

No. 881,803.

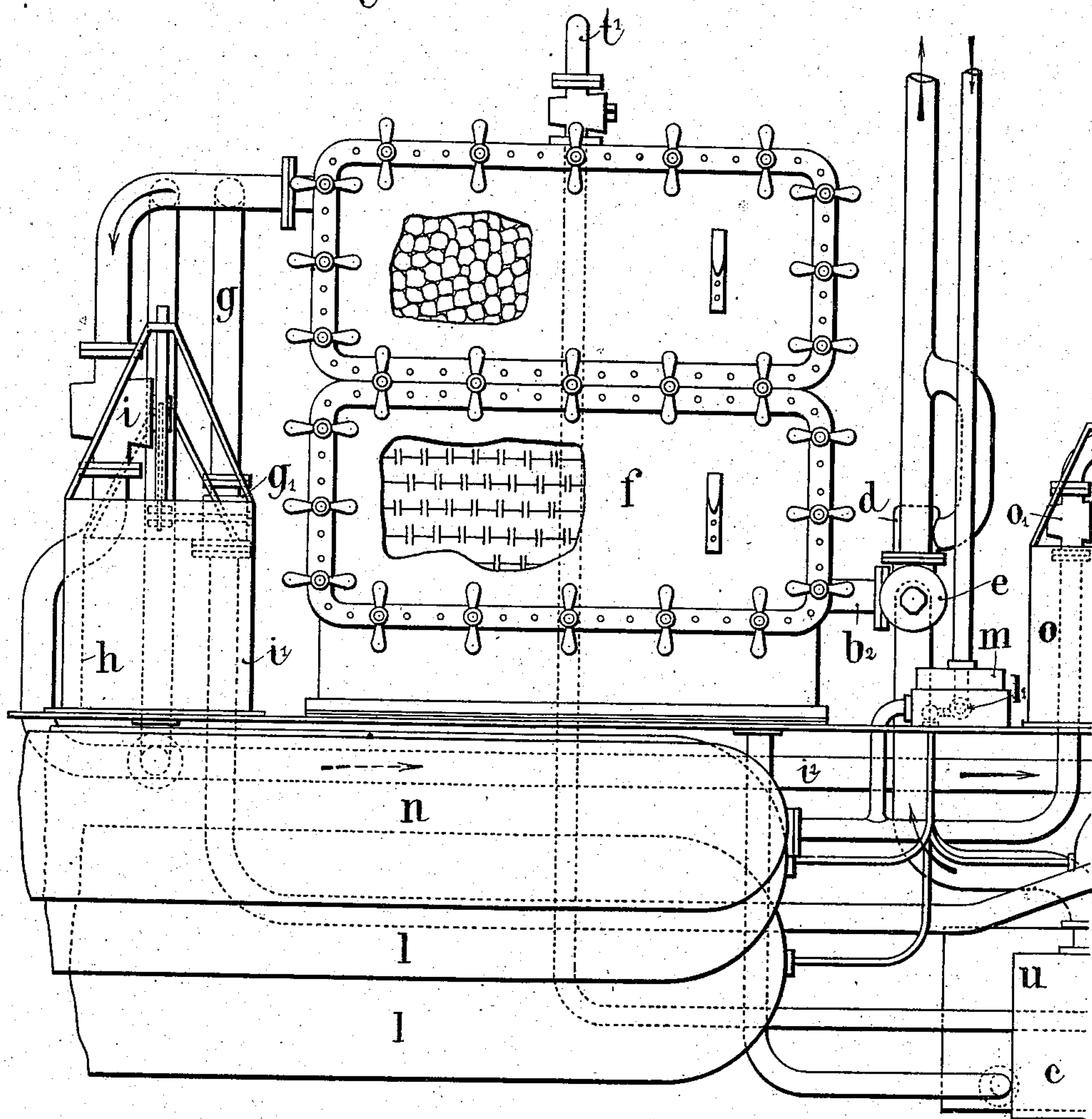
PATENTED MAR. 10, 1908.

