

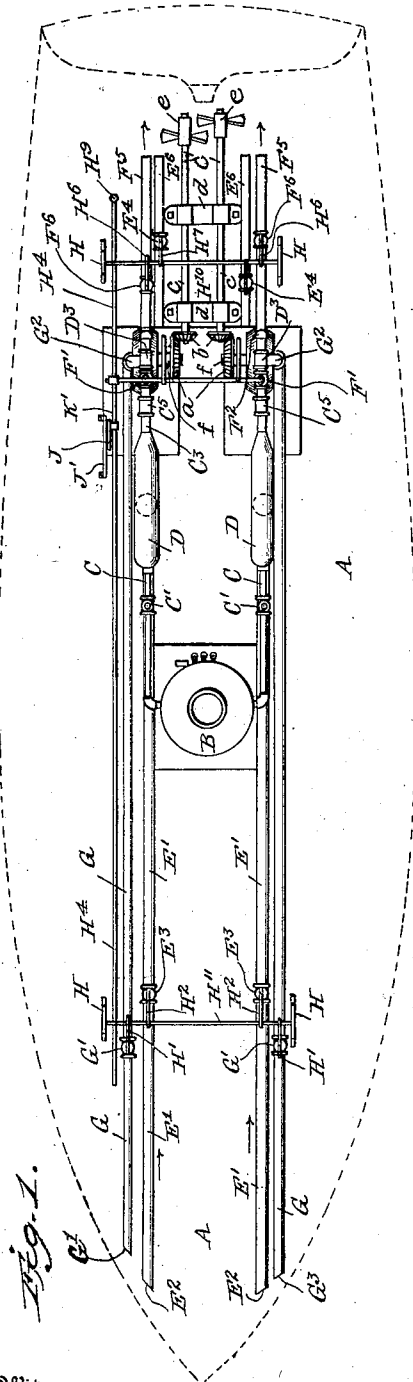
No. 891,214.

PATENTED JUNE 16, 1908.

A. GRAF.
HYDROMOTOR.

APPLICATION FILED APR. 2, 1906.

3 SHEETS—SHEET 1.



Witnesses
Edmund L. Jewell
H. A. Munn

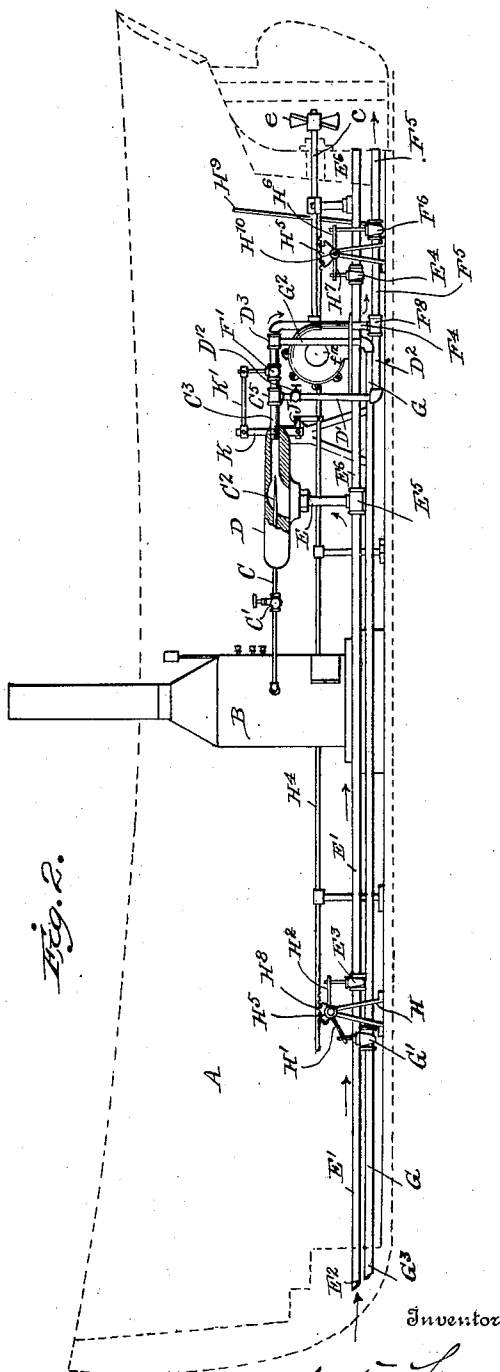


Fig. 2.

