No. 676,164. Patented June 11, 1901.

J. G. VILLAR.

PROPULSION OF BOATS, YACHTS, OR THE LIKE.

(Application filed Dec. 10, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

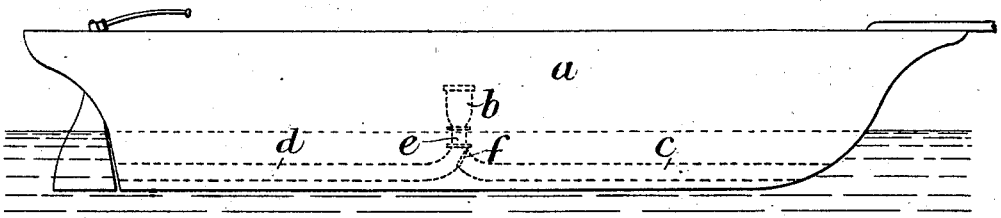


Fig. 3.

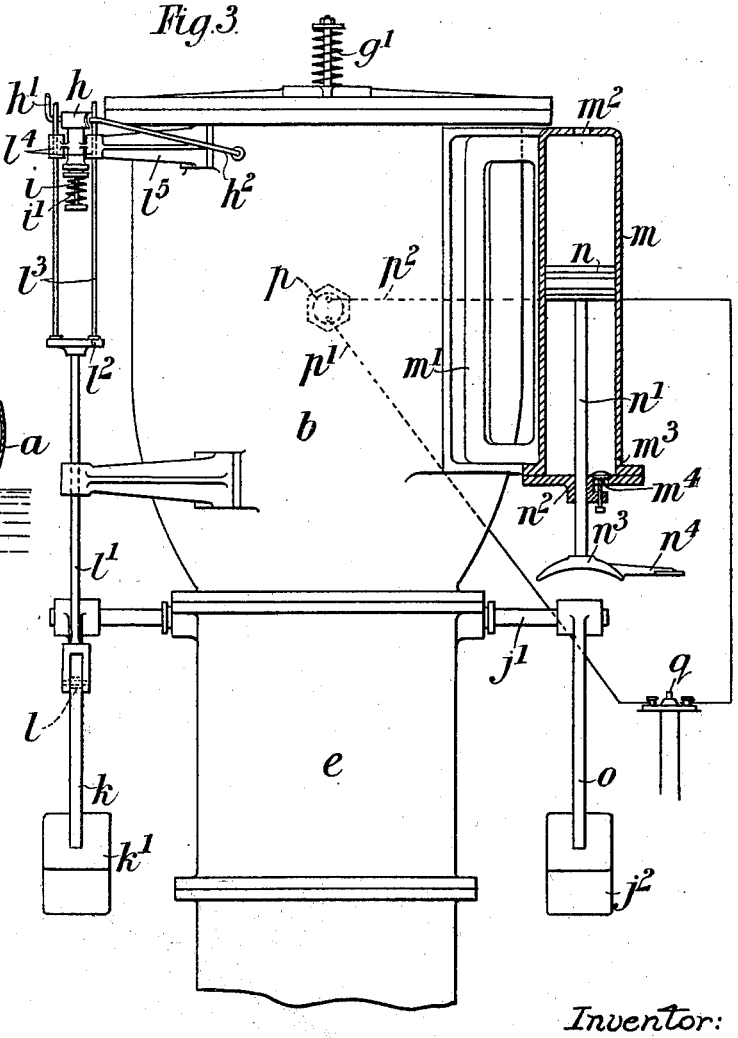
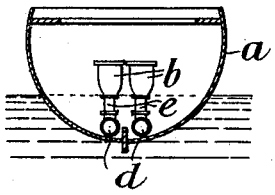


Fig. 2.



Witnesses:

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B. E. Brockett.