G. F. JAUBERT.  
PROPULSION OF SUBMARINE BOATS.

APPLICATION FILED NOV. 27, 1905.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES :  
*W. M. Avery*  
*J. P. Davis*

INVENTOR  
*George Francois Jaubert*  
BY  
*Munn & Co.*  
ATTORNEYS

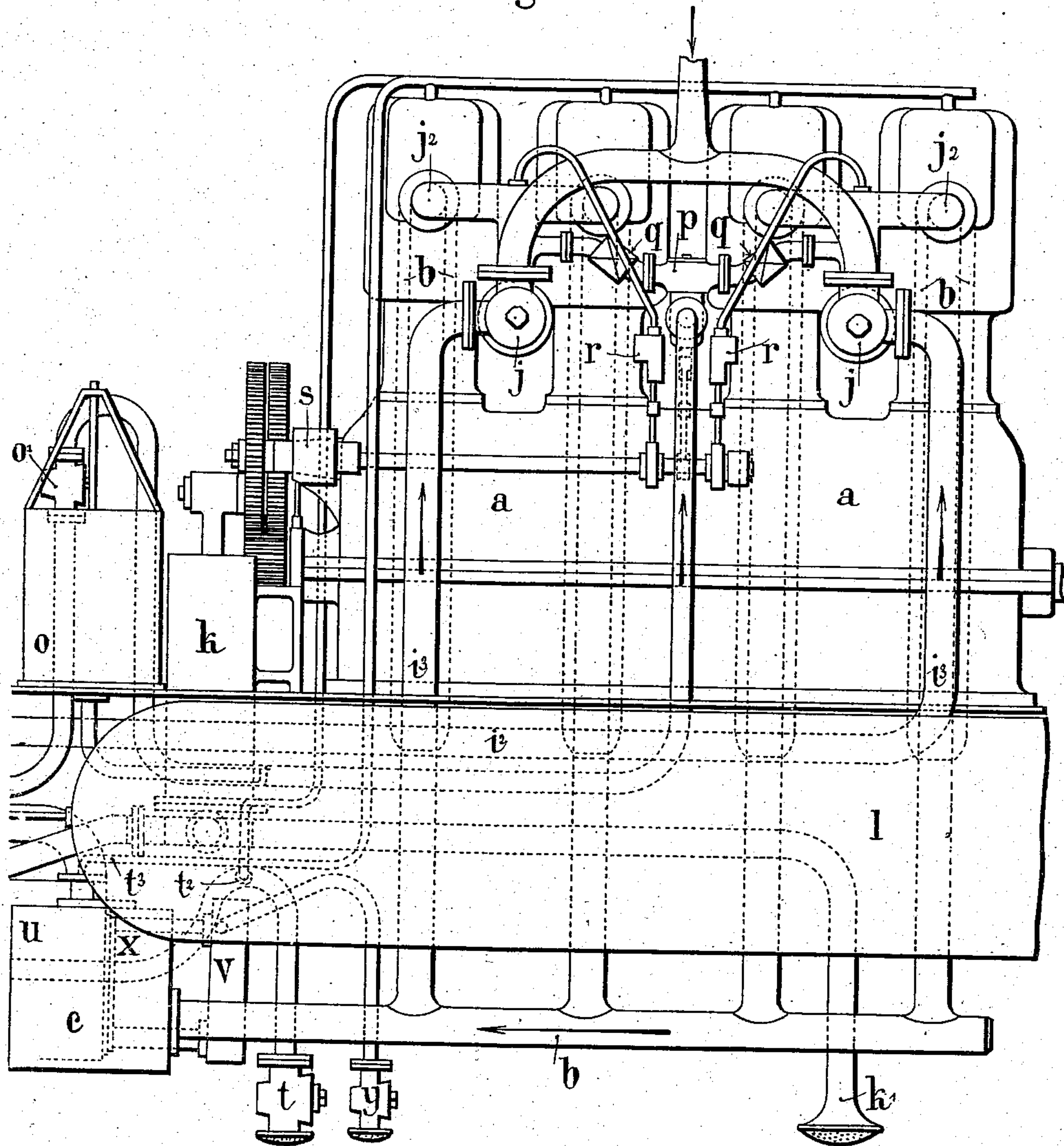
No. 881,803.

PATENTED MAR. 10, 1908.

