Sept. 4, 1928.

1,683,268

A. B. STREETER

ENGINE HEAD

Filed Feb 15, 1926

2 Sheets-Sheet 1

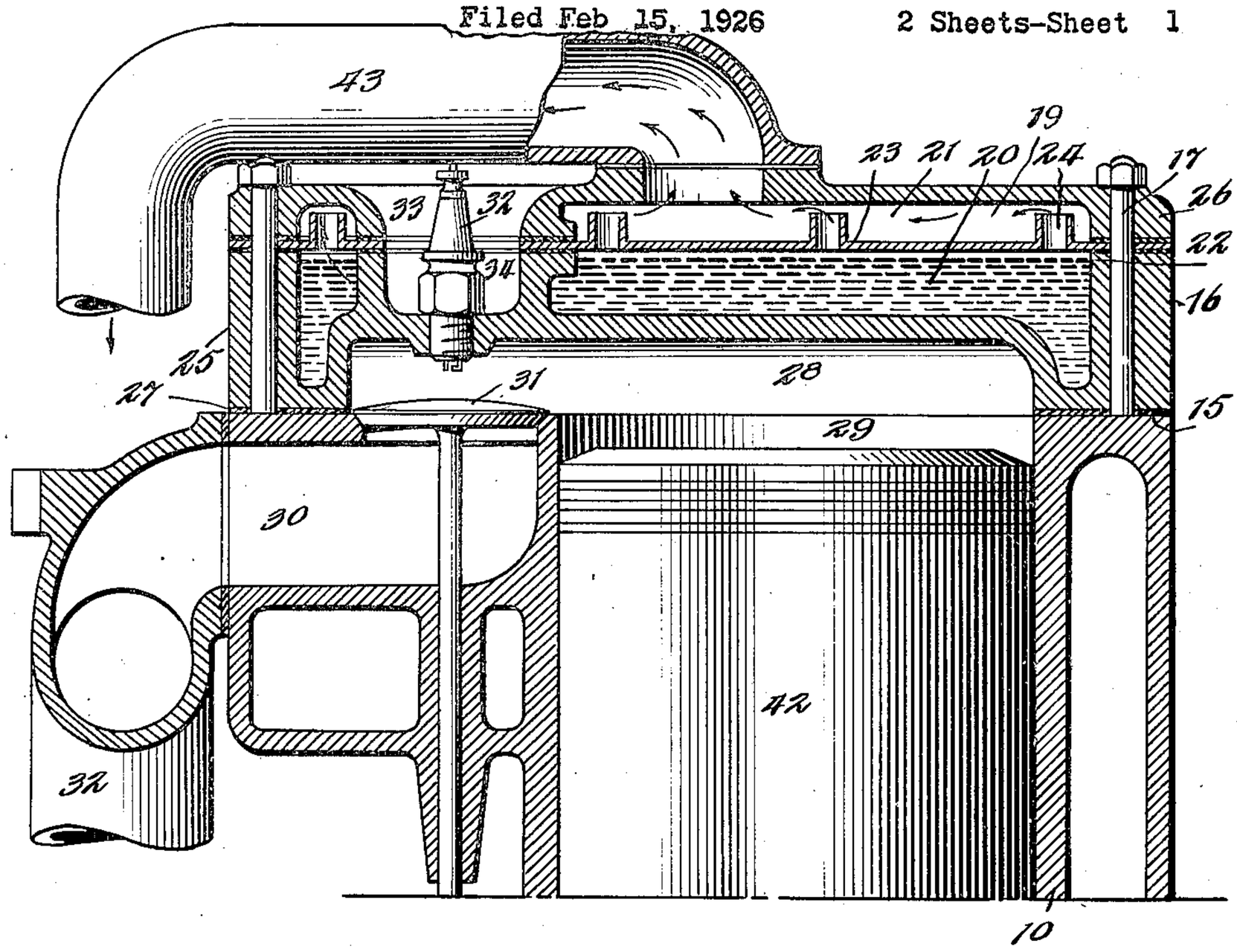

Fig. 1.