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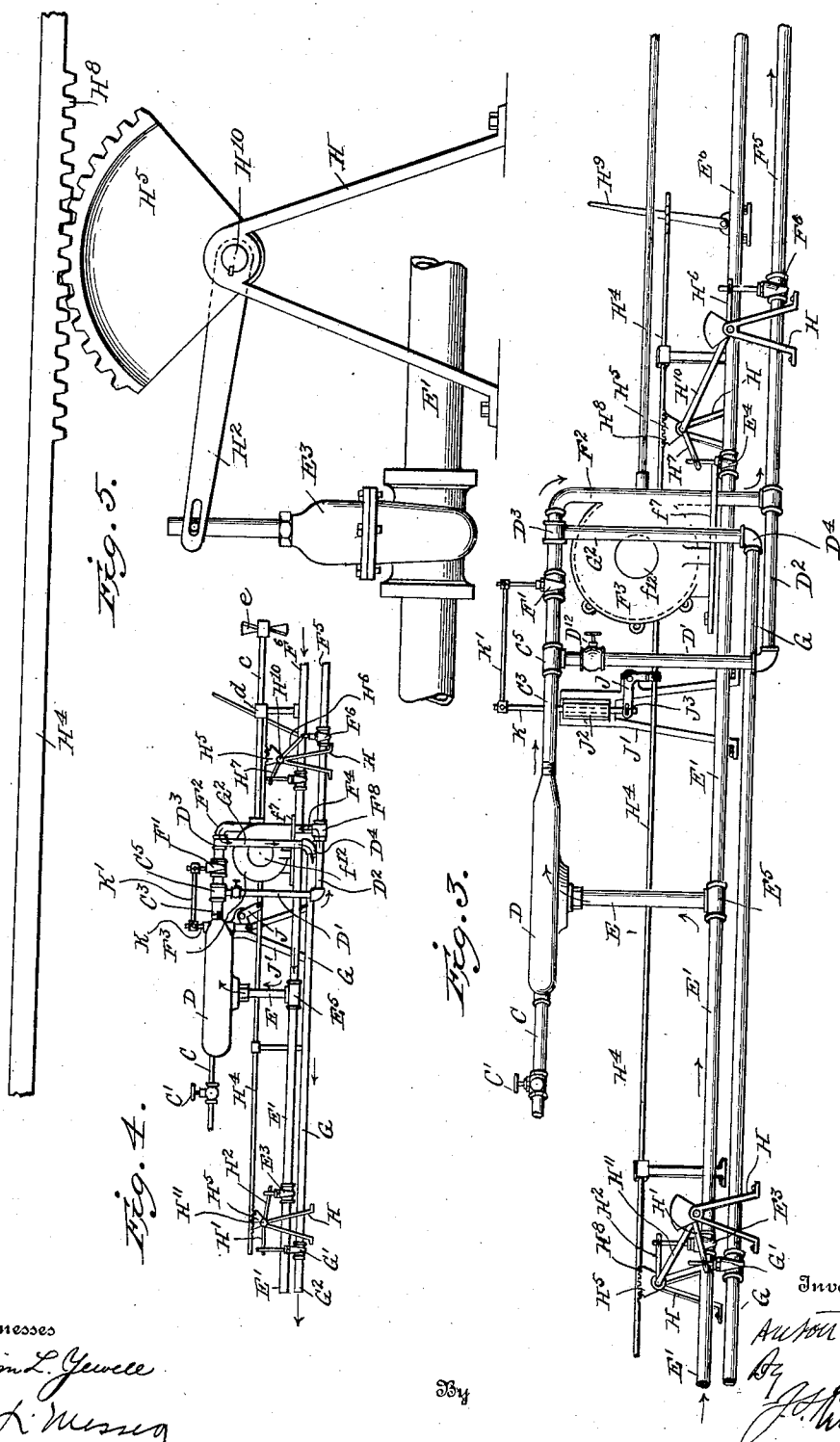
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3 SHEETS—SHEET 2.