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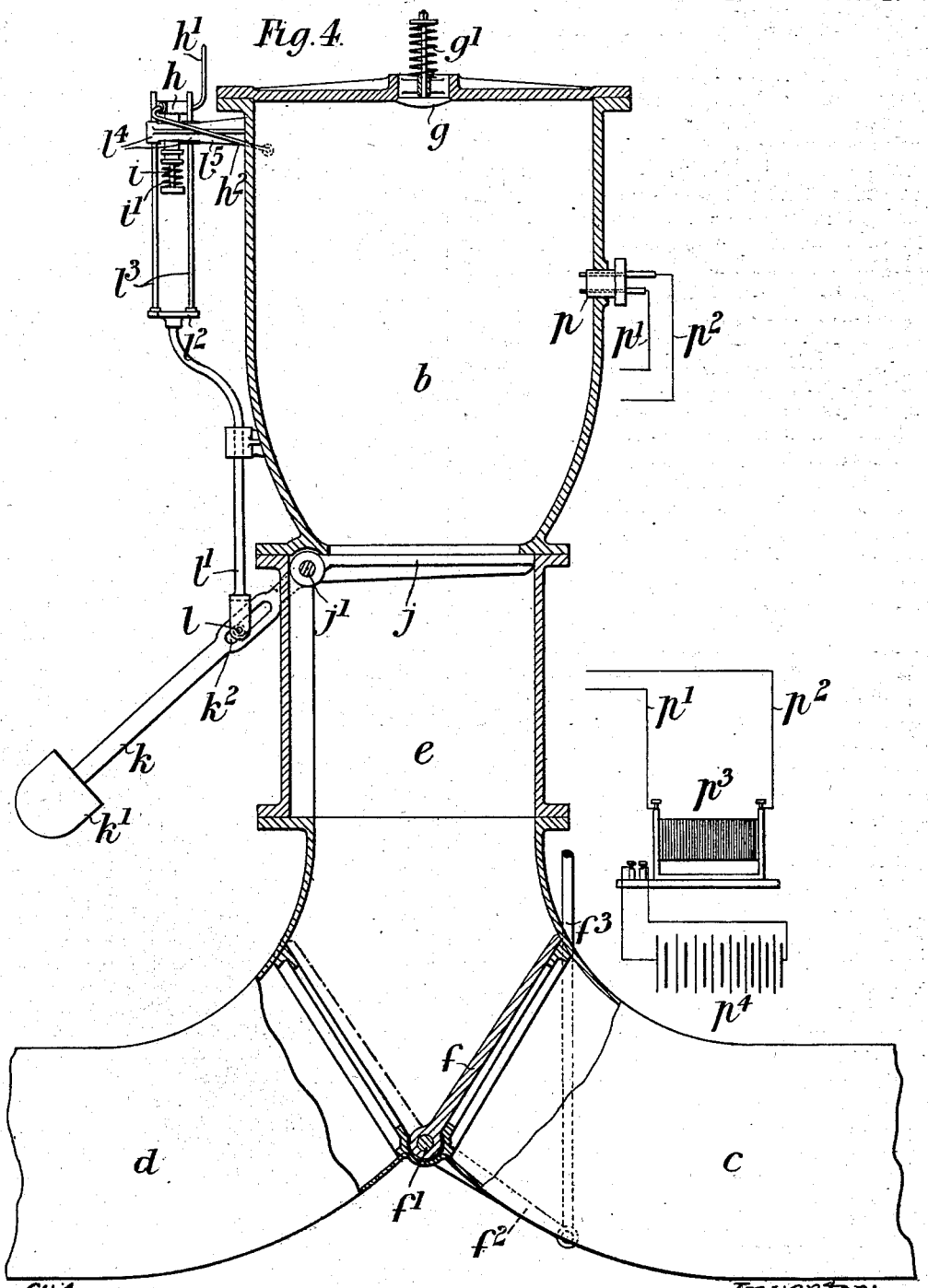
Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN GASPARD VILLAR, OF CHELTENHAM, ENGLAND.

PROPULSION OF BOATS, YACHTS, OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 676,164, dated June 11, 1901.

Application filed December 10, 1900. Serial No. 39,369. (No model.)

To all whom it may concern:

Be it known that I, JOHN GASPARD VILLAR, a subject of the Queen of Great Britain, residing at The Holt, Cheltenham, Gloucester, England, have invented new and useful Improvements in the Propulsion of Boats, Yachts, or the Like, of which the following is a specification.

My invention has for its object to provide improved means for propelling boats, yachts, and the like by the explosion of combustible mixtures or materials without the intervention of screws, paddle-wheels, or the like.

