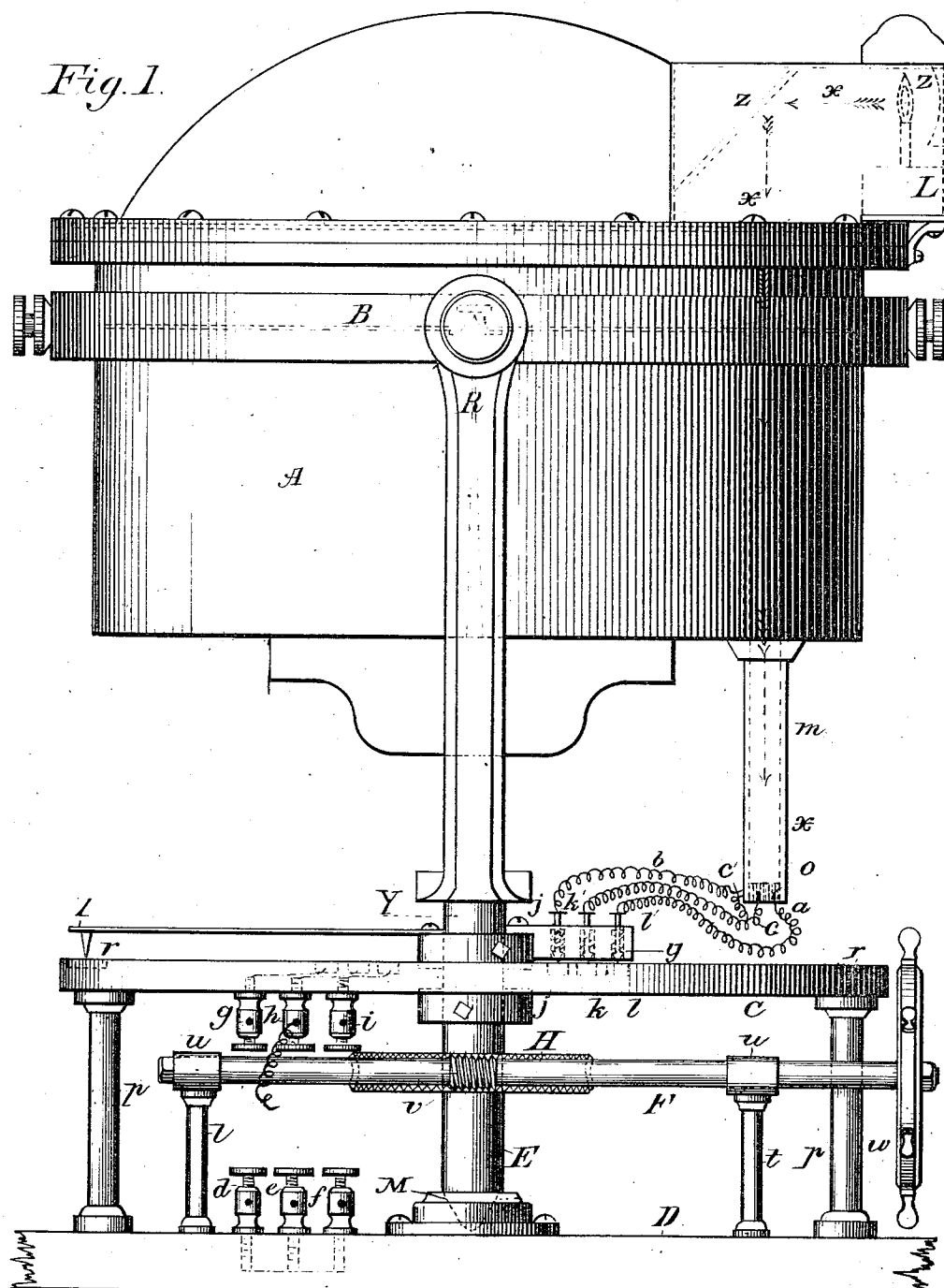
(No Model.)

2 Sheets—Sheet 1.

J. A. TILDEN.
APPARATUS FOR STEERING SHIPS.

No. 352,374.

Patented Nov. 9, 1886.



Witnesses:
Frank B. Hensley,
Chas. H. Hensley

Inventor:
James A. Tilden.