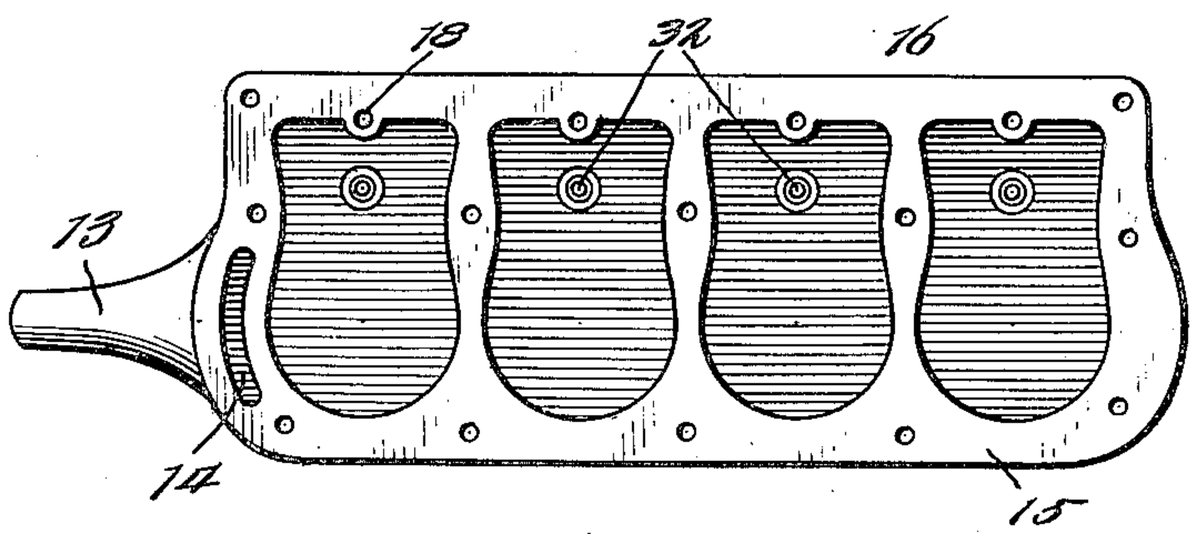

Fig. 4.