G. F. JAUBERT.  
PROPULSION OF SUBMARINE BOATS.  
APPLICATION FILED NOV. 27, 1905.

4 SHEETS—SHEET 2.

Fig. 1<sup>a</sup>



WITNESSES:  
*W. M. Avery*  
*J. P. Davis*

INVENTOR  
*George Francois Jaubert*  
BY  
*Munn & Co.*  
ATTORNEYS



No. 881,803.

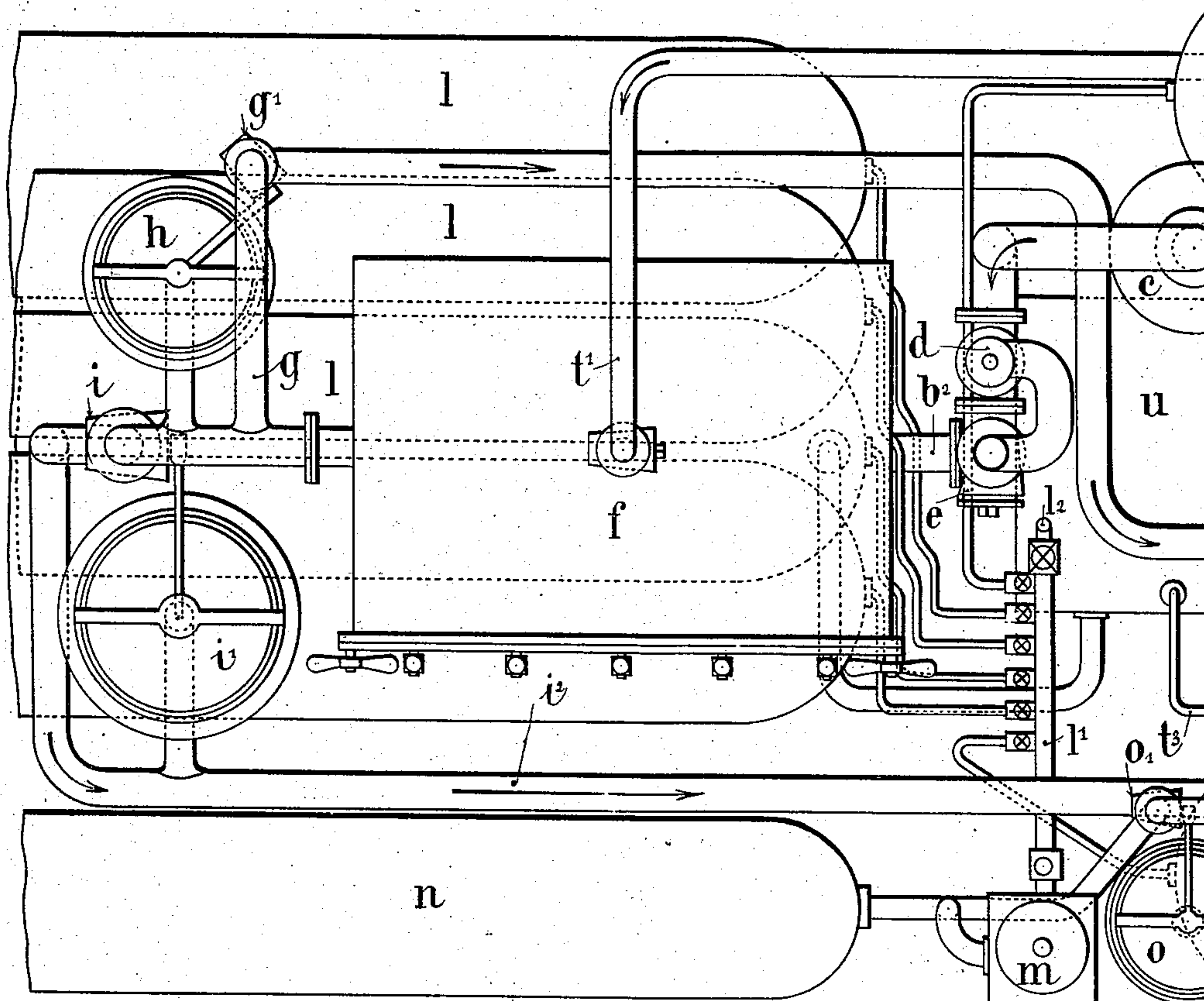
PATENTED MAR. 10, 1908.