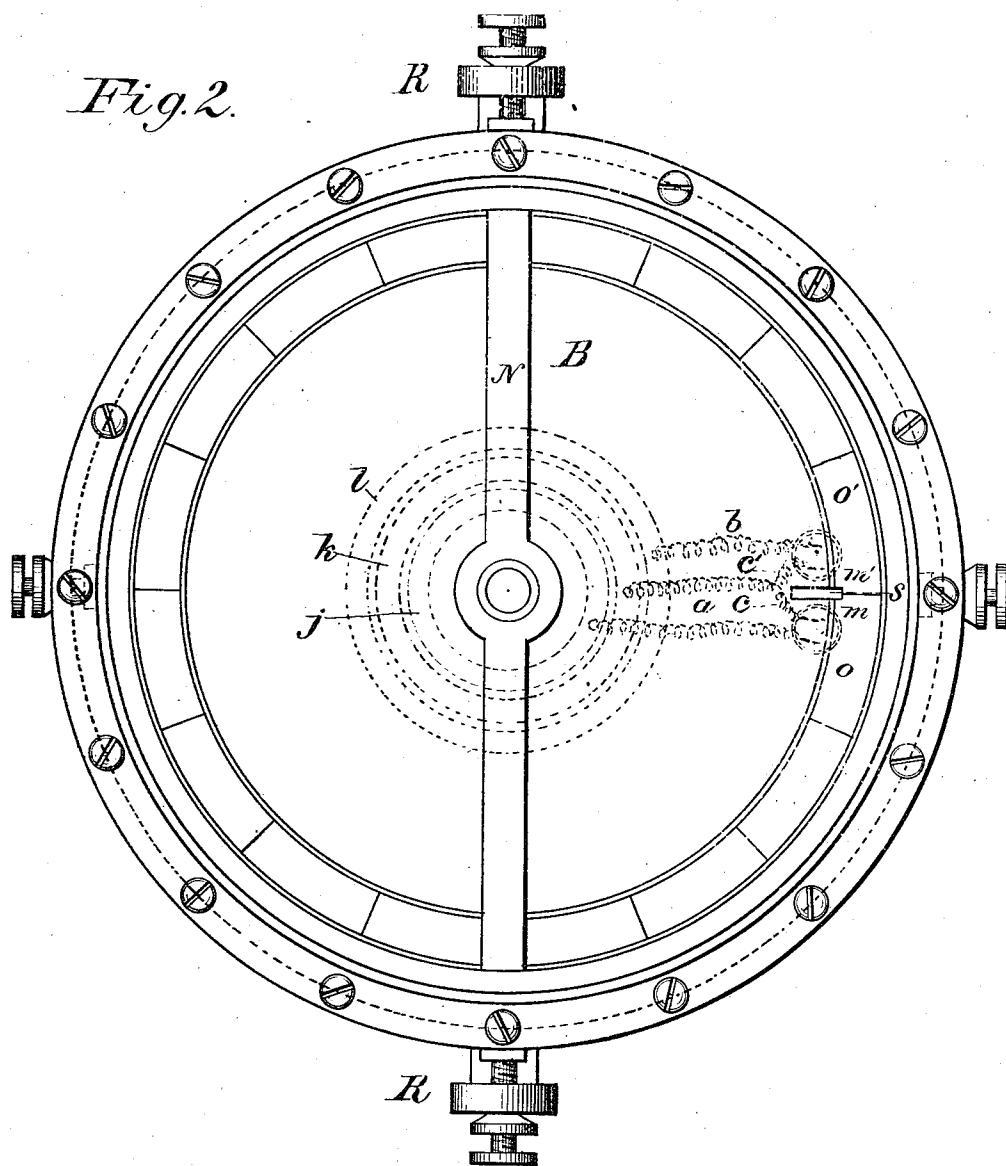
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2 Sheets—Sheet 2.

J. A. TILDEN.
APPARATUS FOR STEERING SHIPS.

No. 352,374.

Patented Nov. 9, 1886.



Witnesses:

Frank L. Hersey,
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Inventor:

James A. Gillett.

UNITED STATES PATENT OFFICE.

JAMES A. TILDEN, OF HYDE PARK, ASSIGNOR OF ONE-HALF TO HERSEY BROTHERS, OF SOUTH BOSTON, MASSACHUSETTS.

APPARATUS FOR STEERING SHIPS.

SPECIFICATION forming part of Letters Patent No. 352,374, dated November 9, 1886.

