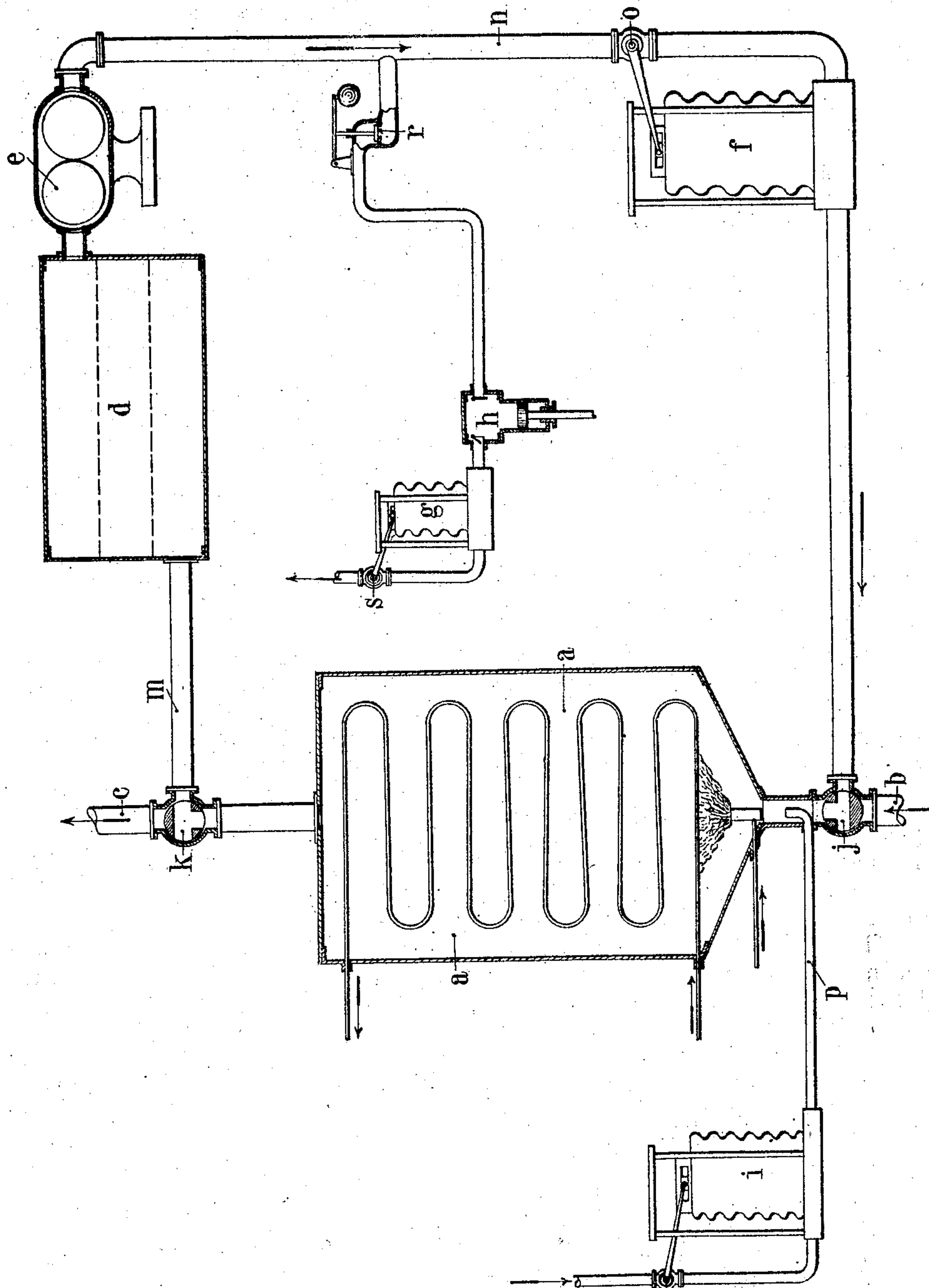


G. F. JAUBERT.  
 PROCESS FOR UTILIZING STEAM ENGINES FOR THE PROPULSION OF SUBMARINES.  
 APPLICATION FILED NOV. 27, 1905.

994,407.

Patented June 6, 1911.



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

INVENTOR  
*George F. Jaubert*  
 BY *Mum & Co*  
 ATTORNEYS



# UNITED STATES PATENT OFFICE.

GEORGE FRANÇOIS JAUBERT, OF PARIS, FRANCE, ASSIGNOR TO ELECTRIC BOAT COMPANY, A CORPORATION OF NEW JERSEY.

PROCESS FOR UTILIZING STEAM-ENGINES FOR THE PROPULSION OF SUBMARINES.

994,407.

Specification of Letters Patent.

Patented June 6, 1911.