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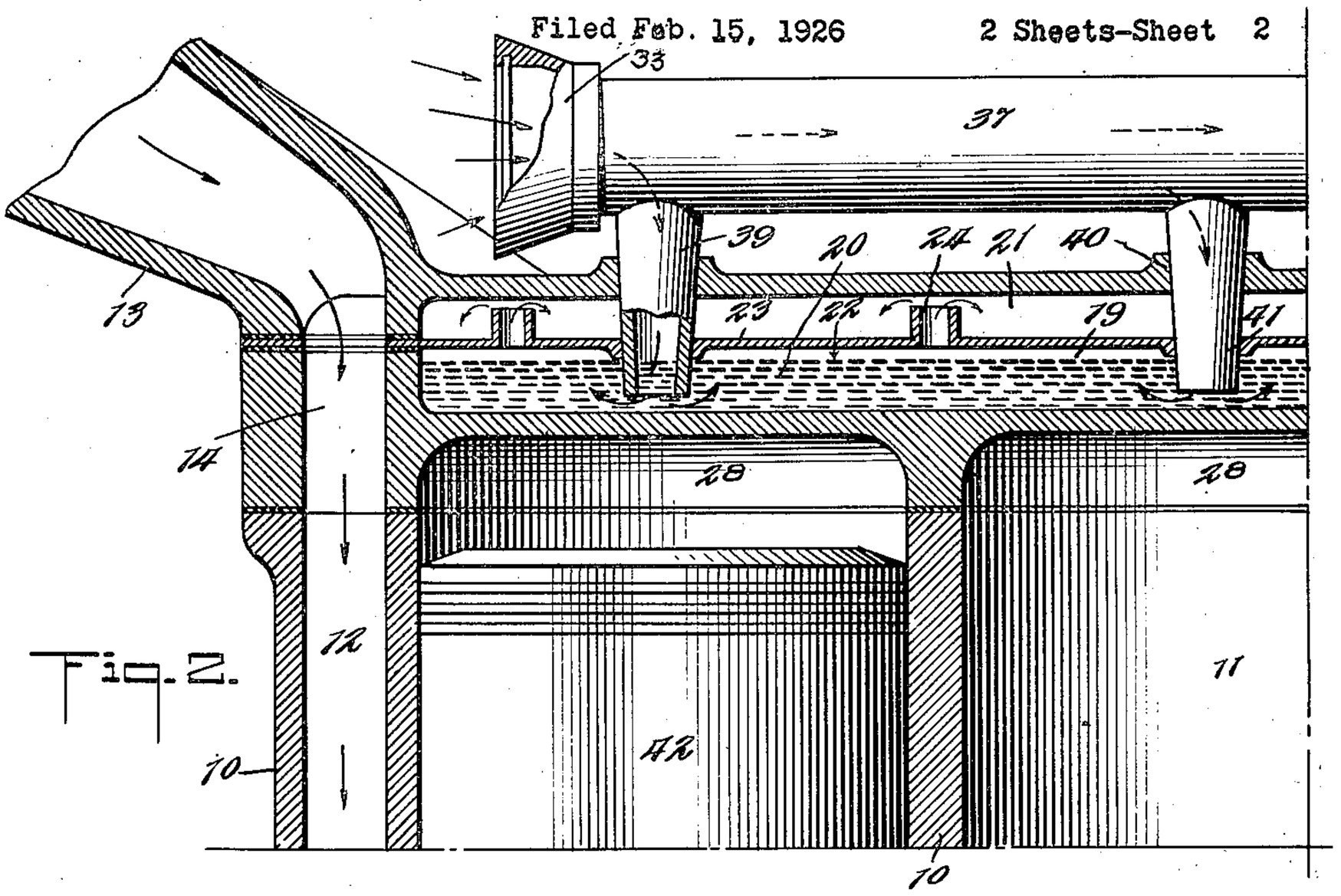

Fig. 2.

