

No. 697,826.

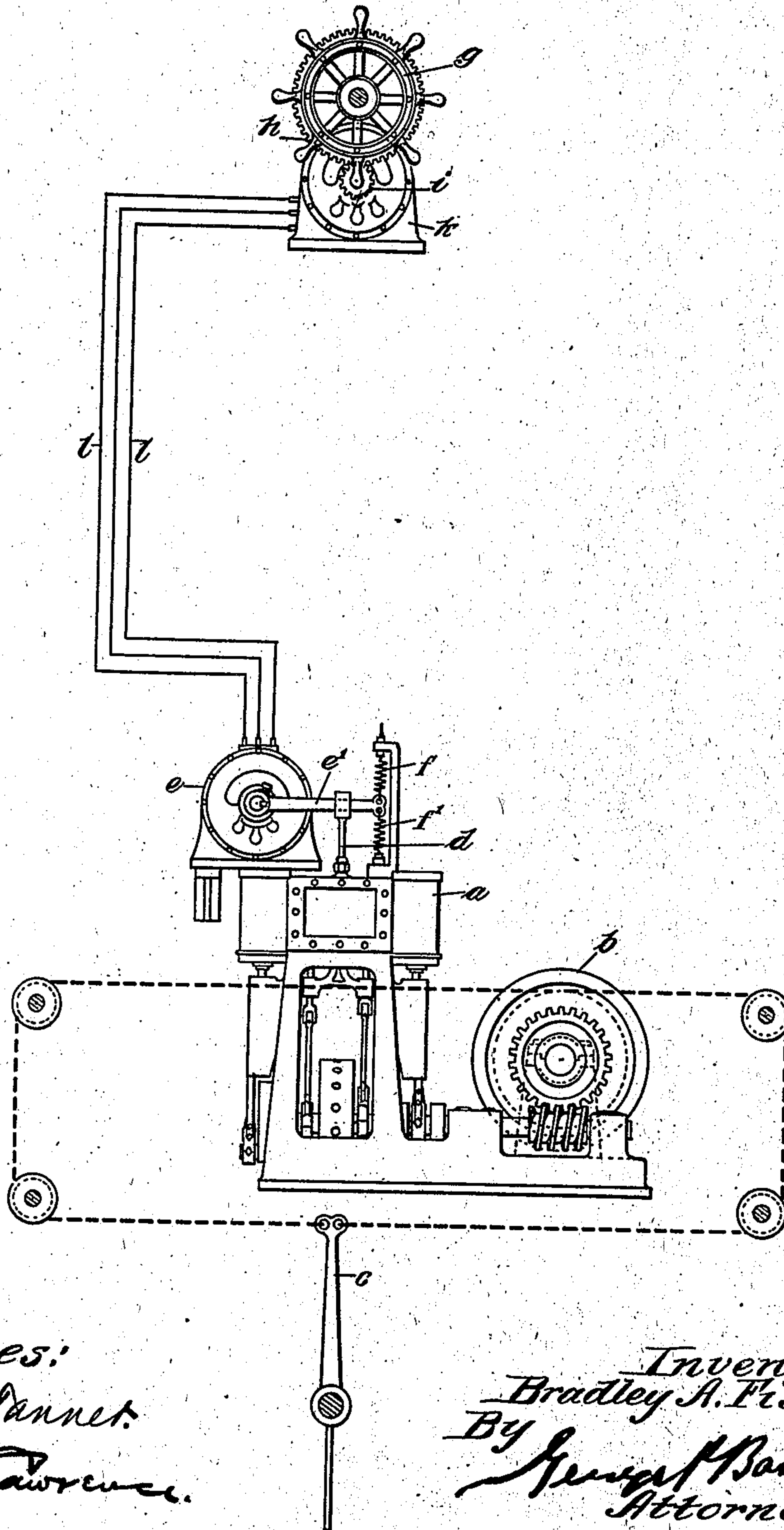
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B. A. FISKE.

ELECTRICAL STEERING APPARATUS FOR SHIPS.

(Application filed Oct. 17, 1900.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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ELECTRICAL STEERING APPARATUS FOR SHIPS.

SPECIFICATION forming part of Letters Patent No. 697,826, dated April 15, 1902.