G. F. JAUBERT.  
PROPULSION OF SUBMARINE BOATS.

APPLICATION FILED NOV. 27, 1905.

4 SHEETS—SHEET 3.

Fig. 2.



WITNESSES :

*W. M. Avery*

*J. P. Davis*

INVENTOR

*George Francois Jaubert*

BY

*Munroe*

ATTORNEYS

No. 881,803.

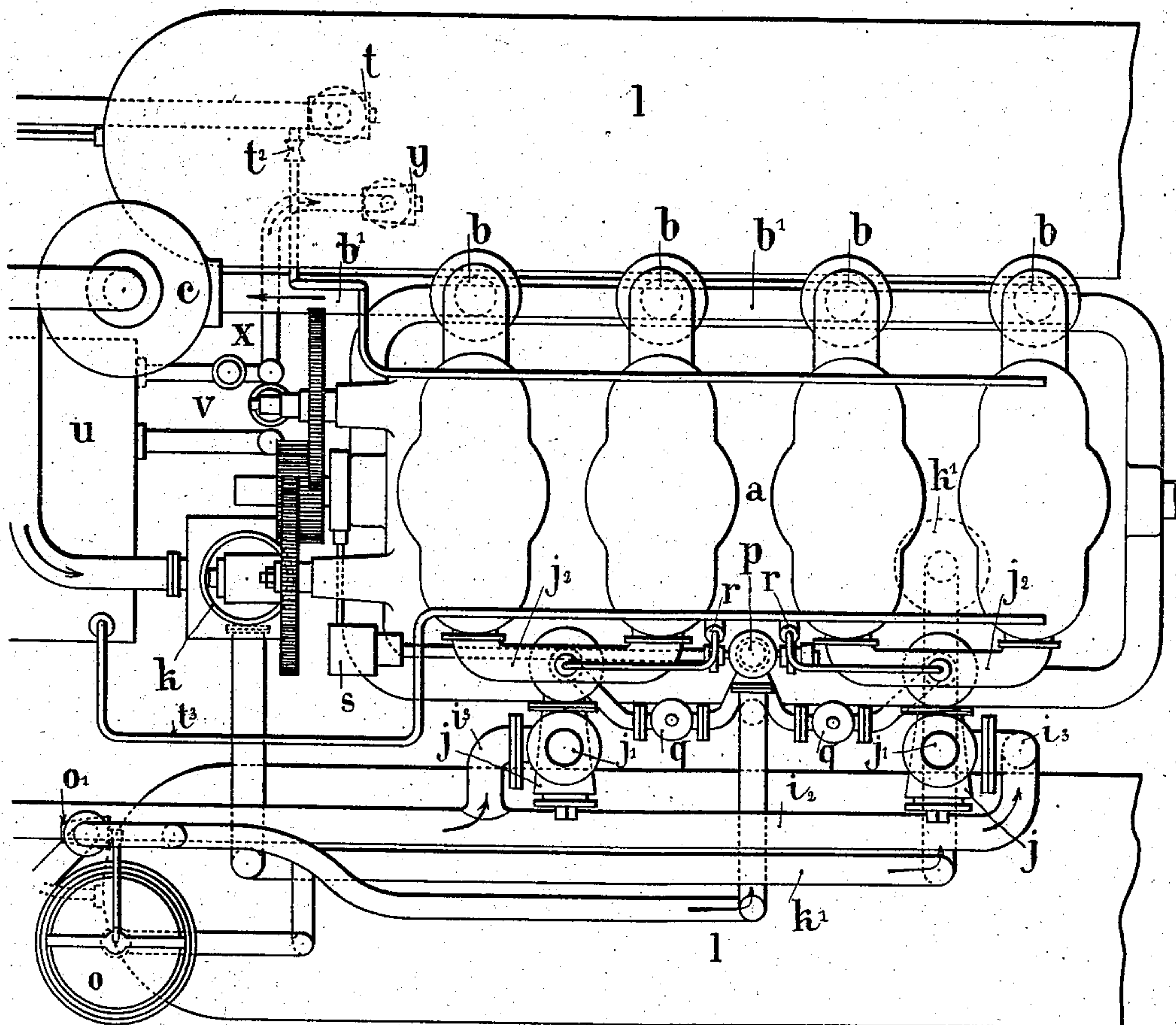
PATENTED MAR. 10, 1908.