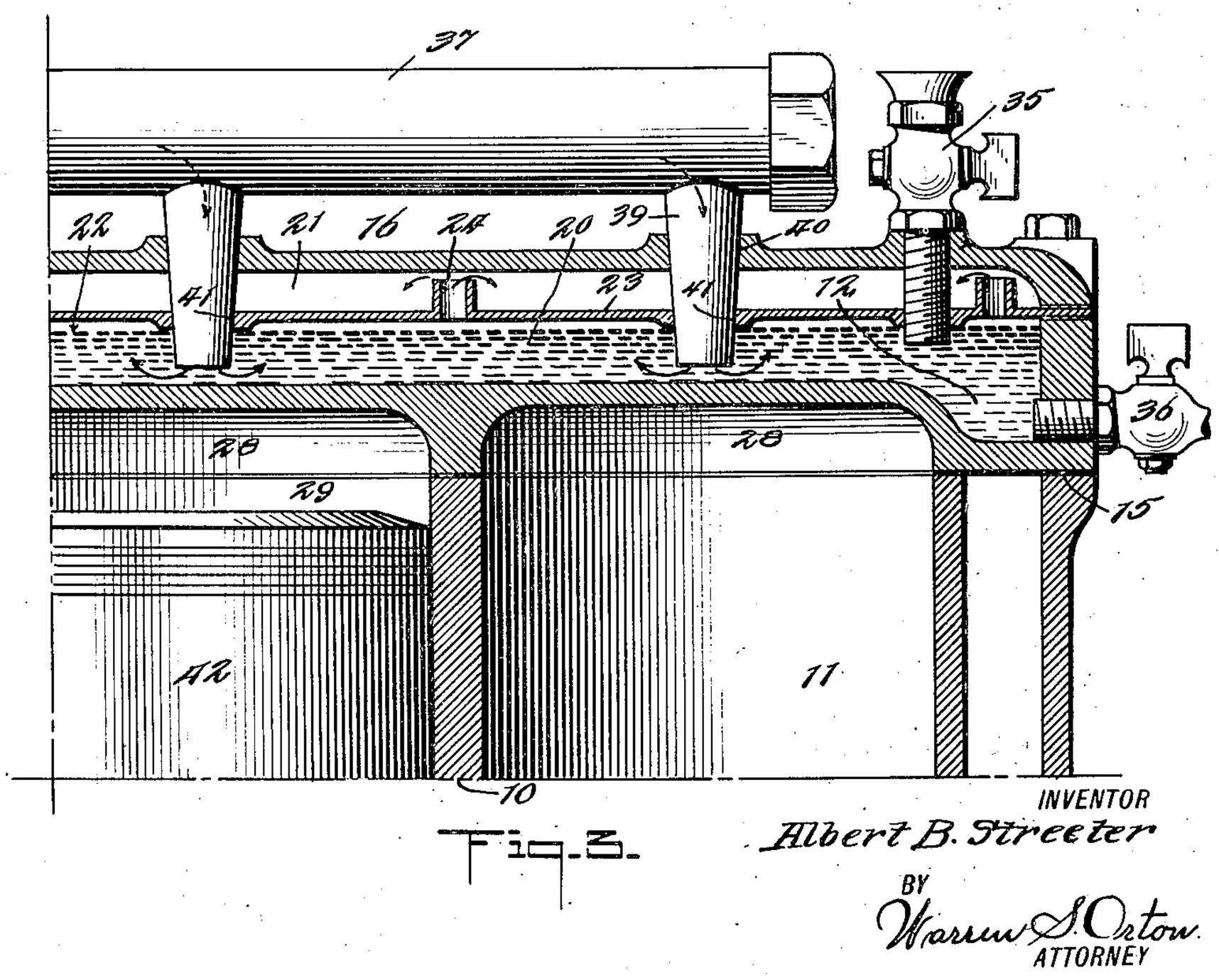

Fig. 3.

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UNITED STATES PATENT OFFICE.

ALBERT B. STREETER, OF NEW YORK, N. Y.

ENGINE HEAD.

Application filed February 15, 1926. Serial No. 88,188.

The invention relates in general to an engine head for a multiple cylinder, internal combustion engine, and the invention specifically relates to such a head when functioning as part of the cooling system of the engine and as an air heater, air cleaner and as a humidifier or fuel charging device for use with internal combustion engines.

The primary object of the invention is to provide a new form of head for internal combustion engines which can be readily substituted on the cylinder block for the conventional forms of heads now in general use, and by means of which novel head it will be possible to heat, charge and otherwise treat the combustion supporting air supplied to the carburetor, and which will incidentally tend to cool the combustion chamber and particularly cool the spark plugs mounted on the head and used for firing the charge in the several combustion chambers.

Another object of the invention is to provide in such a structure for a uniform distribution of the cold incoming air in its contact with the hot portion of the head and thus tend to prevent unequal chilling of localized parts of the head with resulting tendency to misfiring of the charge in the adjacent cylinders.

Incidental to the last desideratum, the invention features the uniform abstraction of heat equally from the several combustion chambers and the utilization of this heat for raising the liquid in the head to its vaporizing point in those cases where such action is required, or to raise the temperature of the water where a humidifying action of the air is desired.

Still another object of the invention is to provide a form of head the several parts of which can be readily separated for cleaning, repairing and substitution of damaged or worn parts when the head is removed from the cylinder block.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the following particular description of one form of device embodying the invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the accompanying drawings;

Fig. 1 is a transverse vertical sectional view through the upper portion of a cylinder block of conventional form equipped with a head constituting a preferred embodiment of the invention, and both shown in section taken axially through one of the middle piston chambers;

Fig. 2 is a longitudinal sectional view at one end of the structure shown in Fig. 1;

Fig. 3 is a similar view adjacent the other end, it being understood that the part shown in Fig. 1 is positioned adjacent the center of the engine and between the parts shown in Figs. 2 and 3; and

Fig. 4 is a plan view of the underside of the head when removed from the cylinder block.

