

APPLICATION FILED SEPT. 13, 1907.

Patented Apr. 27, 1909
2 SHEETS—SHEET 1.

2 SHEETS—SHEET 1.



W. H. Berrigan.
J. W. Logan.

INVENTORS

J. GORDON, T. JACKSON & C. ANDREWS.
GOVERNOR FOR MARINE ENGINES.
APPLICATION FILED SEPT. 13, 1907.

919,713.

Patented Apr. 27, 1909.

2 SHEETS—SHEET 2.

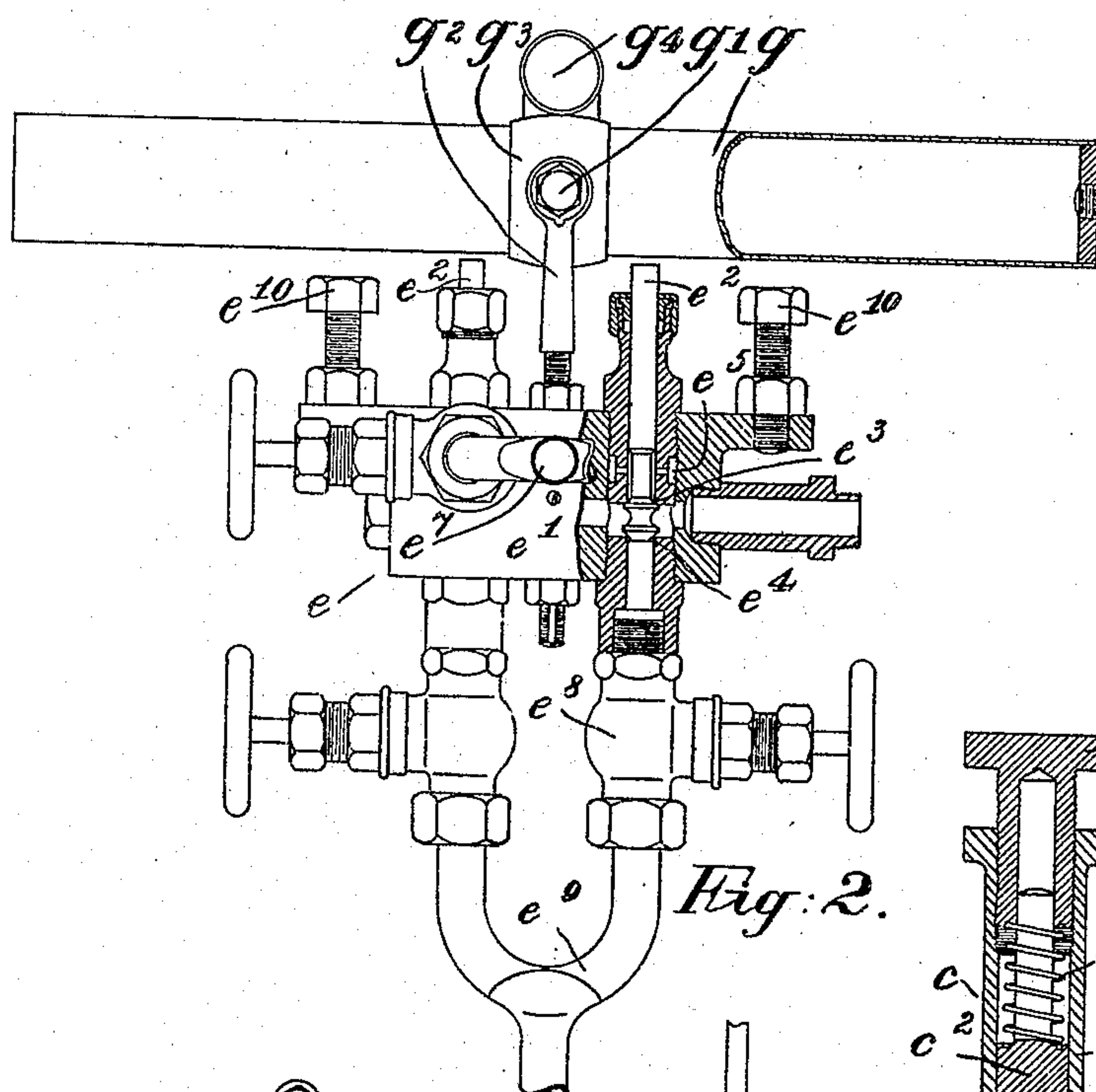


Fig. 2.

