Sept. 8, 1925. 1,553,156

C. W. HART

INTERNAL COMBUSTION ENGINE

Filed March 1, 1920

Fig. 1.

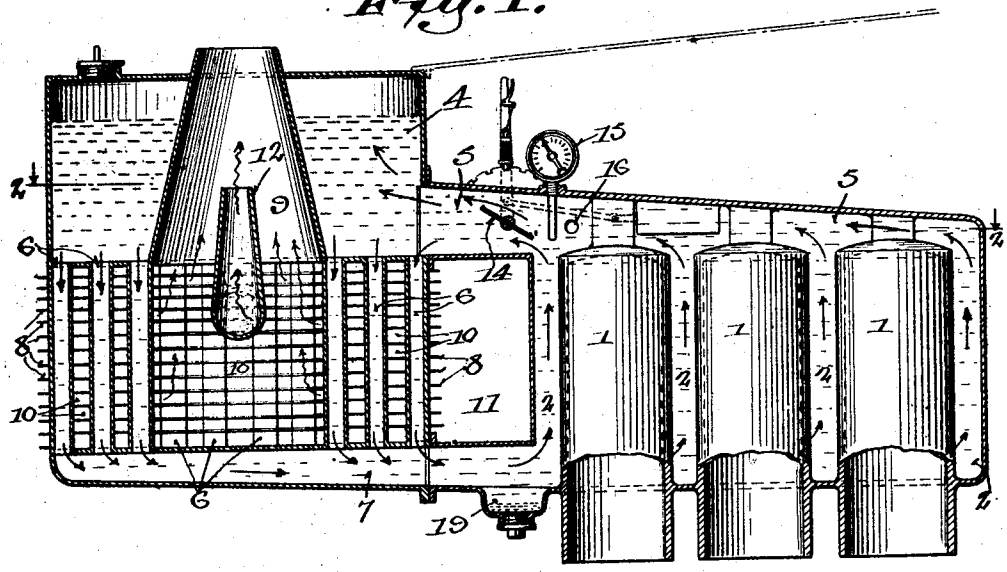
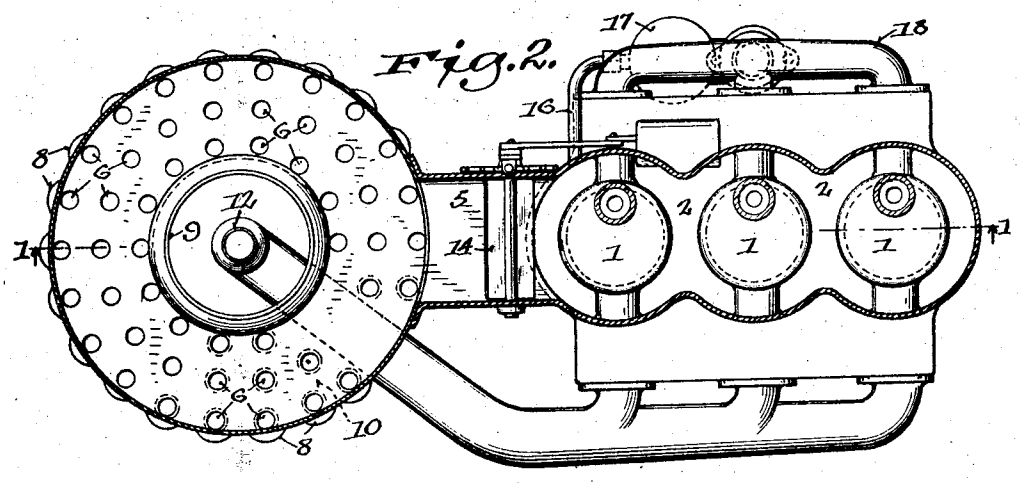


Fig. 2.



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UNITED STATES PATENT OFFICE.

CHARLES W. HART, OF MILWAUKEE, WISCONSIN.

INTERNAL-COMBUSTION ENGINE.

Application filed March 1, 1920. Serial No. 362,264.

To all whom it may concern:

Be it known that I, CHARLES W. HART, a citizen of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

My invention relates to improvements in internal combustion engines and particularly to improvements in the cylinder cooling and fuel supply systems of such engines.

The objects of my invention are to combine the cylinder cooling and fuel supply systems in such a manner that the liquid fuel may be used as the circulating medium to cool the cylinder or cylinders; to provide for connecting the carbureter or fuel supply duct of the engine with the upper portion of the circulatory system in such a manner as to establish a minimum level for the circulatory liquid below which the engine cannot be maintained in operation for lack of fuel; to provide for a more direct delivery from the fuel reservoir to the engine by associating the fuel reservoir with the engine cylinder as a part of the cooling system above referred to; to provide simple means for reducing the heat of the liquid in the reservoir, including the utilization of such heat in the preparation of the fuel charges for delivery into the engine; to eliminate the danger of freezing which exists where water containing jackets and radiating systems are employed; to provide means for accurately controlling and regulating the heat of the fuel charges; to eliminate or reduce to a minimum the danger of clogging or obstructing fuel ducts or passages with sediment or foreign material of any kind; to provide simple means for utilizing low grade hydro-carbon fuels with maximum economy and developed efficiency in the operation of the engine, with minimum carbonization; and to maintain cylinder wall temperatures favorable to ideal running conditions, including good lubrication and minimum deterioration.