According to my invention the gases of combustion are directly used for imparting motion to columns of water to produce a kind of jet propulsion.

In carrying out my invention the gases are generated in cylinders or chambers in connection with which are tubes or passages in open communication with the water, and the said gases may be allowed to escape when under pressure directly into the said tubes or passages to force out the water therein for imparting motion to the boat or vessel, valves being provided for preventing the entrance of water into the said cylinders or chambers and for obtaining the full effect of the fresh column of water forced into the passage by atmospheric pressure, or the gases may be caused to act upon pistons which will themselves eject the water.

In the accompanying drawings, Figure 1 is a side elevation of the hull of a boat having my improved propelling mechanism applied thereto, and Fig. 2 is a transverse section thereof. Fig. 3 is a sectional end elevation of a suitable form of propelling apparatus constructed according to the principle of the invention, and Fig. 4 is a sectional side elevation thereof. Figs. 3 and 4 are drawn to a larger scale than Figs. 1 and 2.

a is the hull of the boat. *b b* are the cylinders or chambers in which the combustible mixture is exploded, and *c c d d* are the tubes or passages in connection with the said cylinders and which extend, respectively, to the bow and stern of said vessel. In practice I find it advantageous, as shown in Fig. 2, to provide the cylinders and tubes in duplicate on either side of the central vertical plane of the vessel, this arrangement being preferable as it enables the vessel to be steered, if required, by means of the water-jets issuing from the tubes.

Referring now to Figs. 3 and 4, the combustion-chamber *b* is in connection with the tubes or passages *c* and *d* by means of the connecting pipe or passage *e*, a valve *f* being provided at the junction of the two passages *c* and *d* with the said pipe *e*, the said valve being pivoted at f' and being adapted to be turned through the medium of the crank f^2 and rod f^3 (which latter extends within reach of the steersman's hand) either into the position shown in Fig. 4, where it closes the end of the pipe *c* and allows the gases from the chamber *b* to flow through the pipe *d*, or so that it can close the passage *d* and leave the passage *c* open. By this means the vessel is either driven forward or backward, as may be desired, being under the control of the steersman by the aforementioned mechanism.

g is an air-valve which is provided at the head of the cylinder or chamber *b*, the said valve being normally closed by the spring g', but automatically opening to admit air to the chamber after each explosion, when the pressure within the chamber is reduced below that of the atmosphere.

h is an oil-pump to which oil is fed through the pipe h' and from which it is ejected through the pipe h^2 into the upper part of the chamber or cylinder *b*. The piston of the pump connected to the rod *i* is normally retained in the bottom of the pump-cylinder by the spring i' and is adapted to be forced upward, so as to eject a charge of oil into the chamber *b* by the means hereinafter described.

j is a valve which is secured to the pivot j', mounted in the upper end of the connecting-pipe *e*, and is adapted to be normally held in the position shown in Fig. 4 by the arm *k*, which at one end is provided with a weight k' and at the other end is keyed upon the pivot j' in such a manner that the weight k' by its gravity tends to close the valve *j*. The arm *k* is provided with a slot k^2, and in this slot there engages a roller *l*, which is mounted in the forked lower end of a rod l', the upper end of which is secured to a head l^2, having two guide-rods l^3 l^3, which extend upward

and through guides l^4 l^4, fixed upon a bracket l^5, carrying the pump h.

m is a cylinder which is secured by means of the bracket m' to the outside of the chamber or cylinder b. This cylinder is provided with a piston n, having a rod n', which passes through a stuffing-box n^2 in the lower end of the said cylinder m, the projecting portion of the said rod n' being formed with a head n^3 and a tappet n^4. The cylinder m is provided with an air-hole m^2 at its upper end and with a small air-hole m^3 and an air-inlet valve m^4 at its lower end. On the pivot j' there is arranged a second arm o, provided with a weight j^2 and designed to operate the piston-rod n', as hereinafter described.

p is an electric ignition-plug which is inserted in the cylinder or chamber b, current being supplied to the said plug through the wires p' p^2, which are connected to an induction-coil p^3 and a battery p^4.

q is a contact which normally maintains the circuit broken, but which is adapted to be operated intermittently, as hereinafter described, by the tappet n^4.