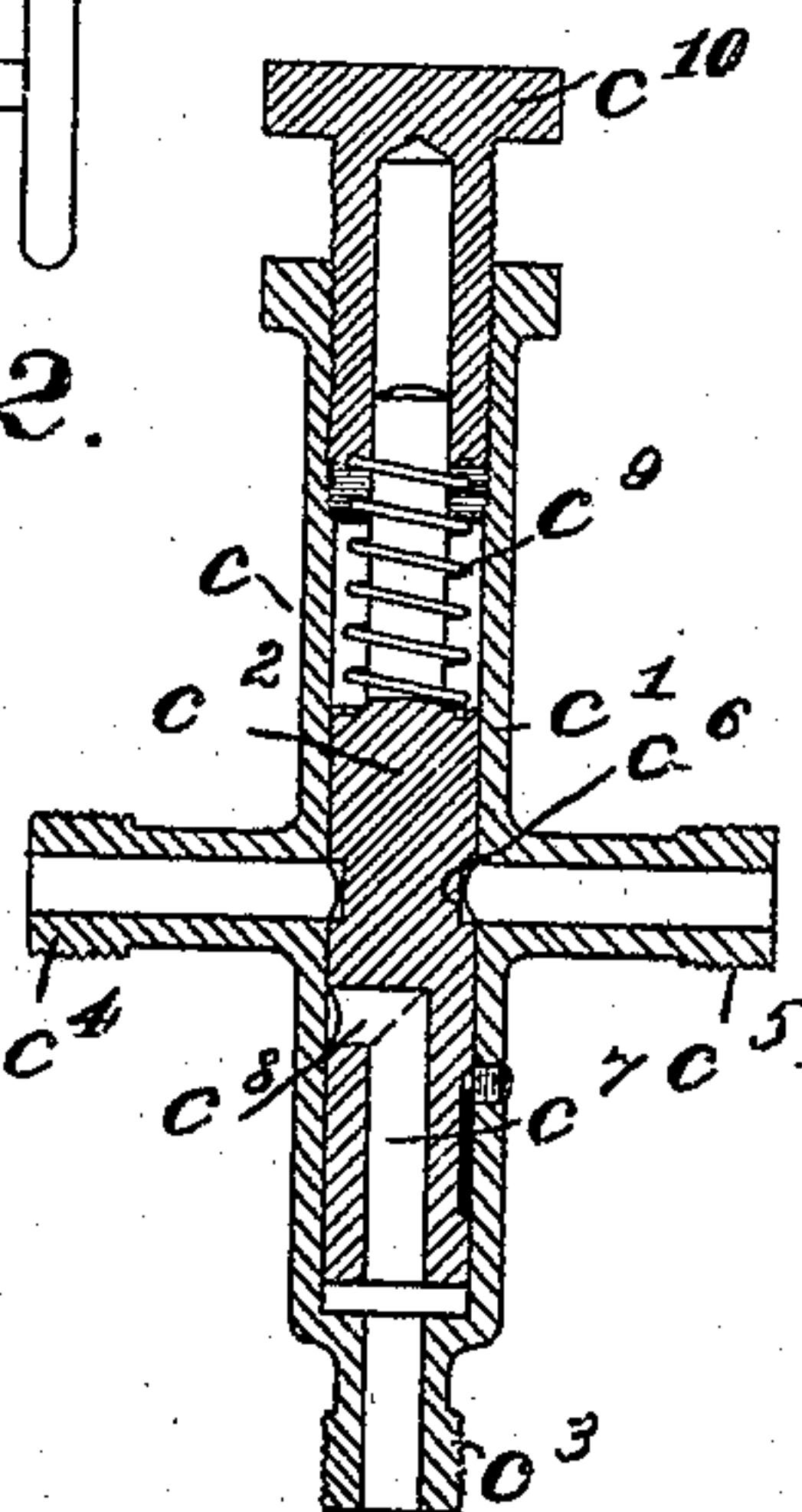


Fig. 4.