Application filed August 19, 1880. Serial No. 15,684. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. TILDEN, a citizen of the United States, residing at Hyde Park, in the county of Norfolk and State of Massachusetts, have invented a new and useful Apparatus for Steering Ships; and I hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a full and clear description of my invention, sufficient to enable those skilled in the art to practice it.

The object of my invention is to automatically control and operate the rudder of a ship for the purpose of keeping her upon her course, and to automatically and promptly bring a ship upon a desired course whenever from any cause she has been altered therefrom.

This invention may be applied to a rudder of a sailing-vessel by connecting it with an electric engine or other system of magnets so constructed as to operate the rudder, and in the same manner it may be applied to vessels propelled by steam. It may also be applied to steam steering gear or engines by connecting it with an electric engine or other system of magnets so constructed as to operate the valve or other mechanism regulating the action of steam upon the engine operating the rudder.

The description of this invention will be made as applied to a vessel provided with steam steering-gear; but as it is addressed to competent marine engineers and mechanics, description of details of construction of electric engines and other systems of magnets and steam steering-gear, which are old and well known to them, will be omitted, leaving to them to exercise their professional skill and judgment in connecting it with such steam steering-gear and electric engines or other systems of magnets as they may be called to produce, or such as are already in existence.

The first part of this invention relates to the opening and closing of an electric circuit by the ship's compass-needle in such a manner that the electric engine or other system of magnets will act upon the valve, regulating the steam steering-gear whenever the circuit is closed, and will cease so to act the instant the circuit is opened.

The second part of this invention relates to the arrangement of electrodes in such a manner that the current of electricity shall be regulated through them by the action of the ship's compass-needle.

The third part of this invention relates to the arrangement of the conductors of the electric current in such a manner that the ship's compass-bowl may be freely revolved upon the center of its base and always maintain the connection of parts.

The accompanying drawings illustrate an embodiment of this invention.

The letters and figures herein refer to the drawings which are submitted herewith (marked Figures 1 and 2.)

Fig. 1 is an elevation showing a ship's compass and the parts connected therewith embraced in my invention. Fig. 2 shows the compass and compass-bowl in plan and the manner of operation by the action of light.

Referring now to Fig. 2, N is the compass-needle, which is firmly attached to the compass-card B. s is an opening through the compass-card, so made and placed that rays of light can freely pass through it from a source of light above or outside the compass into the space within the bowl and below the compass-card. The double-dotted circles m and m' are tubes, of suitable material, for conducting the rays of light which pass through the opening s to the sensitive electrodes o and o', which are placed in the bottoms of the tubes m and m', respectively. These tubes are firmly fixed and supported in the bottom of the compass-bowl and pass upward within the compass-bowl nearly to the compass-card; but care should be observed to prevent the upper ends of these tubes from interfering with the free motion of the compass card and needle. The sensitive electrodes o and o' are of metalloïd selenium, or other well-known substance which becomes suitable as a conductor of electricity whenever acted upon by rays of light. The curved dotted lines a b c c' are suitable insulated wires which form parts of the electric circuits. The double-dotted rings j k l are insulated metal rings, suitable to conduct electricity, and are firmly fixed in the table C, Fig. 1.

Referring now to Fig. 1, A is the compass-bowl. The dotted double line B is the compass-card, to which is firmly attached the needle N, as shown in Fig. 2. *m* is one of the tubes which are shown in plan in Fig. 2. (Only one of these tubes can conveniently be shown in this view.) The compass-bowl is hung and balanced within and upon the forked standard Y upon the bearings R R, Fig. 2. This standard passes through the circular table C and terminates in the pintle E and turns freely in the socket M, which socket is firmly fixed to the base D. H is a wheel firmly fixed to the standard Y, and is provided with suitable spiral gearing to engage with corresponding gearing upon the shaft F. I is an index firmly fixed to the standard Y in such manner as to revolve with the standard and to indicate the direction in which the vessel is steered. The dotted lines *r r* show in cross-section a circular plate embedded in the top of the table C, which plate is marked with the points of the compass upon its upper surface. The table C is supported upon the base D by the supports *p p*. F is a shaft which is turned by power applied at the hand-wheel *w*, which shaft is firmly supported upon the base D by the supports *t t*, and turns within the bearings *u u*. L is a lantern placed in the top of the compass, and is provided with suitable mirrors, *z z*, so placed as to throw the concentrated rays of light downward through the opening *s* into the space beneath the compass-card. *j' k' l'* are pins placed in the frame *y*, which is firmly attached to the standard Y. These are of suitable material for conducting electricity, and are so placed that the pin *j'* will always maintain contact with the ring *j*, and the pin *k'* will always maintain contact with the ring *k*, and the pin *l'* will always maintain contact with the ring *l*. These pins should be held firmly in place in the frame by spiral or other suitable springs, as shown.

