

(No Model.)

F. W. OFELDT.

APPARATUS FOR OPERATING VAPOR LAUNCHES.

No. 551,226.

Patented Dec. 10, 1895.

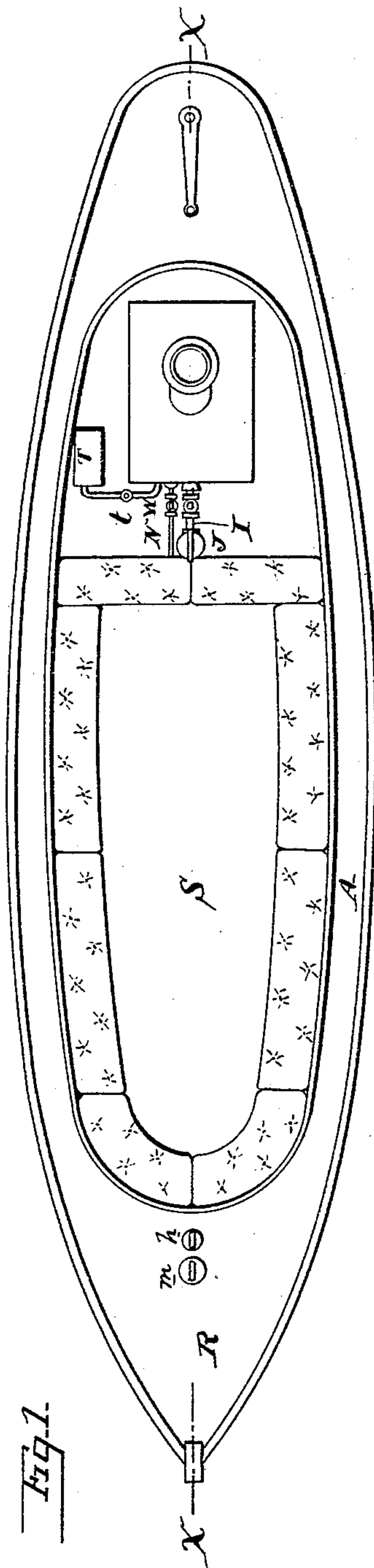


FIG. 1.

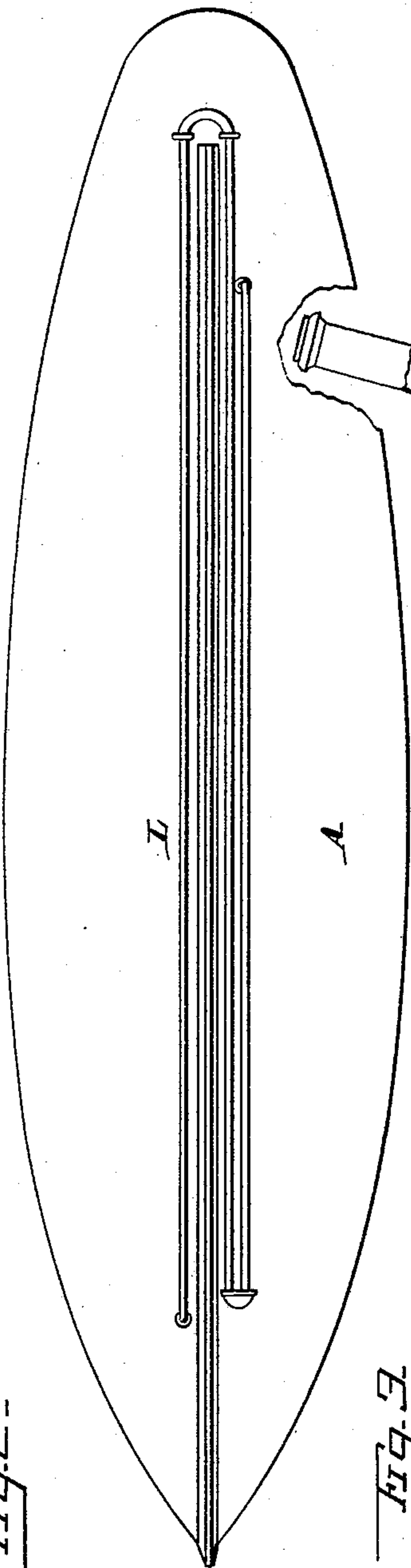


FIG. 2.