Witnesses
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384

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UNITED STATES PATENT OFFICE

ANTON GRAF, OF NEWBURY, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO JOHN JOYCE,
OF ANDOVER, MASSACHUSETTS.

HYDROMOTOR.

No. 891,214.

Specification of Letters Patent.

Patented June 16, 1908.

Application filed April 2, 1906. Serial No. 309,300.

To all whom it may concern:

Be it known that I, ANTON GRAF, of Newbury, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Hydromotors, of which the following is a specification.

My invention relates to new and useful improvements in the propulsion of boats or vessels.

10 My invention consists of certain novel features hereinafter described and particularly pointed out in the claims.

In the accompanying drawings which illustrate a construction embodying my invention, Figure 1 is a top plan view of a boat containing my improvements arranged in duplex. Fig. 2 is a side elevation of the same. Fig. 3 is a detail side elevation of the hydromotor and coöperating parts, with the arrows showing the direction of the flow of the water and with certain valves opened and others closed. Fig. 4 is a similar view to Fig. 3 and showing the position of the valves and the flow of the water indicated by the arrows, when the mechanism is operated to reverse the motion of the boat. Fig. 5 is a detailed side view of one of the valves with the mechanism for operating the same to open and close it. Fig. 6 is a side view of the hydromotor. Fig. 7 is a transverse vertical central section through the hydromotor on the line Y—Y (Fig. 6) looking in the direction of the arrow with parts in full lines. Fig. 8 is a longitudinal sectional view on the line X X Fig. 6 looking in the direction of the arrow and with the parts in full lines. Figs. 9 and 10 are respectively side and perspective views of the wheel hereinafter described.

Like letters of reference refer to like parts throughout the several views.

40 Within the boat A, shown in dotted lines, is located a boiler B, of any suitable construction and from said boiler leads a steam pipe C controlled by the valve C' and forming an injector or inspirator C² within the injector chamber D. To the bottom of the chamber D is connected a pipe E which is connected by a T joint E³ to the pipe E' opening at E² to the water around the front of the boat. Hand operated valve C' controls the flow of steam to the injector C².

50 Connected to the chamber D is a pipe C³ which is bolted or otherwise secured to the duct F² of the hydromotor, which consists of

two exterior plates F³ joined together by 55 suitable bolts as shown. At the center these plates have each an inwardly turned circular flange f⁶ (see Figs. 7 and 8) and passing through these flanges is the shaft f having bearings f⁹ and f¹¹ extending outwardly from 60 the flanges f⁶ and on said bearings are screw threaded suitable stuffing boxes f¹⁰ f¹². Mounted fast on said shaft f is a spider f' with blades f² forming the wheel of the hydromotor. on each of said blades are located 65 four plates f³ capable of movement and guided in their movements by the pins f⁴ located in suitable slots in said plates f³. Between the edges of said plates are located springs f⁸ adapted to force said plates automatically outwardly to make a closer fit 70 within the plates F³ to prevent the escape of water past said blades. While I have shown these adjustable plates yet in practice they may or may not be used as desired. 75

The inner edges of the plates f² f³ extend as shown at f⁵ beyond the spider f' and over the edges of the flanges f⁶, as shown in Figs. 7 and 8. The outlet f' from the hydromotor (Figs. 3, 4 and 6) connects with the pipe F⁴ 80 which communicates by the T-joint F⁸ with the exhaust pipe F⁵.