Application filed October 17, 1900. Serial No. 33,328. (No model.)

To all whom it may concern:

Be it known that I, BRADLEY A. FISKE, a lieutenant-commander in the United States Navy, have invented a certain new and useful Improvement in Electrical Steering Apparatus for Ships, (Case No. 5,) of which the following is a full, clear, concise, and exact description.

My invention relates to steering apparatus, and has for its object to provide improved means whereby the helm of a vessel may be controlled electrically from a distant part of the ship, and in particular to provide steering apparatus which will be extremely simple, inexpensive, and certain in its operation.

While electrically-controlled steering apparatus for vessels is highly desirable, because of the quickness with which the helm can be made to respond, yet it has been thought not so reliable as the steam steering apparatus at present in use. Most of the large vessels are at present steered by means of steam-engines having controlling-valves which are operated by means of iron ropes and rods connected with the steering-wheel on deck.

Many attempts have been made to control the valve of a steam steering-engine by electricity; but apparatus of this character as heretofore constructed has been quite complicated, owing to the difficulty of making the steering-engine follow the movements of the wheel on deck. A sailor who moves the steering-wheel must move it in exactly the same way as he is accustomed to do in ships having no steam steering-engine, and when a steam steering-engine is provided it is essential that the engine must follow exactly the motion of the wheel—that is, the helm must be moved in one direction or the other as the wheel is moved in a corresponding direction and must stop when the wheel is stopped. The speed of the engine also must be regulated in the same way—that is, when the wheel is moved fast or slowly the speed of the steering-engine must be correspondingly fast or slow.

In accordance with my invention the steam steering-engine is provided with a reversing-valve, which is adapted to be moved in either direction to cause the steam-engine to run in

either direction, according to the movement of the valve, said valve being normally maintained in a central position, in which the engine remains at rest. An electric motor device is attached to this valve and is adapted to move the same when it receives current, the direction of motion and the extent to which the valve is open being dependent upon the character of the current received by said motor device. A generator of electricity is provided at the point from which the vessel is to be steered, said generator having an armature or rotor adapted to be turned by hand to supply current of suitable character to operate said electric motor device in either direction, and the generator and motor are electrically connected. In practice a small manually-operated steering-wheel of the ordinary type may be provided, this wheel being geared to a polyphase generator, and the motor device for controlling the engine-valve may be an induction-motor. When such a steering apparatus is used, the steering-engine will not only start and stop when the motion of the steering-wheel starts and stops, but the speed of the engine will be fast or slow as the wheel is moved fast or slowly, because the current generated and the consequent movement of the valve is great or little, corresponding to the speed with which the steering-wheel is turned.

I will describe my invention with reference to the accompanying drawing, which is a diagram illustrating the preferred embodiment thereof.

The steam-engine *a* operates a steering-drum *b* by means of a worm-gear, and the steering-drum is connected in the usual manner with the helm *c* of the ship, the helm being moved to port or starboard, according to the direction in which the engine runs. A reversing-valve *d* is provided for the engine, said valve being adapted to be moved up or down to control the admission of steam to the cylinders of the engine, a downward movement of the valve causing the engine to run in one direction and an upward movement causing the engine to run in an opposite direction. Reversing-valves of this character are well known in the art and need no detailed description. They are very largely

used in controlling hoisting or elevator engines.

An induction-motor *e*, adapted to be operated by three-phase alternating currents, is mounted near the reversing-valve *d*, and the shaft of the motor is provided with an arm *e'*, which engages said valve to move the same up or down, according to the direction in which the armature of the induction-motor rotates. Two springs *ff'* are attached to the arm *e'* and tend to maintain the same in a central position, the valve in this position shutting off steam from the cylinders of the engine, so that the engine is maintained at rest.

On the deck of the ship at any point from which it is desired that the ship be steered a hand steering-wheel *g* is mounted, this steering-wheel carrying a gear-wheel *h*, which meshes with a pinion *i*, mounted upon the shaft of a three-phase generator *k*. The generator *k* is connected by conductors *l* with the induction-motor *e*. When the shaft of the generator is turned in a given direction, electric currents are generated, which being transmitted to the induction-motor cause the armature of said motor to turn, the direction of motion and the torque being dependent upon the direction and speed of rotation of the armature of the generator. The particular construction of the generator and motor forms no part of this invention, and the operation of such apparatus being well understood by those skilled in the art no detailed description will be given.