When it is desired that the ship shall take a certain direction, the wheel *w* is turned so that the point of the index points to the point of the compass to which it is desired the vessel shall sail. The action of the magnetic needle will then carry the compass-card round so that the opening *s* will be over one or the other of the tubes *m* or *m'*. The rays of light will then render the particular electrode upon which the light falls a conductor of electricity, and the electric circuit will be thereby at once closed. As soon as the ship heads to the point of the compass to which the index is pointed the rays of light will not fall in either of the tubes, and the circuit will thereby be opened.

The courses of the electric currents are as follows: An electric generator is connected with the wire *h*. If the rays of light fall within the tube *m*, the current will be through the wire *h*, the ring *k*, pin *k'*, wire *c*, electrode *o*, wire *a*, pin *l'*, ring *l*, wire connected therewith, to an electric engine which operates the steam-valve controlling one side of the steam

steering-gear. If the rays of light fall within the tube *m'*, the current will be through the wires connected with the electrode *o'*, Fig. 2, to the electric engine which operates the steam-valve controlling the other of the steam steering-gear.

The location of the opening *s* with relation to the compass-needle N, the tubes *m* and *m'*, and the index I, is such that when the compass-needle N points to the magnetic pole the opening *s* will be directly over a point half-way between the tubes *m* and *m'*. The tubes *m* and *m'* are placed at such distance apart that rays of light which pass through the opening *s*, when the opening is directly above a point half way between the tubes, will not fall within either of the tubes, and when the bowl is turned in one direction or the other a very little way, the one or the other of the tubes will be brought under the opening, so that the rays of light will cause the one circuit or the other to be closed. The index I is placed so that when the ship is steady upon the desired course the opening *s* will be directly above a point half-way between the tubes *m* and *m'*.

The practical operation of this invention is substantially as follows: When it is desired that the ship shall change her course or keep to a particular course, the compass-bowl A is turned, by power applied to the wheel *w*, until the index I points to that point of the compass on the ring *r r* to which it is desired the ship shall sail. By turning the bowl A in one direction or the other one or the other of the electrodes *o* or *o'* will be brought in contact with the rays of light, and one or the other of the electric circuits, according to the particular direction the bowl is turned, will thereby be closed, and the steam steering-gear will be operated thereby as desired. The instant the ship heads to the point of the compass indicated by the index I the needle and compass card will assume their normal position, and the circuit will be opened by the removal of light from the sensitive electrode. If a sudden gust of wind, or the action of the waves or currents should change the direction of the ship, the circuit will be at once automatically closed by the action of light, and the ship will come into her course promptly, and the instant the ship comes into the course at which the index I has been set the circuit will be automatically and immediately opened.

When metalloid selenium is used, as described, it is only necessary that the intensity of the electric current on the line should be varied or increased by the action of light.

Similar letters refer to the same parts in the drawings.

I claim and desire to secure by Letters Patent—

1. The combination, with a ship's compass-needle and compass-card provided with an opening, substantially as described, of sensitive electrodes which become conductors of

electricity by the action of light upon them, so arranged as to open and close an electric circuit, for the purposes specified.

2. The combination, with a ship's compass-
5 needle, of a compass-card provided with an opening in the compass-card for the admission or light to electrodes which become conductors in an electric circuit by the action of light admitted to them through such opening,
10 sensitive electrodes *o* and *o'*, tubes *m* and *m'*, pins *j'*, *k'*, and *l'*, and the rings *j*, *k*, and *l*, as and for the purposes specified, substantially as described.

3. The combination of a ship's compass which is electrically connected with steering- 15 gear, with the lamp, compass-card provided with an opening, and sensitive electrodes whereby the intensity of the electric current may be varied in the line of said electric connection, as and for the purposes specified.

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Witnesses:

A. E. PILLSBURY,
OLIVER C. STEVENS.