The pipe E' is controlled by a suitable gate valve E³ which moves up and down, as hereinafter described. It is connected at its upper end by a slotted connection to the lever H² carried fast on the shaft H¹¹. On the said shaft supported by the brackets H is a gear segment H⁵ which meshes with the rack H³ on the rod H⁴. This rod H⁴ extends rearwardly and is provided at its rear with a suitably mounted lever H⁹. On said rod H⁴ is mounted the bell crank J pivoted on to the standard J' and to said bell crank is connected a rod K moving in the guide J² on said support J', and to said rod K is secured fast the rod K' likewise secured fast to the stem of the valve F' in the pipe C³. As shown in Fig. 3, the valves E³ and F' are raised thereby opening the pipes E' and C³. In the pipe F⁵ 100 which communicates with the pipe C³ through the connections previously described is a valve F⁶ the stem of which is connected to the lever H⁶ fast on the shaft H¹⁰ on which is also fixed another gear segment H⁵ which meshes with another rack H³ on the rod H⁴. As shown in Fig. 3, the valve F⁶ is open as are also the valves E³ and F'. 105

With the parts described and in the positions shown in Figs. 2 and 3, the boat is started forward by opening the valve C' which allows steam from the boiler B to pass into the injector chamber D, which steam induces a suction of water from the front of the boat through the pipe E' into the pipes E up into the injector chamber D through the pipe C³, past the valve F' which is open, into the duct F² and impacts against the blades f³ of the wheel, thereby rotating said wheel, and passes out from the hydromotor through the outlet f⁷ into the pipe F⁴, then into the pipe F⁵, past the open valve F⁶, into the water at the rear of the boat, as indicated by arrows (Fig. 3). In the pipe D' is the valve D¹², which is closed while the steam and water are passing through the pipe C³ to the hydromotor. The closing of this valve prevents the steam and water from passing through the pipes D' and F⁵ while the valve F⁶ is open. In this arrangement, it will be seen the water is drawn by suction away from the front of the boat and forced out at the rear of the boat, the action of which is to draw the boat ahead at the bow and force it ahead at the stern.

On the shafts f (Fig. 1) are mounted the bevel gears a which mesh with bevel gears b on the shafts c supported by the brackets d and on the ends of said shafts are the propellers e. The rotation of the wheel within the plates F³ due to the impact of the water and steam, causes a rotation of the shaft f which is communicated as above described to the propellers e.

To back the boat when standing still or to reverse the boat when going ahead, the operator takes hold of the lever H⁹ and pulls the same rearward (Fig. 4) which causes the rod H⁴ to move the rear segments H⁵ rearward, thereby opening the valve E⁴ connected to the lever H⁷ fast on the shaft H¹⁰, and to close the valve F⁶ connected to the arm H⁶ fast on the shaft H¹⁰, and to close the valve F' by means of the bell crank J and connections previously described and further to close the valve E³ connected to the lever H² fast on the shaft H¹¹ and to open the valve G' connected to the lever H' fast on to said shaft H¹¹. The parts being moved as just described, and the valve C' being open, the injector C² induces suction of water from the stern through the pipe E⁸ (Fig. 4) to the point E³ and up through the pipe E into the injector chamber D, through the pipe C³ to the joint C⁵ (the valve F' being closed) down through the pipe D' (the valve D¹² being open) to the pipe D² to the joint F³ (valve F⁶ being closed) up through the pipe F⁴ into the hydromotor, turning the wheel to the left and up and out through the duct F² to the joint D³ and down through the pipe G² through the joint D⁴ and out through the pipe G, discharging through the end G³ thereof in the

front of the boat. This reversal of the propeller mechanism aided by the suction at the rear of the boat and the discharge at the front of the boat moves the boat rearwardly. The course of the water and steam is indicated by arrows in Fig. 4 in the backing or in reversing the boat for backward movement.

