

No. 669,230.

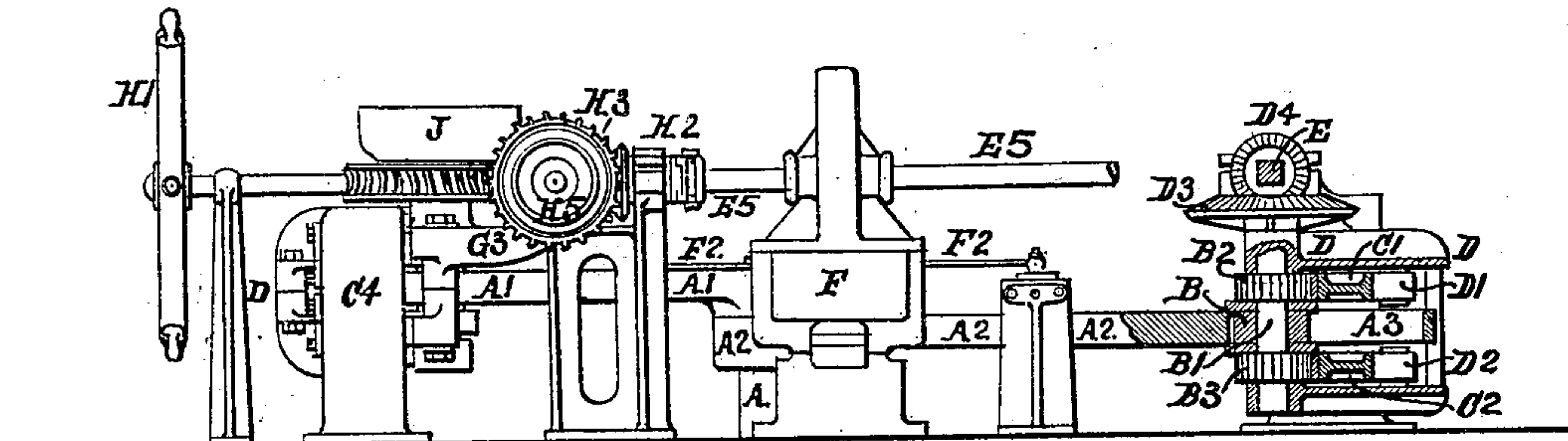
Patented Mar. 5, 1901.

