No. 761,253. PATENTED MAY 31, 1904.

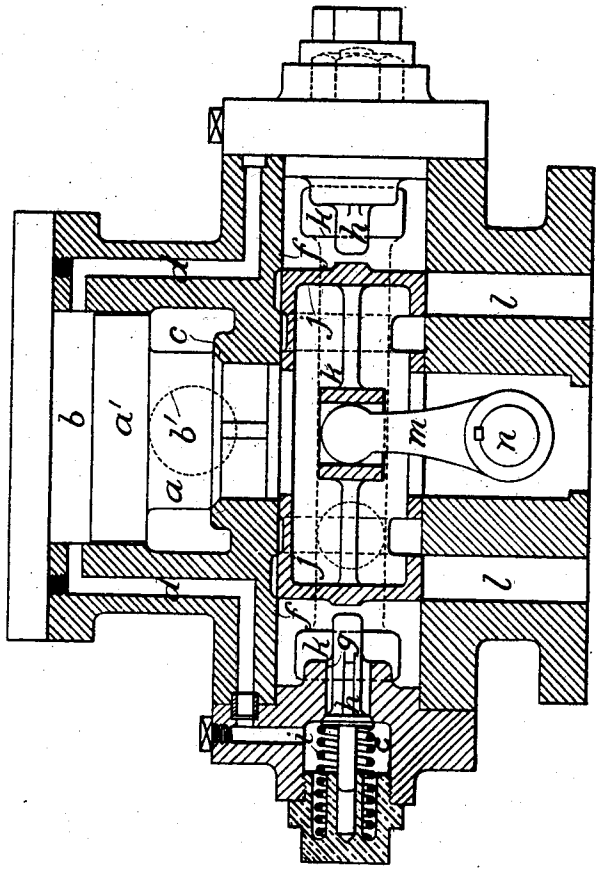
R. RICHARDSON.

CONTROLLING VALVE FOR STEERING ENGINES.

APPLICATION FILED JAN. 15, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

FIG. 1.



Witnesses.

L. Moni.

L. Waldman

Inventor.

Robert Richardson

by F. Singer

Att'y.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 761,253. PATENTED MAY 31, 1904.

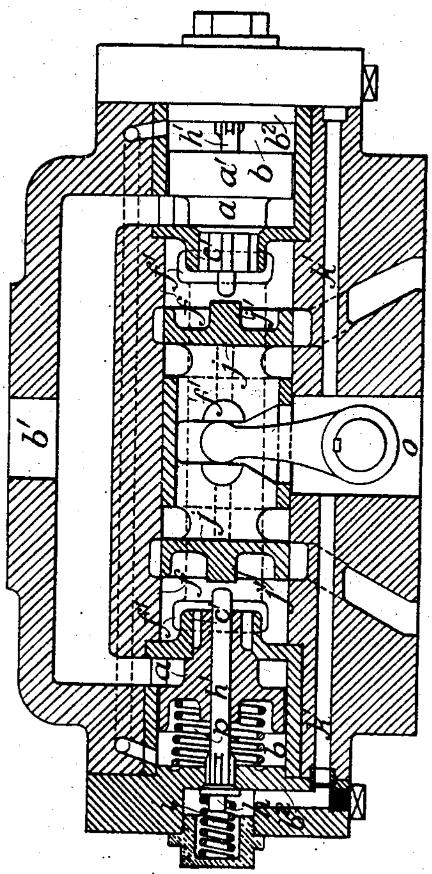
R. RICHARDSON.

CONTROLLING VALVE FOR STEERING ENGINES.

APPLICATION FILED JAN. 15, 1903.

NO MODEL. 4 SHEETS—SHEET 2.

FIG. 2.



Witnesses.

H. Mori.

L. Waldman

Inventor.

Robert Richardson

by B. Singer,

Att'y.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 761,253. PATENTED MAY 31, 1904.