When the steering-wheel is at rest, no current will flow in the conductors *ll*, so that the inductor-motor *e* will be at rest, and the reversing-valve *d* will be maintained in a central position by means of springs *ff'*, the engine being correspondingly at rest. When the steering-wheel is turned in a given direction, the armature of the generator *k* geared thereto is rotated and electric currents transmitted to the induction-motor *e* over conductors *ll*. The torque upon the armature of the induction-motor will be dependent upon the speed at which the armature of the generator is turned, so that the engine-valve will be opened to a greater or less extent, dependent upon such speed of the steering-wheel. As soon as the steering-wheel is brought to rest the supply of current to the motor *e* is stopped, and the springs *ff'* instantly return the reversing-valve of the steam-engine to its central position, so that the engine is brought to a standstill. A movement of the steering-wheel in an opposite direction causes a corresponding opposite running of the engine.

By employing my invention a comparatively small steering-wheel can be used, and a great saving is made in the cost of installation, since the electric wires may be run in one molding from the generator to the motor instead of requiring chains or wire ropes, as heretofore. Where the steering device is

controlled by wire ropes running to a drum turned by the steering-wheel, the expense is great, because there are many changes of direction, and consequently many pulleys to be provided. These pulleys must be mounted to run very exactly and may be located only in certain places.

It will be apparent that numerous modifications may be made in my invention which will readily suggest themselves to those skilled in the art, and I do not, therefore, desire to be understood as limiting myself to the precise apparatus shown; but,

Having thus described my invention, I claim as new, and desire to secure by Letters Patent, the following:

1. In an electrically-controlled steering apparatus, the combination with a helm, of an electric motor device and mechanism associated therewith for moving the helm, a hand steering-wheel, and a generator of electricity having an armature or rotor adapted to be turned by said steering-wheel, and connected with the motor device, whereby the helm may be controlled by moving said steering-wheel, substantially as set forth.

2. In an electrically-controlled steering apparatus, the combination with a helm and an engine for operating the same, of an electric motor device controlling the engine, and a generator of electricity having an armature or rotor adapted to be turned by hand, said generator being electrically connected with said motor device, whereby the helm may be moved to one side or the other by turning the armature or rotor of the generator in a corresponding direction, substantially as described.

3. In an electrically-controlled steering apparatus, the combination with a helm and a steering-engine for moving the same, of a reversing-valve for the engine, a polyphase-current induction-motor for moving the reversing-valve and so controlling the engine, a hand steering-wheel, and a generator of polyphase currents geared to said steering-wheel and connected with the said induction-motor, substantially as set forth.

4. In an electrically-controlled steering apparatus, the combination with a helm and an engine for operating the same, said engine having a reversing-valve, whereby it may be controlled, said valve being adapted to be moved in either direction to cause the engine to run correspondingly, the valve being normally maintained in a central position to keep the engine at rest, of an induction-motor adapted, under the influence of polyphase currents transmitted thereto, to open the valve in one direction or the other, and a generator of polyphase currents connected with said motor, said generator being adapted to be manually operated, whereby the helm may be moved to one side or the other by turning the generator, substantially as described.

5. In an electrically-controlled steering apparatus, the combination with a helm and a

steering-engine adapted to operate the same, said engine having a reversing-valve whereby it may be controlled, said valve being adapted to be moved in either direction to cause the engine to run in one direction or the other, according to the direction of such movement, the valve being normally maintained in a central position to keep the engine at rest, of an electric motor device adapted to move said valve in either direction, according to the character of current supplied to it, and a generator of electricity connected with said motor device and adapted to be op-

erated manually to supply current of suitable character to operate said motor device in either direction, whereby the engine may be caused to move the helm to one side or the other by manually operating the generator in a corresponding manner, substantially as set forth. 15 20

In witness whereof I hereunto subscribe my name this 26th day of September, A. D. 1900.

BRADLEY A. FISKE.

Witnesses:

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