The operation of the above-described apparatus is as follows—that is to say, assuming it to be at rest, to start the motor the plug p is removed and the nozzle of a blow-lamp is inserted to heat the chamber sufficiently to vaporize the oil. The plug is then replaced and the pump h is manipulated by hand to admit a charge of oil into the chamber b, this charge mixing with the air contained in the said chamber to form an explosive mixture. If it is required to drive the vessel forward, the valve f is turned into the position shown in Fig. 4, and the contact q is manipulated by the attendant, so as to explode the charge introduced into the chamber b. The expansion of the gases formed by the explosion throws open the valve j and forces out the water in the passage or pipe d, expelling it at the stern of the vessel with sufficient force to drive the said vessel forward. The opening of the valve j lifts the arm k, and thereby the rod l', so as to raise the head l^2 and bring it into contact with the projecting end of the pump piston-rod i, which is forced upward, so as to expel a charge of oil into the chamber b. The opening of the valve j also raises the arm o, which strikes the head n^3 of the rod n', thereby raising the piston n to the top of the cylinder m, expelling the air above the said piston through the hole m^2 in the top of the said cylinder m and admitting air beneath the piston through the valve m^4. The column of water being expelled from the passage d and the gases having partially escaped, water again rushes into the said passage, and the valve j is closed through the medium of the weights k' and k^2, so as to prevent the inlet of the fresh column of water into the chamber b. The arms k and o therefore descend to their normal positions, the former arm bringing the head l^2 downward, thus allowing the piston of the pump h to be returned under the action of the spring i' to its lowermost position. The piston n, however, in the cylinder m does not immediately descend, as the air contained in the cylinder beneath it forms a cushion and only escapes slowly through the outlet m^3 at the lower end of the cylinder. The rate of descent of the piston n can therefore be regulated to suit requirements. When, however, the piston n reaches its lowermost position, the tappet n^4 strikes the contact q, so as to close or complete the electric circuit and cause sparks to pass between the terminals of the plug p. This sparking explodes the fresh mixture in the chamber b, and the operation begins *de novo*. By regulating the speed at which the tappet n^4 descends it will be clear that I am enabled to govern the number of explosions which take place per unit of time.

I wish it to be understood that I do not confine myself to the construction of apparatus hereinbefore described, as it will be obvious that it can be modified in many respects to suit different requirements.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In apparatus for propelling boats, yachts and the like, the combination of a combustion-chamber having an oil-supply pump and an air-inlet, of one or more passages in connection with the said chamber and open to the water, of a valve for normally closing the communication between the chamber and the passage or passages, of means for intermittently exploding the charge and of means for operating the oil-supply pump by the movement of the valve, substantially as hereinbefore described.

2. In apparatus for propelling boats, yachts and the like, the combination of a combustion-chamber having an oil-supply pump and an air-inlet, of one or more passages in connection with the said chamber and open to the water, of a valve for normally closing the communication between the chamber and the passage or passages, of arms in connection with the valve which operate the oil-supply pump and a tappet and of an electric contact adapted to be operated by the tappet to ignite the explosive charge, substantially as hereinbefore described.

3. In apparatus for propelling boats and the like, the combination with the combustion-chamber, and a passage connected therewith and communicating with the water, of a pivoted outlet-valve for said combustion-chamber, a hydrocarbon-injector pump connected with said chamber and provided with a movable piston, operative connections between said piston and said outlet-valve, whereby the opening of said valve to allow the escape of gases automatically actuates said pump, substantially as described.

4. In apparatus for propelling boats and the like, the combination with the combustion-

chamber, and a passage connected therewith and communicating with the water, of a pivoted outlet-valve for said combustion-chamber, an igniting device for said combustion-chamber, a cylinder, a piston therein, an arm connected with said outlet-valve for operating said piston in one direction, said cylinder having an outlet to permit the return of the piston, and an igniter-controlling device connected with said piston, substantially as described.

5. In apparatus for propelling boats and the like, the combination with the combustion-chamber, and a passage communicating therewith and open to the water, of an outlet-valve for said combustion-chamber, adapted to open under pressure of gases in said chamber, yielding devices for holding said valve normally in closed position, and for returning it to closed position after an explosion to prevent water from entering said combustion-chamber, substantially as described.

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Witnesses:
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P. G. COOKLEY.