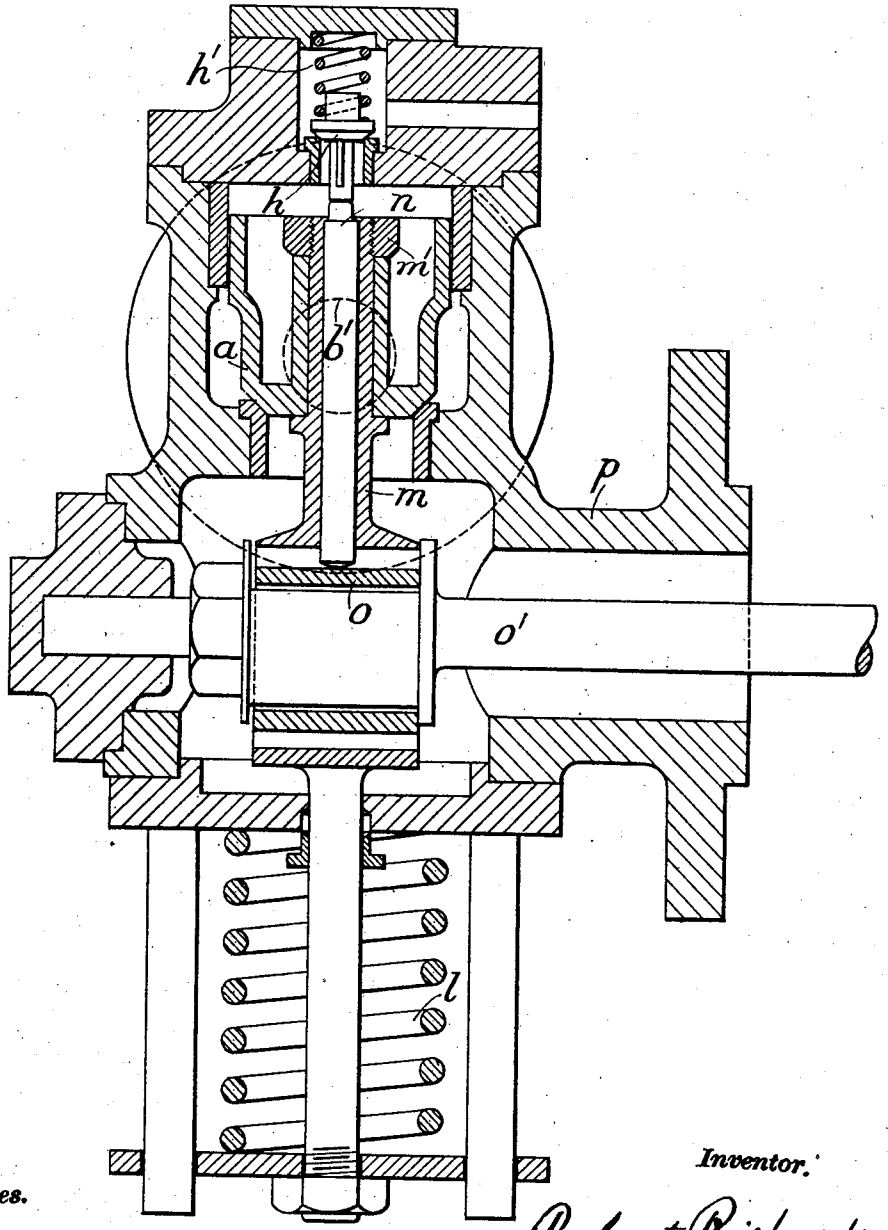
R. RICHARDSON.

CONTROLLING VALVE FOR STEERING ENGINES.

APPLICATION FILED JAN. 15, 1903.

NO MODEL. 4 SHEETS—SHEET 3.

FIG. 3.



Witnesses.

H. C. Morris.

S. Waldman

Inventor.

Robert Richardson

by B. Singer.

Att'y.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 761,253. PATENTED MAY 31, 1904.