G. F. JAUBERT.  
PROPULSION OF SUBMARINE BOATS.

APPLICATION FILED NOV. 27, 1905.

4 SHEETS—SHEET 4.

Fig. 2<sup>a</sup>.



WITNESSES :

*W. M. Avery*

*J. P. Davis*

INVENTOR

*George Francois Jaubert*

BY

*Mum & Co.*

ATTORNEYS



# UNITED STATES PATENT OFFICE.

GEORGE FRANÇOIS JAUBERT, OF PARIS, FRANCE.

## PROPULSION OF SUBMARINE BOATS.

No. 881,803.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed November 27, 1905. Serial No. 289,369.

*To all whom it may concern:*

Be it known that I, GEORGE FRANÇOIS JAUBERT, a citizen of the French Republic, and resident in Paris, France, 155 Boulevard Malesherbes, Paris, France, have invented certain new and useful Improvements Relating to the Propulsion of Submarine Boats, of which the following is a specification.

This invention relates to an apparatus for the propulsion of submarine or submergible vessels, and its object is to permit of adopting an internal combustion engine for operating such vessels both on the surface and when submerged; without necessitating two separate motors for these purposes, while avoiding the inconveniences and complications resulting from the employment of electric accumulators.

According to this invention, the explosion gas engine is fed in a closed cycle, *i. e.*, without air being utilized for the combustion of the fuel. The combustion gases exhaust into a purifier or washer, where the steam is condensed and the carbonic acid partly absorbed, so that an inert gas is obtained, which is then added with oxygen and is capable of being again utilized in the engine for producing an explosive mixture with the liquid fuel.

In the accompanying drawings Figures 1 and 1<sup>a</sup> are views in elevations of the various devices constituting the apparatus and taken together constitute a complete elevation of the device, and Figs. 2—2<sup>a</sup> are views in plan of the apparatus, and taken together constitute a complete plan of the device.

*a* is the explosive gas or combustion motor whose exhaust escapes at *b b'* into a collector provided with a water circulation for cooling purposes.

*c* is the silencer and *d* is an exhaust valve permitting of the exhaust being effected outside the vessel in cases of incorrect operation of the cocks.

*e* is a three-way cock which either permits of exhausting outside the vessel when on the surface or exhausting into the purifier or dissolver when operating in a closed cycle when submerged.

At *b<sup>2</sup>* is shown the union connecting the three-way cock to the purifier or dissolver.

*f* is the purifier which instead of being a rotary apparatus of the "Standard" type, as in the example given in a French Patent No. 309,633 is a plate type washer, in order to

avoid having a large liquid capacity which is important owing to the displacement of the center of gravity due to the pitching and tossing of the vessel. With the same object and with the same success, the inventor has utilized pulverized water or alkaline liquid washers of the Koerting type.

*g* indicates an excess gas outlet which is only utilized in cases in which the purification is not complete. In such cases the excess of gas unabsorbed in the purifier would accumulate in the cycle, and finally the pressure would become such that it would exceed the pressure of the oxygen supply at *p*, so that this latter would be unable to introduce the oxygen into the cycle which would result in the stopping of the motor. As soon as the pressure in the cycle, which is about 10 c. m. of water, increases abnormally, the bell regulator *h* rises and opens the cock *g'*, which regulates the supply to the suction chamber of the gas pump *k* shown in Fig. 1<sup>a</sup>, which forces this excess into the sea, usually in the wake formed by the screw in such a manner as to completely dissolve the gases. The pump *k* is sufficiently powerful to force the excess gas out at a depth of 50 meters.

*i'* is a bell regulator similar to the foregoing and from which the motor sucks the ordinary air at a constant pressure, through the pipe *i<sup>2</sup>* which terminates at the two three-way cocks *j*. During propulsion on the surface, that is to say in an open cycle, these cocks are turned in such a way that the suction is effected in the open air at *i'* the oxygen supply being obturated. During submersion, on the contrary, the cocks are rotated through a quarter revolution and the suction of poor air takes place, oxygen being supplied and the motor operating in a closed cycle.