A. B. BROWN.  
STEERING MACHINERY.

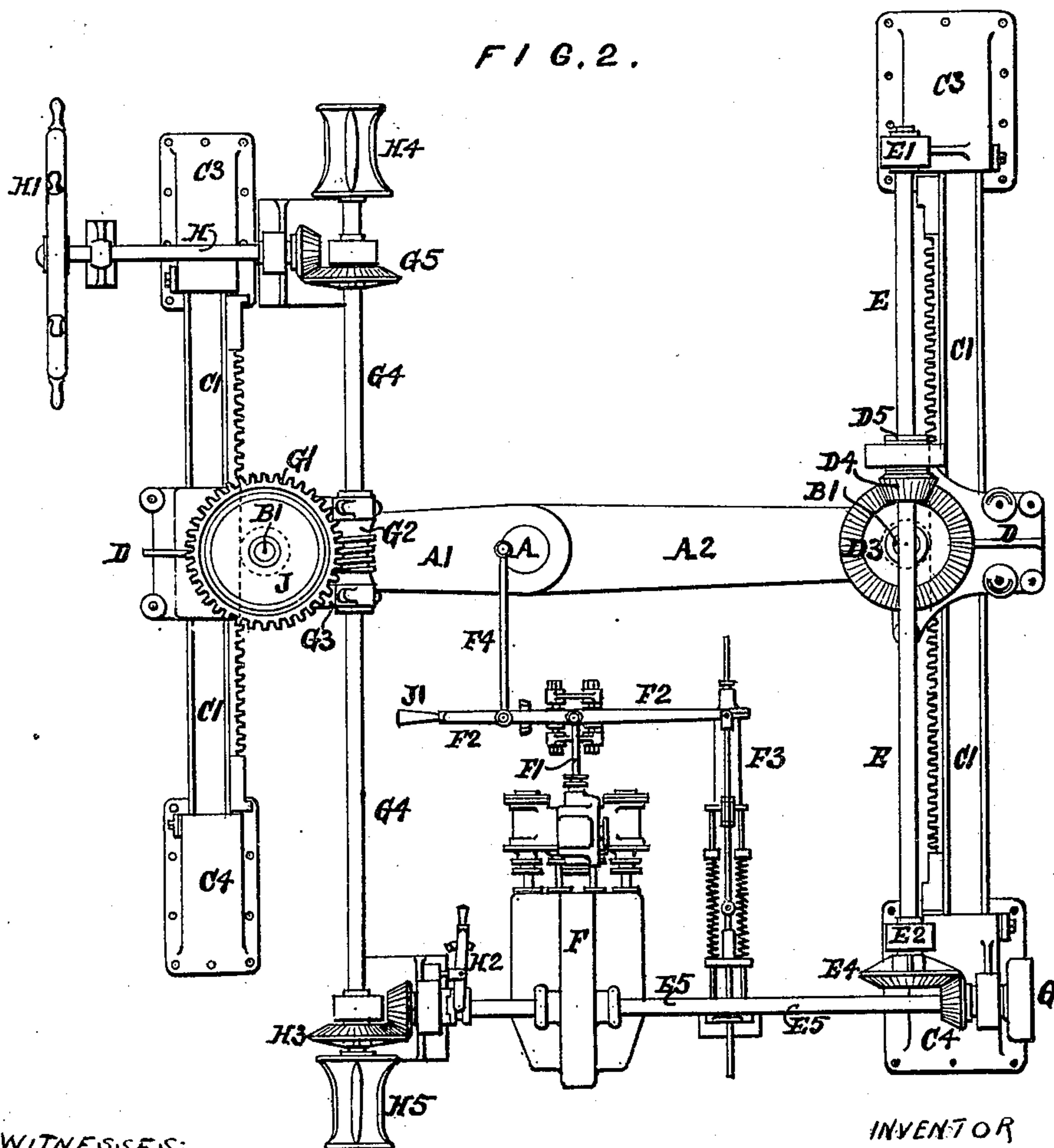
(Application filed Dec. 11, 1900.)

(No Model.)

F I G. 1.



F I G. 2.



WITNESSES:

*P. W. Wright,*  
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INVENTOR

ANDREW BETTS BROWN

BY *Howard and Howard*  
HIS ATTORNEYS.



# UNITED STATES PATENT OFFICE.

ANDREW BETTS BROWN, OF EDINBURGH, SCOTLAND.

## STEERING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 669,230, dated March 5, 1901.

Application filed December 11, 1900. Serial No. 39,503. (No model.)

*To all whom it may concern:*

Be it known that I, ANDREW BETTS BROWN, a subject of the Queen of Great Britain and Ireland, and a resident of Edinburgh, in the county of Mid-Lothian, Scotland, (whose postal address is Rosebank Iron Works, Edinburgh, Scotland,) have invented certain new and useful Improvements in Steering Machinery, (for which I have applied for a British patent, No. 12,211, dated July 6, 1900,) of which the following is a specification.

This invention comprises improvements in steering machinery, the improvements being such that not only is a considerably-increased leverage obtained for moving the rudder when it has to be put "hard over" to either side, but also such that the machinery may be used for warping the ship either along with or independently of steering operations.