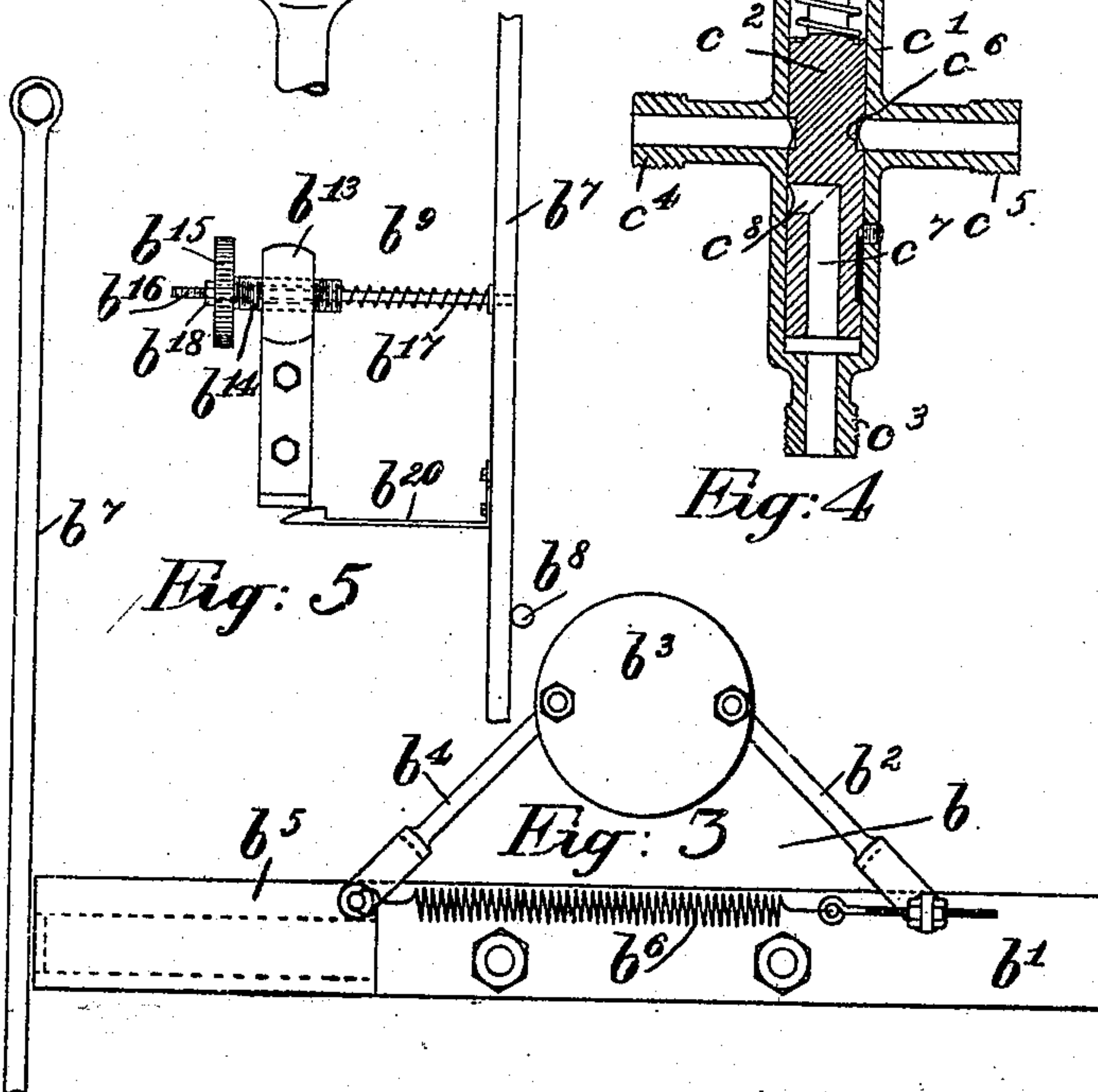


Fig. 3.

WITNESSES:

W. H. Derrigan
F. H. Logan

INVENTORS,
JOHN GORDON,
THOMAS JACKSON and
CHARLES ANDREWS,
by *van Oldenneel & Schoenlant*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN GORDON, THOMAS JACKSON, AND CHARLES ANDREWS, OF LONDON, ENGLAND, ASSIGN-
ORS TO ANDREW'S GOVERNOR PATENTS LIMITED, OF LONDON, ENGLAND, A COMPANY
OF GREAT BRITAIN AND IRELAND.

GOVERNOR FOR MARINE ENGINES.

No. 919,713.

Specification of Letters Patent.

Patented April 27, 1909.

Application filed September 13, 1907. Serial No. 392,696.

To all whom it may concern:

Be it known that we, JOHN GORDON, THOMAS JACKSON, and CHARLES ANDREWS, subjects of the King of Great Britain and Ireland, residing at London, England, have invented new and useful Improvements in and Relating to Governors for Marine Engines, of which the following is a specification.

This invention relates to governors for marine engines and has for its object the arrangement and construction of apparatus whereby the combined result of governing the engine on an increase of speed from any cause whatever on the one hand or from the submergence of the propeller to a more or less extent on the other hand is effected in a most reliable and simple manner.