My improved engine is particularly adapted for installation upon heavy duty tractors such as farm tractors, but it is not limited to such use or purpose. My improvements may be applied generally to all internal combustion engines.

In the drawings:

Figure 1 is a central longitudinal sectional view of an internal combustion engine, radiator, and fuel chamber embodying my invention.

Figure 2 is a plan view, partly in horizontal section, on line 2—2 of Figure 1.

Like parts are identified by the same reference characters thruout the several views.

The upper or working portions of the cylinders 1 are suitably jacketed to provide a liquid cavity or cavities 2 encircling the respective cylinders and communicating at the top with a portion 4 of the fuel reservoir thru a passage 5. The portion 4 of the reservoir is connected by radiator tubes or ducts 6 with a return passage or set of passages 7 which lead to the lower end of the jacket. The walls of the radiator ducts or passages are preferably formed with heat conducting ribs or projections 8 and a relatively large air passage 9 leads upwardly from the central portion of the radiator thru the portion 4 of the reservoir to the exterior. Air may be drawn thru the interspaces 10 of the radiator from a main air admitting cavity 11 and thru lateral openings to the cavities or spaces 10 and forced out thru the passage or stack 9 by any suitable means. Where the engine is to be associated with a tractor, a nozzle 12 connected with the exhaust manifold, is preferably employed. It is centrally disposed in the stack 9 and arranged to deliver a vertical blast thru the top of the stack, thereby causing a forced draft thru the radiator.

The circulation of the liquid fuel thru the jacket cavity or cavities 2 may be controlled by a butterfly valve 14. Thermo or gravity circulation may be depended upon but it is not material to my invention whether this is the case or whether the liquid is mechanically circulated. The valve 14, may be closed or nearly closed when the engine is started or either just before or after stopping it, whereby the normal running temperature may be quickly attained when the engine is started and whereby the cylinder may be kept warm for considerable periods after it has stopped. A thermometer 15 is preferably employed to indicate the temperature of the liquid in the jacket cavity.

A fuel duct 16 leads to a carburetor float chamber 17 from a point in the passage 5 above the jacket cavity or cavities 2. This duct is short since the carburetor 17 and intake manifold 18 are near the upper ends

of the cylinders, and the duct 16 may therefore be connected directly to the carburetor at only a short distance from the inlet of the duct. The butterfly or circulation controlling throttle valve 14 is located between the inlet to the duct 16 and the portion 4 of the reservoir, and therefore this duct receives the more highly heated and also the more quickly heated liquid fuel. The location of the duct is such as to reduce the danger of its being clogged with sediment to a minimum.

The valve 14 may be manually or thermostatically adjusted. The portion 4 of the reservoir may be of such capacity as to receive a normal quantity of fuel, the available supply for the engine being limited by the location of the connection of the duct 16 with the jacket cavity or superposed portion of the passage 5. It is therefore obvious that the location of the fuel outlet of the circulatory system is such as to secure a four fold advantage, i. e., to protect the engine from overheating, to deliver the fuel immediately to the carburetor float chamber through a short passage, to withdraw the fuel at the hottest point in the circulatory system, and to withdraw it at a point which is located at a considerable distance above the bottom passage 7 thereby avoiding sediment both by reason of the distance of the outlet from the bottom and of the heated condition of the fuel in and above the cylinder jacket. The heat increases the fluidity of the fuel and allows any entrained sediment to settle to the lowest level with greater freedom than would otherwise be the case. Further, the upward movement along the cylinder walls will ordinarily be slow, as compared with the movement in the passage 5, and even if any particles of sediment reach the passage 5, they will be swept along the bottom of the passage and will tend to settle into any intervening jacket cavities that may be encountered. The lower passage 7 is large enough to allow sediment to remain at the bottom after it has once settled, but a collecting well 19 may be provided between the radiator portion and the jacket portion of the circulatory system.

I claim:—

1. A jacketed internal combustion engine, in combination with a fuel chamber, and a radiator having upper and lower communicating connections with the jacket cavity; a valve in the upper connection adapted for the control of the circulation between the jacket cavity and the radiator; and a non-air feeding fuel supply duct communicating with the jacket cavity at the rear of said valve and leading to the engine, whereby to withdraw fuel from the cavity at a point where such fuel is at its highest temperature.

2. A jacketed internal combustion engine, in combination with a radiator having upper and lower communicating connections with the jacket cavity, a valve adapted to control circulation from the jacket cavity to the radiator thru the upper communicating connection, and the fuel supply duct leading from said upper connection, and arranged to supply fuel to the engine cylinders from a point in said connection on the engine side of the valve.

In testimony whereof I affix my signature.

CHARLES W. HART.