In machinery made with my improvements the rudder-head has fixed to it tiller-arms extending fore and aft, steam-gearing being applied to one tiller-arm and hand-gearing to the other. Each tiller-arm has at its end a slot in which is fitted to slide a block upon a short vertical shaft having on it two pinions, one above and the other below the tiller. The two pinions gear with toothed racks fixed to brackets fixed to the deck. At the steam-gear end the pinion-shaft has on it a bevel-wheel with which gears a bevel-pinion on a transverse horizontal shaft squared or fitted with groove and feather, so that the pinion can slide along it while turning with it. The transverse shaft is carried in end bearings and is driven by means of bevel-gearing from a steering-engine fixed to the deck and provided with a controlling-valve and telemotor or other actuating mechanism. The pinion-shaft at the hand-gear end has on it, with a combined frictional clutch, a worm-wheel gearing, with a worm on a transverse shaft which is connected by bevel-gearing with the shaft of the usual large hand steering wheel or wheels. Friction-clutches of any suitable known description having adjustable spring devices for slipping under abnormal strain are provided for engaging and disengaging the steam-gearing and the hand-gearing.

On the ends of the transverse shaft carrying the worm there are fixed warping-drums, which when the steam steering-gear has been

disengaged may be brought into action for warping the ship.

In some cases the steering-gear or part of it may be duplicated on the opposite side of the tiller-arms, and when this is the case the auxiliary steam-engine is always available for either steering the ship or warping.

Figure 1 of the accompanying drawings is a sectional elevation, and Fig. 2 a plan showing steering machinery as made according to my present invention.

As shown in the drawings, the rudder-head A has fixed to it tiller-arms A' A<sup>2</sup>, extending fore and aft, these arms being either in one or, by preference, as shown in the drawings, separate from each other and independently keyed onto the rudder-head, so that in the event of damage to either it can be removed and the other left for steering. Steam-gearing is applied to the arm A<sup>2</sup> and hand-gearing to the arm A', as hereinafter described. Each tiller-arm has at its end a slot A<sup>3</sup>. (Shown only in Fig. 1 at the end of the arm A<sup>2</sup>.) In this slot there is fitted to slide a block B upon a short vertical shaft B', having on it two pinions B<sup>2</sup> B<sup>3</sup>, one above and the other below the tiller A' A<sup>2</sup>. The two pinions B<sup>2</sup> B<sup>3</sup> gear with toothed racks C' C<sup>2</sup>, fixed to brackets C<sup>3</sup> C<sup>4</sup>, fixed to the deck. These racks C' C<sup>2</sup> are by preference each made in three sections, so that on the center portion becoming worn through time the sections may be transposed. Each vertical pinion-shaft B' is carried at its upper and lower ends by a carriage D, made to travel athwartships, as hereinafter described, along the racks. The carriage is made with a part above and a part below the racks C' C<sup>2</sup>, extending to the back of the racks, where it is fitted with antifriction-rollers D' D<sup>2</sup>, bearing on the back of the racks, and thus keeping the pinions B<sup>2</sup> B<sup>3</sup> in gear with the racks. At the same time, the sides of the carriage D being open, there is no interference with the movement of the slotted end of the tiller-arms A' A<sup>2</sup> as they go hard over to either side.

At the steam-gear end the pinion-shaft B' has on its upper end a bevel-wheel D<sup>3</sup>, with which gears a bevel-pinion D<sup>4</sup> on a tubular boss or a sleeve D<sup>5</sup>, turning in bearings in an upwardly-extending part of the carriage D. Through this pinion D<sup>4</sup> and sleeve D<sup>5</sup> there



passes a square transverse horizontal shaft E. The transverse shaft E is carried in end bearings E' E<sup>2</sup> and is driven through bevel-gearing E<sup>4</sup> and a second horizontal shaft E<sup>5</sup> from a steering-engine F, (which may be of any suitable known construction,) fixed to the deck and provided with a controlling-valve. The spindle F' of this valve is connected to a floating lever F<sup>2</sup>, one end of which is connected to a well-known form of telemotor or actuating mechanism F<sup>3</sup>, the other end of the lever F<sup>2</sup> being connected through a rod F<sup>4</sup> to the rudder-head A, so that when the lever is moved by the telemotor F<sup>3</sup> it turns on its connection with the rod F<sup>4</sup> as a fulcrum and shifts the controlling-valve as required. When the rudder A moves by the action of the motor F, the previously-actuated end of the lever F<sup>2</sup> acts as its fulcrum, and it is moved through the rod F<sup>4</sup>, so as to return the controlling-valve to its middle position.