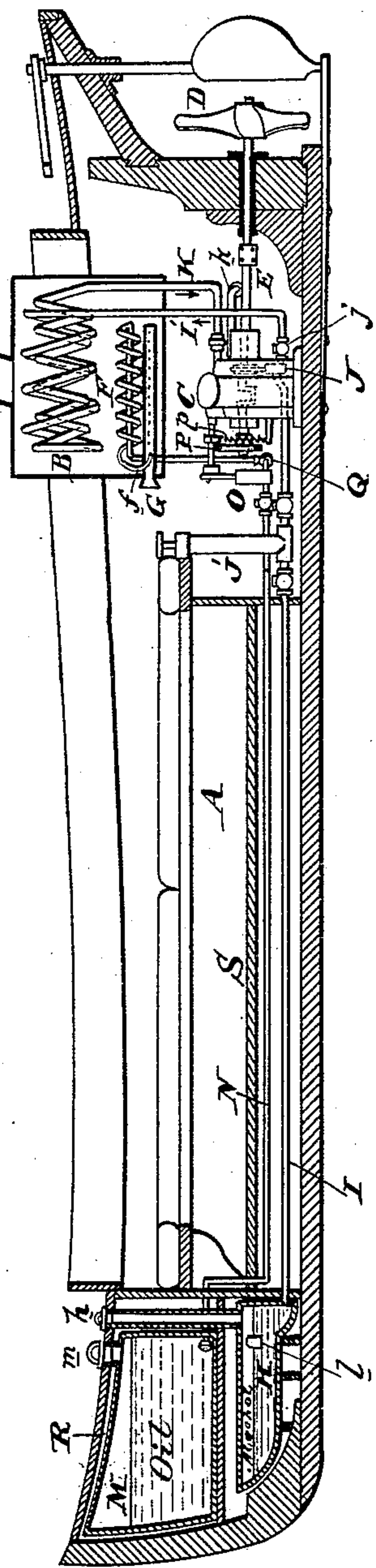
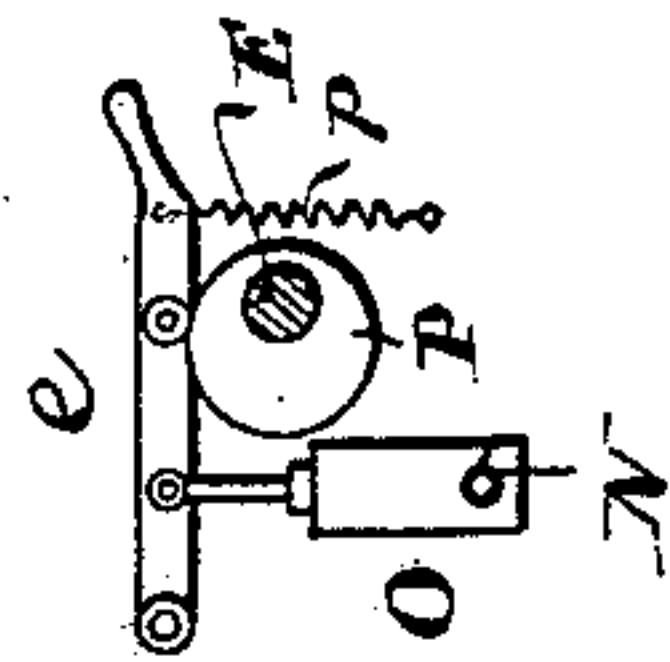


FIG. 3.

Witnesses:

Jesse B. Heller,  
C. H. Newcomb,

FIG. 4.



Inventor.

Frank W. Ofeldt

By *[Signature]*

Attorney.



# UNITED STATES PATENT OFFICE.

FRANK W. OFELDT, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO THE  
MARINE VAPOR ENGINE COMPANY, OF NEW JERSEY.

## APPARATUS FOR OPERATING VAPOR-LAUNCHES.

SPECIFICATION forming part of Letters Patent No. 551,226, dated December 10, 1895.

Application filed April 20, 1894. Serial No. 508,318. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK W. OFELDT, of Jersey City, Hudson county, and State of New Jersey, have invented an Improvement in Apparatus for Operating Vapor-Launches, &c., of which the following is a specification.