It is found in practice that ships of great length will travel through waves of considerable size on an even keel but the depth of the water over the propeller will continually vary in passing through such waves and the resistance to the engine will vary as a consequence.

This invention consists in the combination of a momentum governor driven by the engine with a gravity governor operated by the motion of the ship about a transverse horizontal axis.

To carry the invention into effect we arrange any form of momentum governor either of the reciprocating or rotary type upon or in connection with the engine so as to be driven thereby and adapted to operate on any excess of speed being attained a control valve for regulating the supply of motive fluid to an operating device for working the throttle or other regulating valve. The motive fluid passes on its passage to the operating device through an automatic by-pass valve which has a double duty hereinafter described. We arrange a moving mass gravity controlled element with valves for example of the type described in the specification of United States Letters Patent No. 858320 granted to the Andrews' Governor Patents, Limited consisting of a pivoted tube containing mercury adapted to operate valves on any given alteration in the trim of the ship. We connect the valves of this device which we term the "anticipator" with the throttle operating device also through the automatic by-pass valve. Normally the by-

pass valve is open to the "anticipator" and throttle operating device, so that on any alteration in the trim of the ship the "anticipator" allows the motive fluid to operate the throttle, while in the case of a sudden increase of "non-anticipated" speed, the momentum governor comes into action admits motive fluid to the automatic by-pass valve, closes the communication between the latter and the "anticipator", and opens the communication with the throttle operating device direct. We may connect the exhaust from the various devices with the condenser not only for the purpose of obtaining a higher effective working pressure but also to save the water resulting from the steam used when steam is the motive fluid utilized.

In order that our invention may be the better understood we will now proceed to describe the same in relation to the accompanying drawings reference being had to the letters and figures marked thereon.

Like letters refer to like parts in the various figures.

Figure 1 is a general end elevation of a marine engine with our invention applied thereto. Fig. 2 is a part sectional elevation of the gravity governor or "anticipator". Fig. 3 is a view of the momentum governor and its gear. Fig. 4 is a sectional view of the automatic by-pass valve. Fig. 5 is a detail view of the adjustable reacting spring and safety detent.

To carry the invention into effect we mount upon the crosshead *a* or other convenient reciprocating part of the engine a momentum governor *b* consisting of a bar *b*¹ to which is pivoted a rod *b*² attached to a weight *b*³ and this weight is pivotally connected by a rod *b*⁴ with a sliding sleeve *b*⁵ carried by the bar *b*¹ while a spring *b*⁶ attached to the sleeve *b*⁵ at one end and to a fixed point on the bar *b*¹ at the other end enables the effect of the weight *b*³ on the sleeve *b*⁵ to be modified according to circumstances by varying the tension of the spring *b*⁶. Upon the framing of the engine we pivot a rod *b*⁷ of such a length as to allow the sleeve *b*⁵ to co-act with the said rod for the whole length of stroke of the engine when the governor is operated on excessive speed being attained. At the lower end of the rod *b*⁷ a fixed stop *b*⁸ is arranged on one side and on the other side an adjustable reacting spring device *b*⁹ is pro-

vided whereby the force against which the sleeve b^5 acts can be regulated.

The adjustable reacting spring device b^9 consists of a fixed support b^{13} into which is screwed a stem b^{14} having a hand wheel b^{15} and through the center of the stem a rod b^{16} is passed which is fixedly supported in the rod b^7 . A spiral spring, b^{17} is wound upon the rod b^{16} and a nut b^{18} is threaded upon one end of said rod. The rod b^7 carries a spring detent b^{20} which engages the support b^{13} on any excessive acceleration of the engine.

In proximity to the rod b^7 a valve b^{10} is arranged and connected to a source of fluid pressure such as the steam pipe b^{11} , the pressure tending to keep the valve closed. The rod b^7 when moved about its pivot against the spring b^9 co-acts with the valve b^{10} and opens it allowing steam to pass to the automatic by-pass valve c by the pipe b^{12} .