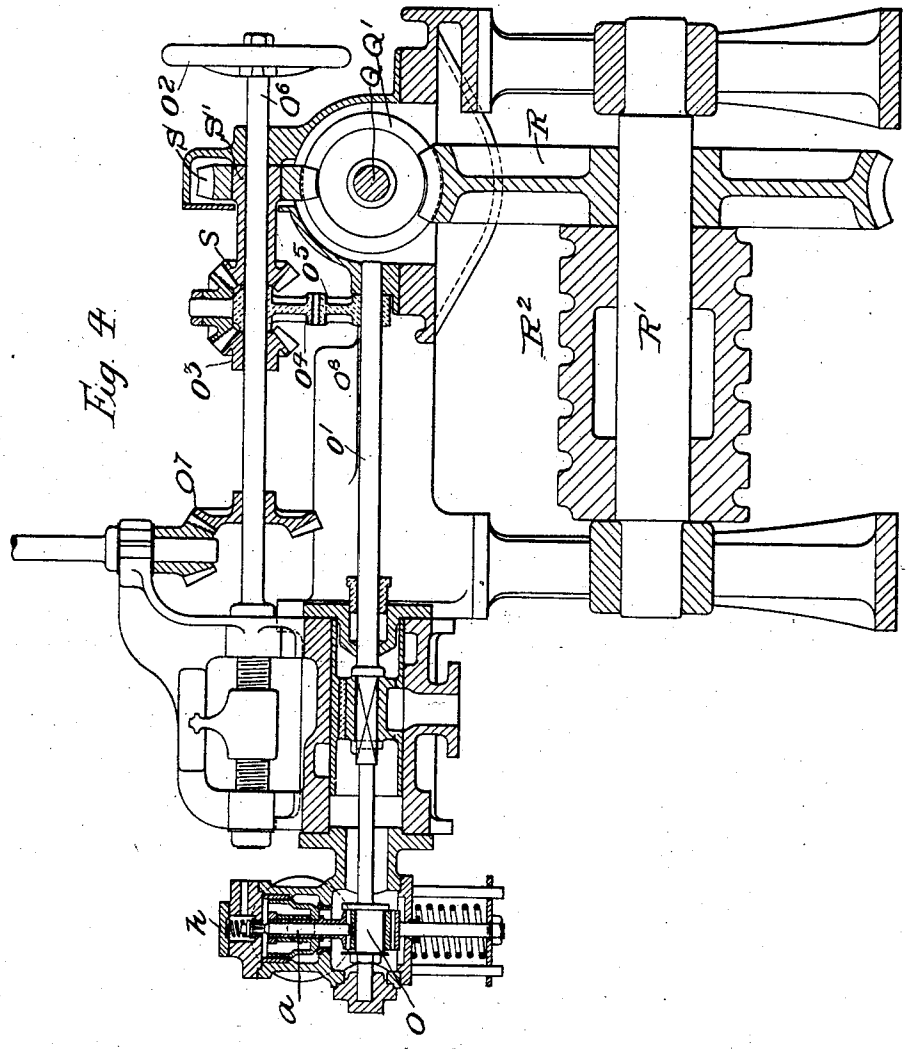
R. RICHARDSON.

CONTROLLING VALVE FOR STEERING ENGINES.

APPLICATION FILED JAN. 15, 1903.

NO MODEL. 4 SHEETS—SHEET 4.

Fig. 4.



Witnesses.

C. Heymann.

L. Waldman

Inventor.

Robert Richardson

by P. Singer

Att'y.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 761,253. Patented May 31, 1904.

UNITED STATES PATENT OFFICE.

ROBERT RICHARDSON, OF GLASGOW, SCOTLAND, ASSIGNOR TO JOHN HASTIE AND COMPANY, LIMITED, OF GREENOCK, SCOTLAND.

CONTROLLING-VALVE FOR STEERING-ENGINES.

SPECIFICATION forming part of Letters Patent No. 761,253, dated May 31, 1904.

Application filed January 15, 1903. Serial No. 139,143. (No model.)

To all whom it may concern:

Be it known that I, ROBERT RICHARDSON, a subject of the King of the United Kingdom of Great Britain and Ireland, residing at 16 Jamieson street, Govanhill, Glasgow, Scotland, have invented certain new and useful Controlling-Valves for Steering-Engines, (for which applications for patents have been made in Great Britain, No. 16,525, dated July 24, 1902, and in Germany, dated December 20, 1902,) of which the following is a specification.