The valve F' controls the flow of steam pressure and water to the motor in that on the forward movement of the boat, said valve F' being open, steam pressure and water pass into the motor through the duct F² from the pipe C³ while on the back or reverse movement of the boat, the valve F' being closed, steam pressure and water pass down the pipe D' into the pipe D² up through the pipe F⁴ into the motor out through the duct F² to the joint D³ and down through the pipe G² and out through the pipe G.

While I have shown in Fig. 1 a hydromotor and its connecting ducts arranged in duplex, yet it will be understood that one hydromotor with its connecting ducts or any number of motors with their connecting ducts may be used.

In another application Serial No. 265,849 filed June 19, 1905, I have described and claimed the hydromotor without limiting it to a boat or vessel.

Having thus described the nature of my invention and set forth a construction embodying the same, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In an apparatus of the character described, a vessel, a source of steam pressure, an injector for said pressure, an injector chamber in which said injector is located, an inlet duct open to the water at the front of the vessel and communicating with said injector chamber into which the water is drawn by said injector, a motor operated by the flow of water and the steam pressure, and an exhaust duct opening into the water at the rear of the vessel for the exhaust of the steam pressure and water from said motor.

2. In an apparatus of the character described, a vessel, a source of steam pressure, an injector for said pressure, an injector chamber in which said injector is located, an inlet duct open to the water at the front of the vessel and communicating with said injector chamber into which the water is drawn by said injector, a motor operated by the flow of water and the steam pressure, an exhaust duct opening into the water at the rear of the vessel for the exhaust of the steam pressure and water from said motor, and valves controlling said water inlet duct and said exhaust duct.

3. In an apparatus of the character described, a vessel, a source of steam pressure, an injector for said pressure, an injector chamber in which said injector is located, an inlet duct open to the water at the front of

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scribed, a vessel, a source of steam pressure, an injector for said pressure, an injector chamber in which said injector is located, an inlet duct open to the water at the front of the vessel and communicating with said injector chamber into which the water is drawn by said injector, a motor operated by the flow of water and the steam pressure, an exhaust duct opening into the water at the rear of the vessel for the exhaust of the steam pressure and water from said motor, valves controlling said water inlet and said exhaust duct, a valve controlling the flow of steam pressure and water to the motor, mechanism common to all of said valves for operating the same, a rear inlet duct open to the water at the rear of the vessel and communicating with said injector chamber into which the water is drawn by said injector, a front exhaust duct open to the water at the front of the vessel for the exhaust of steam pressure and water from said motor, valves controlling said rear inlet duct and said front exhaust duct and normally closed, mechanism common to the rear inlet duct valve and front exhaust duct valve for operating the same and adapted upon the closing of the valves controlling the front inlet duct, the rear exhaust duct and the valve controlling the flow of steam pressure and water to the motor to open the said rear inlet duct valve and the front exhaust duct valve to back or reverse the movement of the vessel, and propelling mechanism operated by said motor.

12. In an apparatus of the character described, a vessel, a source of steam pressure, an injector for said pressure, an injector chamber in which said injector is located, an inlet duct open to the water at the front of the vessel and communicating with said injector chamber into which the water is drawn by said injector, a motor operated by the flow of water and the steam pressure, an exhaust duct opening into the water at the rear of the vessel for the exhaust of the steam pressure and water from said motor, valves controlling said water inlet and said exhaust duct, a valve controlling the flow of steam pressure and water to the motor, a rear inlet duct open to the water at the rear of the vessel and communicating with said injector chamber into which the water is drawn by said injector, a front exhaust duct open into the water at the front of the vessel for the exhaust of steam pressure and water from said motor, valves controlling said rear inlet duct and said front exhaust duct and normally closed, mechanism common to all of said valves for operating the same and adapted to open the valves controlling the front inlet duct and rear exhaust duct and the valve controlling the flow of steam pressure and water to the motor and to close the valves controlling the rear inlet duct and the front exhaust duct for the forward movement of

the vessel, and to open the valves controlling the rear inlet duct and the front exhaust duct and to close the valves controlling the front inlet duct and the rear exhaust duct and a valve controlling the flow of steam pressure and water to the motor for the backward or reverse movement of the vessel, and propelling mechanism operated by said motor.