My invention has reference to apparatus for operating vapor-launches, &c., and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

Small launches have heretofore been operated by the employment of naphtha, which is vaporized by heat and in its expanded condition employed under pressure to operate the engine. The naphtha vapor upon being exhausted from the engine is condensed and returned to the tank. A portion of the naphtha which is vaporized in the generator has been employed to heat the generator. In this manner a single fluid has been used both to generate the motive power and act as the fuel.

The great objection to the employment of naphtha lies in the fact that while it has excellent properties for being quickly vaporized under pressure, it is very objectionable to have in a launch, because being highly inflammable it is liable to ready ignition, and if from any cause it should become ignited it burns with an intense heat. If it should escape upon the water it does not mix with the water and would burn upon the surface, so as to endanger the lives of the occupants of the vessel.

Another and more important defect in the use of naphtha from a commercial standpoint is that naphtha after being expanded and condensed a few times loses its property of ready expansion and in a great measure is useless for further use. In any event it is not economical to use it for more than about six or eight complete vaporizations. In practice it seems to lose in time its property of becoming a vapor under the temperature of the generator, and for this reason and owing to the lack of a sufficient naphtha supply or the liability of not being able to secure fresh naphtha it becomes difficult to take long cruises in the launch.

The object of my invention is to overcome all of the defects due to the employment of naphtha—that is to say, I eliminate the tendency to fire, I reduce the temperature required for maintaining a given pressure in operating the engines, and I do not require changing or replacing the vaporizable liquid.

In carrying out my invention I provide the launch at the forward end with two tanks, one of small size and containing alcohol, and the other of large size and containing a hydrocarbon oil, such as head-light oil, which is fire-proof. The alcohol-tank is preferably at the bottom, so as to be adjacent to the cool surface of the keel and be protected also against the rays of the sun as its contents are more volatile than that of the oil-tank.

At a suitable location, and preferably in the rear of the launch, I arrange the engine to operate the screw-propeller and the generator for producing the pressure necessary to operate said engine. The alcohol is fed to the generator-coils by a suitable pump continuously operated by the engine, and is quickly vaporized within the coils, assuming a predetermined pressure, and operates the engine at this pressure. The alcoholic vapor after escaping from the engine is condensed in a suitable condenser upon the bottom of the launch, and returns to the alcohol-tank as a fluid. It will be observed that the alcohol is thus in a closed circuit having no communication with the burner or means of heating the coils, and is in no way consumed. The headlight-oil is connected by a suitable pipe with the vapor-generator of the burner, which latter is arranged below the vaporizing-coils of the generator and adapted to produce a hydrocarbon vapor which is mixed with air and burned for the purpose of heating the generator-coils to vaporize the alcohol contained therein. The headlight-oil is supplied to the burner under a given pressure produced by an automatic pump operated by the engine. The headlight-oil will not burn if fire is suddenly applied to it. It will not ignite if it escapes upon the water or into the boat. It is not as volatile as naphtha and therefore has less liability to generate explosive gases. The alcohol is volatile at a lower temperature than naphtha and generates a



higher pressure for the same heat. It is possible to more quickly raise the necessary pressure to operate the engine, and the pressure medium is practically inexhaustible. In  
 5 practice five gallons of alcohol will suffice a twenty-five foot launch for a whole year, and even then the only loss is due to leakage. Owing to the fact that alcohol vaporizes at a  
 10 lower temperature, it is evident that a given supply of oil burned in the vapor-burner will propel the launch to a greater distance than when naphtha is used both as the pressure agent and the fuel.

My improvements will be better understood by reference to the accompanying drawings, in which—

Figure 1 is a plan view of a vapor-launch embodying my improvements. Fig. 2 is an inverted plan view of same. Fig. 3 is a vertical sectional elevation of same on line  $x-x$  of Fig. 1; and Fig. 4 is an elevation of the pump device for the vapor-burner.

A is the boat proper, and as usually made has a seat-compartment or cock-pit S in the middle, a tank-compartment R at the forward or bow end, and a rear compartment for the machinery.

B represents any suitable vapor-generator, preferably formed of a series of coils. The  
 30 terminals from these coils respectively receive the alcohol from the pump and supply vapor to the engine.