*l* are the oxygen storage tubes which may, of course, be replaced by any appropriate means for the production of this gas on board *l<sup>1</sup>* is the oxygen collector *l<sup>2</sup>* the branch for introducing oxygen to fill these tubes.

*m* is the oxygen reducing valve which reduces the pressure from 120 kilograms or more to 1 kilogram, which is the pressure in the reservoir tube *n*. It is this reservoir tube *n* that feeds the motor by the intermediary of the bell regulator *o* which acts upon the cock *o<sup>1</sup>*.

*p* is the oxygen distributing valve with the regulating cocks *q*.

*r* are the fuel pumps (which may be gaso-



lene, spirit or the like) each of which supplies a pair of cylinders.

In the accompanying drawing the washing of the gases may be effected with sea water which is taken in at  $t$  and supplied to the purifier at  $t'$  see Fig. 2, this water being discharged into the tank  $u$  and finally into the sea by the pump  $y$ . In this case the purification is only partial. In order to effect complete purification and to obtain a perfectly closed cycle, the tank  $u$  is filled with an alkaline liquid (such as caustic soda, caustic potash or the like) and the pump  $y$  causes this liquid to circulate through a pipe (which is not shown) in the washer until exhausted, it then being forced into the sea and replaced by fresh liquid. Under these conditions the tank should be of sufficient size for a submersion of several hours.

$t^2$   $t^3$  indicate the inlet and outlet for the circulating cooling water of the motor.

By applying this apparatus the weight and volume of the propulsion means of a submarine vessel are considerably reduced, and it is also possible to maintain constancy in the weight of the boat and preserve the interior atmosphere from vitiation.

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

1. In an apparatus for the purpose set forth, the combination of an explosion gas engine, a gas pipe, a silencer placed thereon, an exhaust valve, a purifier, a three-way cock permitting either of exhausting outside the vessel or into the purifier, a pipe leading from the purifier for supplying the purified exhaust gases to the engine, a pump for the excess gases and an oxygen supply to the engine.

2. In an apparatus for the purpose set forth the combination of an explosion gas engine exhausting into a purifier, an excess gas out. with a cock controlled by means of a bell regulator, a gas pump for forcing the excess gas into the sea, a pipe leading from the purifier for supplying the purified exhaust gases to the engine, and an oxygen supply to the engine.

3. In an apparatus for the purpose set forth, the combination of an explosion gas engine exhausting into a purifier, an excess gas pump, a bell regulator for the aspiration

of the gases and a pipe for supplying the exhaust gases, three-way cocks arranged on said pipe for supplying either atmospheric air or exhaust gases to the motor, oxygen storage tubes connected with a reducing valve and with a reservoir tube, a pipe for supplying oxygen to the motor and an oxygen distributing valve with regulating cocks.

4. In an apparatus for the purpose set forth, the combination of an explosion gas engine exhausting into a purifier, a sea-water supply to said purifier, a discharge tank connected with the purifier, a pump for causing the water to circulate through the purifier and for expelling the washing water into the sea, an excess gas pump, a bell regulator for the aspiration of the gases and a pipe leading to the motor, three-way cocks arranged on said pipe for supplying either atmospheric air or exhaust gases to the motor, oxygen storage tubes connected with a reducing valve and with a reservoir tube, a pipe for supplying oxygen to the motor and an oxygen distributing valve with regulating cocks.

5. In an apparatus for the purpose set forth, the combination of an explosion gas engine, an exhaust valve connected with a purifier or washer, a plate type washer having a small liquid surface, a sea-water supply to the washer, a discharge tank connected with said washer, a pump for causing the water to circulate through the purifier and for expelling the washing water into the sea, an outlet and an inlet for the circulating cooling water of the motor, an excess gas pump, a bell regulator for the aspiration of the gases and a pipe for the supply of exhaust gases, three-way cocks arranged on said pipe for supplying either atmospheric air or exhaust gases to the motor, oxygen storage tubes connected with a reducing valve and with a reservoir tube, a pipe for supplying oxygen to the motor, an oxygen distributing valve with regulating cocks and fuel pumps for supplying the motor.

In testimony whereof I have hereunto placed my hand at Paris, France this eleventh day of November, 1905.

GEORGE FRANÇOIS JAUBERT.

Witnesses:

FREDERIC W. CAULDWELL,  
HENRY SCHWAB.