This invention relates to steam steering-engines in which the direction and extent of motion are regulated by a controlling-valve which is automatically brought back after each action into its middle or neutral position. The controlling-valve in such engines is usually for ease in handling a piston-valve which besides being difficult to keep steam-tight cannot effectually close the passages to the distributing-valves of the steering-engines owing to the engines ceasing to operate, and therefore ceasing to actuate the controlling-valve when these passages are so nearly closed as to supply insufficient steam, and consequently large leakage of steam occurs. For the purpose of overcoming this difficulty a stop-valve operated by the controlling-valve has been introduced to cut off the steam-supply when the controlling-valve is in the neutral position; but it is also apt to remain partially open.

The object of this invention is to insure that the valve provided for cutting off the steam-supply to the controlling-valve of steam steering-engines shall be open and kept open when the controlling-valve is moved in either direction, but shall be effectually closed to prevent leakage of steam when the neutral position of the controlling-valve is reached. For that purpose the cut-off valve is so constructed and arranged that it is opened by the steam-pressure on exhausting the steam which acts on its opposite face to normally close it, such exhaust being effected by the action of the controlling-valve on an exhaust valve or valves.

The invention is illustrated by way of example in the accompanying drawings, in which—

Figure 1 is a longitudinal section of the controlling-valve casing of a steering-engine, showing a modification in which a single vertically-moving cut-off valve is employed and operated by exhaust-valves situated at each end of the controlling-valve; and Fig. 2 is a like view showing a modification in which a cut-off valve moving horizontally is placed at either end of the controlling-valve casing. Fig. 3 shows in vertical section a modified construction of the cut-off valve and relative parts. Fig. 4 is a longitudinal vertical section of a steam steering-engine, showing the application thereto of the construction illustrated in Fig. 3.

In the example represented at Fig. 1 the cutting-off valve *a* is formed on or attached to a piston *a'*, fitted in a small cylindrical casing *b*, the inner end of which forms the seat *c* for the valve *a*. The outer end of the cylinder is connected by passages *d* to a small valve-casing *e* at each end of the controlling-valve casing *f*, these end casings *e* communicating each through a valve-orifice *g* with the corresponding end of the controlling-valve casing. In these valve-orifices are seated small valves *h*, which are normally closed by springs *i*, but one or other of which is pressed open by the controlling-valve *j* when it is moved slightly from the central position. The opening of either of these small valves *h* allows the steam which has leaked past the piston *a'* on the cutting-off valve *a* to escape by way of the passage *d* from the outer end of the cylinder *b* into and through the exhaust-chamber *k* of the controlling-valve, (which in this instance is at either end of the valve *j*,) or to otherwise exhaust, whereupon the pressure of the steam which is admitted at *b'*, acting on the inner side of the piston *a'*, forces it outward and raises the cutting-off valve *a* from its seat, whereupon steam is admitted to and through the controlling-valve *j* to the ports *l*, leading to the steering-engine. Immediately on the

controlling-valve j returning to its mid-position the small valve h in the end of the casing e is closed by the spring i or by the pressure on its back, and exhaust of steam being prevented the steam-pressure, acting on the outer side of the piston a', effectually closes down the valve a, which cuts off steam to the controlling-valve, this action being assisted by a spring or by gravity when, as is usual, the valve closes downward.

The movements of the controlling-valve j to right and left is effected in the usual way, as by the lever-arm m on the shaft n.