H is an alcohol-tank arranged in the lower part of the compartment R at the bow of the  
 35 boat, and is provided with a sealed nozzle  $h$  whereby it may be filled with alcohol when necessary.

I is an alcohol-supply pipe leading from the bottom of the alcohol-tank and passing along the lower part of the boat. This pipe I connects with the suction side of a small alcohol-pump J indicated in dotted lines and directly operated from the shaft E of the engine C. This pump J forces the alcohol  
 40 through a check-valve  $j$  into a pipe I' connecting with the coil of the generator B.

The vapor-pipe from the coils of the generator is indicated at K and supplies the vapor under pressure to the engine C, which  
 50 engine may be of any suitable construction and adapted to operate the propeller D through the shaft E. The exhaust-vapor from the engine C escapes by an exhaust-pipe  $k$  (see Fig. 2) into a condenser L arranged upon the bottom of the boat, so as to be constantly in contact with the cold water, and which produces immediate condensation of the exhausted vapor. The condensed vapor of alcohol leaves the condenser L by a nozzle  $l$   
 55 and thereby returns into the tank H to be used over again. A hand-pump J' is arranged in the pipe I, so that just prior to the operation of the engine C the alcohol may be forced into the generator-coils B to enable a pressure to be formed therein sufficient to start the engine. This pump J' is provided with suitable check-valves to enable its proper oper-

ation, and to prevent any pressure from the generator making itself felt backward into the tank H. 70

F is a vapor-burner arranged below the generator-coils B and is connected with an oil-tank M arranged in the compartment R above the alcohol-tank H by means of a pipe N. The oil-tank M is provided with a sealed aperture  $m$  whereby the tank may be filled with oil from time to time. I prefer to employ in this tank a hydrocarbon oil adapted to stand the fire-test, such as headlight-oil, so that under no normal conditions could the said oil  
 75 be ignited. Arranged in the pipe N is a pump O provided with suitable check-valves, and by the operation of which the oil is sucked from the tank M and forced under uniform pressure into the vapor-burner F where it is vaporized and burned with admixture of air. The nozzle  $f$  of the coil of the burner for vaporizing the oil discharges into an air-tube G, so as to suck in a sufficient quantity of air to produce perfect combustion from the orifices  
 80 of said tube simultaneously heating the burner-coils to vaporize the oil and also the generator-coils B to vaporize the alcohol. 85

The pump O may be of any suitable construction, and is operated by the engine B by means of an eccentric P and spring  $p$ . (More clearly shown in Fig. 4.) In this manner the eccentric P operates the lever  $e$  to suck in the oil in the pump, and the spring  $p$  operates upon the lever to cause the pump to force the  
 90 oil into the vapor-burner under a given pressure. Furthermore, this device is automatic and maintains a given flow of oil irrespective of any variations in the speed of the engine. In this way the temperature is maintained, and consequently the pressure of the alcohol  
 95 vapor in the generator-coils is also maintained uniform, and the engine therefore operates with steadiness and without material variation in its speed. For these reasons there is absolute coaction between the various parts of the apparatus to maintain a given pressure of vapor in the generator for operating the engine by means of a source of heat separate and distinct from the vapor operating the engine. This is a feature of the utmost importance in vapor-launches. The check-valve Q in the pipe N leading to the vapor-burner prevents any possibility of the oil passing from the burner backward into the  
 100 pump during the reciprocations of its plunger. The size of the orifices  $f$  for the escape of the vapor into the air-mixing tube G controls the amount of oil discharged by the pump O, and also insures the absolute amount of pressure which may be possible in the coils B with a given tension of spring  $p$ . 105

The alcohol which is the immediate source of power for the engine is never consumed because it plays no part in the generation of the fuel for the vapor-burner. It is circulated in what may be termed an "absolutely-sealed circuit," and there is no loss of alcohol except what is due to leakage. The low tem- 130



perature at which alcohol may be volatilized and brought to a given pressure is peculiarly advantageous in this system as it permits, with a given amount of oil as a fuel, a greater distance to be traveled by the boat, and also enables the vapor-pressure to be more quickly produced and maintained.

By locating the alcohol-tank H below the oil-tank M it is protected from the sun's heat, first by the tank M and its contents, and, secondly, by being located in a portion of the boat immediately in contact with the water and therefore exceedingly cool. This is an important provision in that the high specific volatility of the alcohol renders it necessary for the proper operation of the apparatus to protect it against excessive temperature in the summer-time when the sun's rays are exceedingly strong.