Application filed November 27, 1905. Serial No. 289,370.

*To all whom it may concern:*

Be it known that I, GEORGE FRANÇOIS JAUBERT, a citizen of the French Republic, and resident of 155 Boulevard Malesherbes, in Paris, France, have invented a certain new and useful Process for Utilizing Steam-Engines for the Propulsion of Submarines, of which the following is a specification.

My invention has for its object means for supporting combustion in steam boiler furnaces, whereby it is possible to apply a steam engine to the propulsion of submarine vessels during the submersion period. Numerous difficulties have been met in applying steam engines under these conditions, foremost among which is the impossibility of feeding a fire under water in default of the necessary material for supporting combustion and also of discharging the products of combustion without disclosing the exact position of the boat.

The difficulties referred to have been overcome in accordance with the present invention by the combination of the following means: 1. Heating by gasolene, heavy oils or any other fuel burning readily and completely. 2. The employment of pure oxygen (or of air which has been oxygenated or not). This oxygen is either employed pure or diluted with an inert gas such as the combustion gases, for example. 3. Expulsion into the water of the combustion gases in excess (the gases being almost entirely formed of carbonic acid dissolve completely) or neutralizing these gases by means of an alkaline lye. And in order that my invention may be more fully understood, I will describe it with reference to the accompanying drawing which shows a diagrammatic view of an arrangement illustrating the invention.

The boiler *a* may be of the instantaneous vaporization type, say a flash boiler with forced circulation. In these conditions the boiler need occupy but a little space and it may be readily insulated by means of a heat retaining envelop. The fuel may be petroleum, such as employed for illuminating purposes, which, volatilized under the influence of the temperature will burn in a Bunsen burner giving a blue flame, that is to say the combustion will be complete. The burners are supplied either with atmospheric air, through the communication *b c*, or by means of oxygen coming through the pipe *p*, said

oxygen being diluted by the products of the combustion. The products of combustion are purified by their passage in a circuit which comprises a purifier or scrubber *d*, a fan *e* of the rotary type, a pressure regulator *f* for controlling the entrance in the boiler, a safety valve for the cycle with a pump *h* which expels the products of combustion in excess overboard. Said pump is also provided with a pressure regulator *g*. The pipe *p* which leads the oxygen to the burners is provided with a cock *q*, controlled by a regulator *i*.

The steam engine which may be of any known type is not illustrated in order to leave the drawing more clear.

The operation is the following: When the boat is floating at the surface, the three-way cocks *j* and *k* are placed in such a position as to put the furnace of the boiler in communication with the atmosphere, and to isolate the same from the circuit of purification. The supply of oxygen is closed and the air for the combustion arrives by *b* and escapes through *c*. At the moment of submersion, the cocks *j* and *k* are placed in the position shown in the drawing and the products of combustion which escape from the boiler are conducted by the pipe *m* to the washer *d* where they are cooled and purified by passing in an alkaline solution. When leaving the washer, the products are drawn by the fan *e* and the pipe *n* to the boiler and the entrance in the furnace of the boiler is controlled by a cock *o* operated by the regulator *f*. Before arriving under the burners the products receive a quantity of oxygen which arrives by the pipe *p* and whose pressure is regulated by the regulator *i* which latter acts on the cock *q*. When the gases are only washed and cooled, it is necessary that the excess be expelled overboard. The pressure in the cycle is regulated by the safety valve *r* which allows the excess of gas to escape when the pressure rises over a determined limit. The gases in excess are exhausted by means of the pump *h* and expelled overboard. And for this purpose a regulator *g* is provided which opens a cock *s* when necessary. When the gases are purified by an alkaline solution, the quantity of gases in excess is nearly equal to zero.

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. The method of supplying motive power for the propulsion of submarine vessels without disclosing their position, which consists in generating steam by heat resulting from the combustion of a mixture of diluted oxygen and hydrocarbon vapor in such proportion as to give substantially complete combustion utilizing a portion of the products of combustion as the diluent of the oxygen, and disposing of the remainder of the products of combustion by condensation of the water vapor and absorption of the carbon dioxid.

2. The method of supplying motive power for the propulsion of submarine vessels without disclosing their position, which con-

sists in generating steam by heat resulting from the combustion of a mixture of diluted oxygen and hydrocarbon vapor in such proportion as to give substantially complete combustion utilizing a portion of the products of combustion as the diluent of the oxygen, and disposing of the remainder of the products of combustion by condensation of the water vapor and absorption of the carbon dioxid in an alkaline solution within the vessel.

Dated this eleventh day of November, 1905.

GEORGE FRANÇOIS JAUBERT.

In presence of two witnesses:

FREDERIC W. CAULDWELL,  
HENRY SCHWAB.