13. In an apparatus of the character described, a vessel, a source of steam pressure, an injector for said pressure, an injector chamber in which said injector is located, an inlet duct open to the water at the front of the vessel and communicating with said injector chamber into which the water is drawn by said injector, a motor operated by the flow of water and the steam pressure, an exhaust duct opening into the water at the rear of the vessel for the exhaust of the steam pressure and water from said motor, valves controlling said water inlet and said exhaust duct, a valve controlling the flow of steam pressure and water to the motor, a rear inlet duct open to the water at the rear of the vessel and communicating with said injector chamber into which the water is drawn by said injector, a front exhaust duct open into the water at the front of the vessel for the exhaust of steam pressure and water from said motor, valves controlling said rear inlet duct and said front exhaust duct and normally closed, mechanism common to all of said valves for operating same and adapted to open the valves controlling the front inlet duct and rear exhaust duct and the valve controlling the flow of steam pressure and water to the motor and simultaneously to close the valves controlling the rear inlet duct and the front exhaust duct for the forward movement of the vessel, and to open the valves controlling the rear inlet duct and the front exhaust duct and simultaneously to close the valves controlling the front inlet duct and the rear exhaust duct and the valve controlling the flow of steam pressure and water to the motor for the backward movement or reverse movement of the vessel, and propelling mechanism operated by said motor.

14. In an apparatus of the character described, a vessel, a source of steam pressure, an injector for said pressure, an injector chamber in which said injector is located, a rear inlet duct open to the water at the rear of the vessel and communicating with said injector chamber into which the water is drawn by said injector, a motor operated by the flow of water and the steam pressure, a front exhaust duct opening into the water at the front of the vessel for the exhaust of the steam pressure and water from said motor, and propelling mechanism operated by said motor.

15. In an apparatus of the character de-

scribed, a vessel, a source of steam pressure, an injector for said pressure, an injector chamber in which said injector is located, a rear inlet duct open to the water at the rear of the vessel and communicating with said injector chamber into which the water is drawn by said injector, a motor operated by the flow of water and the steam pressure, a front exhaust duct opening into the water at the front of the vessel for the exhaust of the steam pressure and water from said motor, valves controlling said rear water inlet duct and front exhaust duct, and propelling mechanism operated by said motor.

16. In an apparatus of the character described, a vessel, a source of steam pressure, an injector for said pressure, an injector chamber in which said injector is located, a rear inlet duct open to the water at the rear of the vessel and communicating with said injector chamber into which the water is drawn by said injector, a motor operated by the flow of water and the steam pressure, a front exhaust duct opening into the water at the front of the vessel for the exhaust of the steam pressure and water from said motor, valves controlling said rear water inlet duct and front exhaust duct, a valve controlling the flow of steam pressure and water to the

motor, and propelling mechanism operated by said motor.

17. In an apparatus of the character described, a vessel, a source of steam pressure, an injector for said pressure, an injector chamber in which said injector is located, a rear inlet duct open to the water at the rear of the vessel and communicating with said injector chamber into which the water is drawn by said injector, a motor operated by the flow of water and the steam pressure, a front exhaust duct opening into the water at the front of the vessel for the exhaust of the steam pressure and water from said motor, valves controlling said rear water inlet duct and front exhaust duct, a valve controlling the flow of steam pressure and water to the motor, mechanism common to all of said valves for operating the same, and propelling mechanism operated by said motor.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses, this 27th day of March A. D. 1906.

ANTON GRAF.

Witnesses:

A. L. MESSER,
E. L. HARLOW.