While I prefer alcohol as the immediate source of power vapor I may employ other highly-volatile substances, which may be termed "equivalents" therefor, such as chloroform or ether; but I prefer for practical purposes to employ the common commercial wood-alcohol which is cheapest. It is also evident that while headlight-oil adapted to withstand the fire-test is the most desirable and more readily attainable, other forms of oil may be employed in lieu thereof.

In starting the apparatus, it is necessary to heat the vapor-burner F by some auxiliary means and this is accomplished by allowing oil to flow from a small tank T through a pipe W controlled by a valve *t* into the vapor-burner where it is ignited so as to give it a preliminary heating sufficient to make it self-acting in the generation of its own vapor. After this preliminary heating the valve *t* is shut off and the apparatus continues to work automatically.

In starting up the apparatus it is also necessary to force some of the alcohol into the generator B when the pump J is at rest, and this is accomplished by means of a hand-pump J', the said pump forcing the alcohol through the pump J and its check-valve *j*. After the apparatus is in operation the pump J feeds necessary alcohol to the generator B and the pump J' is then normally out of action.

The illustrations of apparatus for carrying out my improvements are simply illustrative of suitable apparatus adapted to the purpose, and therefore it is to be understood that I do not confine myself to any particular details thereof so long as it performs the function stated and permits the proper carrying out of my invention. I have described my invention as especially applicable to launches, but it is to be understood that I do not confine myself to that particular use, as the process and apparatus might be employed in connection with power plants in buildings or other places requiring special adaptations.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a vapor launch, power apparatus ar-

ranged upon the vessel and consisting of a vapor generator, in combination with a vapor burner, an engine, independent pumping devices for supplying oil to the burner and volatile fluid to the generator, a tank for holding the volatile liquid arranged near the bottom of the vessel and substantially below the water line thereof, a pipe connecting said tank with the pump for supplying liquid to the generator, a tank for containing the oil arranged within the boat and above the first mentioned tank so as to shield it from the rays of the sun, and prevent the formation of vapor therein and a pipe leading from said oil tank to the pump for supplying oil to the burner.

2. In a vapor launch, power apparatus arranged upon the vessel and consisting of a vapor generator, in combination with a vapor burner, an engine, independent pumping devices for supplying oil to the burner and volatile fluid to the generator, a tank for holding the volatile liquid arranged near the bottom of the vessel and substantially below the water line thereof, a pipe connecting said tank with the pump for supplying liquid to the generator, a tank for containing the oil arranged within the boat and above the first mentioned tank so as to shield it from the rays of the sun, and prevent the formation of vapor therein, a pipe leading from said oil tank to the pump for supplying oil to the burner, and a condenser arranged upon the outside of the boat leading from the exhaust of the engine and discharging into the first mentioned or lower tank.

3. In a vapor launch, a boat having a compartment at its bow, a lower tank arranged at the bottom of the compartment and below the water line for containing a highly volatile fluid, an upper tank for containing oil arranged above the lower tank to shield it from the sun's rays and prevent the formation of vapor therein, sealed orifices for supplying fluid to the respective tanks, a vapor generator, a vapor burner, an engine receiving vapor from the generator, a pipe leading from the upper or oil tank to the vapor burner, a constant pressure pump to force the oil from the tank to the burner, a pipe leading from the lower tank to the generator, and a pump operated by the engine to force fluid from the said tank to the generator.

4. In a vapor launch, a boat having a compartment at its bow, a lower tank arranged at the bottom of the compartment and below the water line for containing a highly volatile fluid, an upper tank for containing oil arranged above the lower tank to shield it against the rays of the sun and prevent the formation of vapor, sealed orifices for supplying fluid to the respective tanks, a vapor generator, a vapor burner, an engine receiving vapor from the generator, a pipe leading from the upper or oil tank to the vapor burner, a constant pressure pump to force the oil from the tank to the burner, a pipe leading from the lower tank to the generator, a pump op-



erated by the engine to force fluid from the said tank to the generator, and a condenser interposed between the exhaust of the engine and the lowermost tank.