The by-pass valve c consists of a casing c^1 containing a piston c^2 sliding therein and having three branches c^3 , c^4 and c^5 . The branch c^3 is connected to the pipe b^{12} to admit steam under the piston c^2 . The piston has a groove c^6 around which communication is made between the branches c^4 and c^5 and also has a central passage c^7 leading to a side passage c^8 adapted to communicate with the branch c^4 when the piston is forced along by the steam pressure against the pressure of a spring c^9 adjustably supported by an adjustable cover c^{10} . In this latter position of the piston c^2 the branch c^5 is entirely closed. A pipe c^{11} preferably of a flexible character leads from the branch c^4 to an oscillating cylinder d mounted on suitable supports d^1 on the bulkhead d^2 or other convenient fixed part and the piston rod d^3 is connected by a rod d^4 with the lever d^5 of the throttle valve d^6 . The branch c^5 of the by-pass valve c is connected by a pipe c^{12} with the body of the gravity governor or "anticipator" e which is supported in any convenient manner upon the bulkhead or other support so that the axis of the device is parallel to the keel of the ship.

The moving mass gravity governor e consists of a valve box e^1 having duplicate valves e^2 one being for "head seas" and the other for "stern seas". Each valve e^2 can engage an upper valve seat e^3 and a lower valve seat e^4 . The upper valve seat e^3 communicates with a space e^5 leading to a stop valve e^6 connected with a pipe e^7 to the condenser f . The lower valve seat e^4 is in communication with a stop valve e^8 connected to the pipe e^9 from the steam supply. Upon the upper part of the valve box e^1 we pivotally mount a tube g upon bearing pins g^1 carried in supports g^2 . The cradle g^3 in which the tube g is supported is capable of expansion and contraction by means of an adjusting screw g^4 whereby the position of the tube g can be adjusted relative to the axis of

movement to adapt the device for "head seas" or "stern seas". The tube g contains mercury or any equivalent mobile body or bodies and when the alteration in the trim of the ship tilts the tube the resultant movement of the mercury varies the position and action of its weight on the stem of the particular valve e^2 then in use and forces the said valve on its lower seat e^4 . This closure of the valve prevents the further passage of the live steam until such time as the weight of the mercury has been removed by the reverse inclination of the ship by its running to the opposite end of the tube g and tilting the latter about its axis. In this case, the live steam passes by the automatic valve c to the cylinder d by the pipe c^{11} and operates the throttle valve d^6 . On the reverse movement of inclination the mercury resumes its former position and the tube g closes the valve e^2 on the steam valve seating e^4 and opens the exhaust valve seating e^3 thus putting the cylinder d in communication with the condenser which causes the throttle valve d^6 to open. Adjustable stops e^{10} are provided on each side to regulate the inclination of the tube g to the line of the keel. This "anticipator" therefore controls the speed of the engine on any material alteration in the trim of the ship. When the engine is accelerated from other causes than the above on the next up-stroke of the engine the weight b^3 moves relatively downward against the tension of the spring b^6 and forces the sleeve b^5 outward so as to contact with the rod b^7 . This action causes the rod b^7 to turn on its pivot and open the valve b^{10} admitting live steam to the automatic by-pass valve c operating the piston c^2 , cutting off the connection of the cylinder d with the condenser and admitting live steam to the said cylinder which closes the throttle valve d^6 . Immediately the speed is reduced (assuming it has not been abnormally excessive so as to cause the spring detent b^{20} to act) the rod b^7 reverts to its normal position, the valve b^{10} closes and the automatic by-pass valve is returned by its spring c^9 to its normal position putting the cylinder d in communication with the condenser f and opening the throttle valve d^6 .

On the under side of the cylinder d we provide at a convenient point a drain pipe d^7 which not only enables the condensed water to escape but also allows the steam to get away when the piston of the cylinder d has traveled along so as to uncover the drain orifice.

Having now described our invention what we claim and desire to secure by Letters Patent is:—

1. In a speed governing apparatus for marine engines, a gravity-controlled tiltable device including a movable mass, and a valve arranged for operation by said tiltable

device and controlling the passage of motive fluid to throttle-operating gear, in combination with a momentum governor also adapted to control the passage of motive fluid to the throttle-operating gear, and means operated by said governor for cutting out of action the aforesaid valve.

2. In a speed governing apparatus for marine engines, a means for controlling the supply of power to the engine, a cylinder for operating said means, a valve for controlling the passage of motive fluid to said cylinder, a gravity-controlled tiltable device, arranged to operate said valve, in combination with a momentum governor, and an automatic by-

pass valve arranged to admit motive fluid to said cylinder and to cut out from action the valve first named and means operated by the said momentum governor for supplying motive fluid to the by-pass valve to operate the latter.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN GORDON.

THOMAS JACKSON.

CHARLES ANDREWS.

Witnesses:

CHARLES JOHN ROBERT BALLOUGH,
RICHARD A. HOFFMANN.