When in action, the rotation of the pinion D<sup>4</sup>, as described, turns the bevel-wheel D<sup>3</sup> and causes the pinions B<sup>2</sup> B<sup>3</sup> and carriage D to travel athwartships on the racks C' C<sup>2</sup> to either side, and thus to carry the end of the tiller-arm A<sup>2</sup> over to that side, the leverage obtained increasing the farther over the arm is carried.

A friction-clutch G, with any suitable known device for slipping under abnormal strain, is applied to the end of the shaft E<sup>5</sup>, so that the steam steering-gear may be disengaged when the engine F is to be used for warping, for example, as hereinafter described.

The pinion-shaft B' at the hand-tiller-arm end A' has on it a worm-wheel G', which gears with a worm G<sup>2</sup>, carried in bearings on the end of the arms G<sup>3</sup>, extending out from the carriage D at that end. Through this worm G<sup>2</sup> there passes a square transverse shaft G<sup>4</sup>, which is connected by bevel-gearing G<sup>5</sup> with the shaft H of the usual large hand steering-wheel H' or wheels. On turning this hand-wheel H' the action on the hand tiller-arm A' is similar to that produced by the steam steering-gear on the tiller-arm A<sup>2</sup>. For hand-steering a worm G<sup>2</sup> and worm-wheel G' is preferred, as if bevel-gearing, such as D<sup>3</sup> D<sup>4</sup>, were employed there would be danger to the men steering. The worm-wheel G' is connected to the pinion-shaft B' through a clutch J, which is similar to the clutch G, used in the steam steering-gear. When warping, as hereinafter described, this clutch may also be disengaged, so that the worm-wheel will

then run idle. A clutch may be provided for disengaging the bevel-wheels G<sup>5</sup>.

The shaft E<sup>5</sup> of the engine F is connected through a hand-clutch H<sup>2</sup> and bevel-gearing H<sup>3</sup> with the transverse shaft G<sup>4</sup>. On the ends of this shaft G<sup>4</sup> there are warping heads or drums H<sup>4</sup> H<sup>5</sup>. When the clutch H<sup>2</sup> is engaged and the connecting-rod F<sup>4</sup> disengaged from the lever F<sup>2</sup>, the engine F can be operated through a handle J' on the lever, and thus made to bring the warping-drums into action, so that they may be employed for warping the ship, or if the clutch G of the steam steering-gear is disconnected and the clutches H<sup>2</sup> J engaged the engine F can also be used to actuate the hand-gear tiller-arm A<sup>2</sup>.

Where auxiliary steam steering-gear is also required, the engine with the gear, as shown on the drawings, is duplicated on the other side of the tiller-arms A' A<sup>2</sup>, the auxiliary engine in that case being serviceable for either steering the ship or warping at all times.

What I claim is—

1. In steering machinery, tiller-arms fixed to the rudder-head and extending fore and aft, each arm having at its end a slot in which slides a vertical shaft having on it two pinions gearing with pairs of toothed racks, fixed to the deck the vertical pinion-shafts being driven through gearing from transverse shafts connected through gearing and clutches with a motor fixed to the deck and with hand steering-wheels, one of the transverse shafts having on its ends warping-drums, the parts being combined, arranged, and operating substantially as and for the purposes hereinbefore described.

2. In steering machinery, tiller-arms fixed to the rudder-head and extending fore and aft, each arm having at its end a slot in which slides a vertical shaft having on it two pinions gearing with pairs of toothed racks fixed to the deck the vertical pinion-shafts being driven through gearing from transverse shafts connected through gearing and clutches with a motor fixed to the deck and with hand steering-wheels, the parts being combined, arranged, and operating substantially as and for the purposes hereinbefore described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ANDREW BETTS BROWN. [L. S.]

Witnesses:

N. URQUHART,  
FREDERICK PIATT.