5 5. In a vapor launch, power apparatus arranged upon the vessel and comprising a vapor generator, a vapor burner, an engine, and independent pumping devices for supplying  
10 oil to the burner and volatile fluid to the generator, in combination with a tank for holding the volatile liquid arranged near the bottom of the vessel and substantially below the water line thereof, a pipe connecting said tank with the pump for supplying liquid to the generator, a tank for containing the oil arranged  
15 within the boat and above the first mentioned tank so as to shield it from the rays of the sun and prevent the formation of vapor, a pipe leading from said oil tank to the pump  
20 for supplying oil to the burner, means for maintaining a constant pressure on the oil pump and an independent hand pump arranged in the pipe leading from the lowermost tank for the purpose of forcing the volatile fluid through the power pump into the  
25 generator when the engine is at rest to start the apparatus.

6. A power plant consisting of the combination of a vapor generator, a tank for containing volatile liquid, a closed circuit leading  
30 from the said tank including the generator and returning to said tank, an engine interposed between the generator and the tank to receive the vapor, a condenser interposed between the exhaust of the engine and the tank  
35 to condense the vapor flowing in said circuit, a power pump to positively force the volatile liquid from the tank into the generator, a vapor burner having no connection with the closed circuit, an oil tank, a pipe leading from  
40 the oil tank to the vapor burner, and a constant pressure power pump for forcing oil from the oil tank into the vapor burner, whereby the vapor of the burner is entirely  
45 independent of the vapor of the generator and the temperature of the burner is maintained constant.

7. A power plant consisting of the combination of a vapor generator, a tank for containing volatile liquid, a closed circuit leading  
50 from the said tank including the generator and returning to said tank, an engine interposed between the generator and the tank to receive the vapor, a condenser interposed between the exhaust of the engine and the tank  
55 to condense the vapor flowing in said circuit, a power pump to positively force the volatile liquid from the tank into the generator, a vapor burner having no connection with the closed circuit, an oil tank, a pipe leading  
60 from the oil tank to the vapor burner, a constant pressure power pump for forcing oil from the oil tank into the vapor burner whereby the vapor of the burner is entirely independent of the vapor of the generator, and

power devices for simultaneously operating both of the pumps one uniformly with the engine and the other intermittently to maintain the constant pressure.

8. A power plant consisting of the combination of a vapor generator, a tank for containing volatile liquid, a closed circuit leading  
70 from the said tank including the generator and returning to said tank, an engine interposed between the generator and the tank to receive the vapor, a condenser interposed between the exhaust of the engine and the tank  
75 to condense the vapor flowing in said circuit, a power pump to positively force the volatile liquid from the tank into the generator, a vapor burner having no connection with the closed circuit, an oil tank, a pipe leading  
80 from the oil tank to the vapor burner, a power pump for forcing oil from the oil tank into the vapor burner whereby the vapor of the burner is entirely independent of the vapor of the generator, power devices for simultaneously operating both of the pumps, and means  
85 independent of the power devices for forcing oil into the burner to control the pressure under which the oil is delivered to the vapor burner whereby a uniform temperature may be maintained and a uniform or substantially  
90 uniform pressure produced in the generator.

9. In a vapor launch, the combination of a vapor generator, a volatile liquid tank, closed  
95 circulating supply and return circuits between the tank and the generator, an engine receiving vapor from the generator, a condenser between the exhaust of the engine and the tank and arranged upon the outside of  
100 the launch, a pump arranged in the supply circuit between the tank and the generator operated by the engine to supply volatile fluid to the generator, a propeller operated by the engine for moving the launch through the  
105 water and thereby presenting the condenser to fresh bodies of cold water, a vapor burner for heating the generator entirely independent of said generator, an oil tank, a pipe leading from the oil tank to the vapor burner, a  
110 pump for forcing oil from the tank to the vapor burner, power devices operated by the engine for actuating the pump in one direction to draw the oil from the oil tank, and a spring device for operating the oil pump in  
115 the other direction for forcing the oil into the vapor burner under uniform pressure, whereby the pressure under which the vapor of the burner is generated may be less than the pressure of the vapor in the generator  
120 and the heat produced be under control of devices entirely independent of the pressure in the generator.

In testimony of which invention I have hereunto set my hand.

FRANK W. OFELDT.

Witnesses:

FRANK A. OFELDT,

JOHN B. M. SHOWELL.