In the modification represented at Fig. 2 a cut-off valve a is fitted at each end of the controlling-valve casing f in a valve-orifice e', through which the boiler-steam from the inlet b' is admitted to the ends of the controlling-valve pistons j instead of, as is usual, to the space between them, which latter in the present instance is connected to the exhaust-port o. Each cut-off valve a is formed with a piston a', fitting in a short cylinder b at the end of the valve-casing f, the cylinder b being formed with a dividing-web b^2, in which is fitted a small auxiliary valve h, closed by a spring i, and whose stem h' passes through the cut-off valve a and projects into the controlling-valve casing. On the movement of the controlling-valve j in either direction from its neutral position a tap j' on its end strikes the stem h' of the auxiliary valve h at that end and opening it allows the steam at the back of the cut-off valve a to escape to exhaust by the passage k', whereupon the valve a opens and steam is admitted to the controlling-valve casing f, whose ends communicate by means of a passage f'. On the controlling-valve returning to the neutral position the auxiliary valve h first closes and the steam-pressure passing to the back of the cut-off valve a closes it also, a spring p being used to facilitate the closing operation.

In the modification represented at Figs. 3 and 4 the cut-off valve a is normally held on its seat apart from the steam-pressure acting on it by means of a spring l and link or rod m, extending through an orifice in the valve and engaged by a nut m', and through this rod is carried a tappet or pin n, which is acted on by a cam o on the controlling-valve stem o' to raise the auxiliary valve h from its seat against the power of a spring h' and permit of the exhaust of steam from the back of the valve a when the controlling-valve spindle o' is turned. The exhaust of the steam at the back of the valve a permits of the steam admitted at b' acting on the inner side of the valve a and lifting it from its seat to admit steam to the controlling-valve through the casing p, and on the controlling-valve spindle o' returning to its neutral or mid-position the tappet n drops and the auxiliary valve h is closed by the spring h', whereupon the steam leaking past the valve a and acting on the greater area of its upper side closes it, this action being aided by the spring l.

In Fig. 4 a steering-engine is shown as fitted with the controlling-valve described with reference to Fig. 3. The engine itself is of an ordinary type having a crank-shaft Q, on which is a worm Q', meshing with a worm-wheel R on a shaft R', which carries the usual chain-barrel R^2, from which the ship's rudder is actuated. The worm Q' also meshes with a worm-wheel S, fast on a sleeve S', on which is formed the bevel s, meshing with the usual differential gear O^3 O^4 and through which sleeve the handing-shaft O^6 passes.

In the operation of the engine the handing-wheel O^2 is turned by the steersman to turn the shaft O^6, or said shaft may be turned by means of bevel-gear O^7 from the ship's bridge. The bevel O^4, fast on the shaft O^6, imparts a turning movement to the bevel O^3, which, owing to its engagement with the then stationary bevel s, is swung around the shaft O^6 and carries with it the segment O^5, with which it is integral, and thereby the segment O^8 and with it the controlling-valve spindle O' is turned to open the steam-ports to the steering-engine. On the operation of the engine the worm Q', acting on the worm-wheel S and bevel s, brings back the differential bevels and segments thereby operated and returns the controlling-valve spindle O' to the initial position of rest. On the first movement of the controlling-valve spindle O' the cam O on its end acting on the exhaust-valve h allows to escape to exhaust the steam acting to close the stop-valve a, and said valve would then rise to admit boiler-steam to the controlling-valve casing. On the return movement of the control-valve spindle the cam O allows the exhaust-valve h to close, and then the steam-pressure on both sides of the valve a being equalized the valve a closes on its seat by gravitation, the steam-pressure on its upper side thereafter maintaining it tightly closed. The piston a', to which the stop-valve a is attached, is a loose fit in its casing, that boiler-steam leaks past the piston and no passages are made in the latter.

Having now described the invention, what I claim, and desire to secure by Letters Patent, is—

1. In a controlling-valve for steering-engines, the combination of a cut-off valve adapted to cut off the steam from the boiler to the casing of the controlling-valve, means whereby said cut-off valve is opened when the controlling-valve is moved from its neutral position by the exhaust of steam which normally holds said cut-off valve in closed position, substantially as described.

2. In a controlling-valve for steering-en-

gines the combination with a cutting-off or stop valve provided to close off the boiler-steam of a piston thereon working in a cylinder having connections to an exhaust valve or valves operated as described by the movement of the controlling-valve from the neutral position.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ROBERT RICHARDSON.

Witnesses:
WALLACE CRANSTON FAIRWEATHER,
JNO. ARMSTRONG, Jr.