In the drawings there is shown an internal combustion engine of the four cylinder type including a cylinder block 10 provided with piston cylinders 11 and water jacketing spaces 12, it being understood that the showing is intended to represent substantially an engine block of the Ford type except that there is no outlet between the water space 12 and the hollow interior of the head as is usual in such types of engines. There is shown the usual form of nipple 13 carried by the head for making fluid connection with the radiator and communicating through the passageway 14 at one end of the head to the water jacketing space 12 in the cylinder block. In the instant case the top of the block about the cylinders provides a flat surface 15 for receiving the head 16 particularly constituting the novel feature of this disclosure. The head constitutes a marketable unit complete in itself and is provided with bolts 17 and bolt holes 18 by means of which the parts which form the head may be secured together and to the cylinder block as is usual in the mounting of conventional forms of heads to such cylinder blocks. The disclosure features the providing in the head of a wide shallow liquid containing chamber 19 in which is contained a body of liquid 20 arranged to provide a gas or a vapor chamber or space 21 above the level 22 of the liquid pool in the head. This liquid is intended to

be water where the device is intended to be utilized for the purpose of humidifying the air passed through the carburetor as hereinafter described, or it may be some suitable form of hydrocarbon, preferably a hydrocarbon which will vaporize readily where it is intended to utilize the disclosure as a super charger for enriching the hydrocarbon fuel as it is fed to the carburetor.

To prevent oscillation or undue splashing of the liquid in the head a baffle plate 23 is positioned slightly above the normal liquid level 22 in the chamber. Preferably this baffle defines the line between the liquid chamber and the gas chamber or space 21 above the same. The baffle is provided with a plurality of horizontally spaced apart relatively short upstanding tubes 24 constituting vents for discharging the vapor or gaseous products discharged from the liquid into the gas space 21.

For the purpose of providing a convenient means for replaceably mounting the baffle in position, and at the same time to provide access to the interior of the head for the purpose of cleaning the same and replacing the baffle, it is herein suggested that the head be formed of two parts, a lower hollow casting 25 and an upper hollow casting 26 disposed with the baffle fitting therebetween and secured by the through bolts 17.

It is also suggested that a conventional form of sheet packing 27 be positioned on opposite sides of the baffle and between the head and the cylinder block so as to insure a hermetically tight fit between the several parts.

The several portions of the underside of the lower casting 25 which are positioned over the piston chambers are recessed to provide a combustion chamber 28 at the top of each piston cylinder 29 in the cylinder block. Following conventional structures fuel is introduced through the intake 30 controlled by the valve 31 and supplied from the carburetor through the conduit 32 as is usual in such constructions. The charge in the combustion chamber is ignited by a spark plug 32 intruded into the combustion chamber above the fuel inlet and through the recessed portion of the bottom wall of the casting 25. The upper portion of the spark plug is contained in a cup 33 formed mainly by superposed cylindrical walls projecting upwardly from the bottom of the casting 25 and depending from the top of the casting 26. This construction provides an air pocket 34 for receiving the upper portion of the spark plugs and in each instance the cup is surrounded by the cooling liquid 19 in the liquid chamber. This phase of the construction accordingly features the mounting of the firing plugs so that they will be air cooled and at the same time protected within the outlines of a cup which itself is subjected to the cooling effect of the liquid in the head.

Liquid is supplied to the liquid chamber through a valve controlled inlet funnel 35 (see Fig. 3) and the liquid is drained from the chamber whenever necessary by means of a drain cock 36.

Extending lengthwise of and above the head is a cold air conduit 37 provided at one end with a screened intake port 38 and having depending therefrom a plurality of auxiliary passageways 39 in the form of nipples fitted in openings 40 in the top of the head and extending through openings 41 in the baffle plate therebelow. In the form illustrated one of these passageways discharging into the liquid in the chamber and at a point centrally positioned above each of the piston chambers 29. From this construction it will be appreciated that the cold air passes from the air conduit into the liquid and above the hot points of the head centered above each of the combustion chambers. In this way, the cold air is distributed above each of the pistons 42 and this air has a tendency to cool the head, the piston ends and the adjacent parts uniformly.

Opening out through the top of the head and adjacent the center thereof is an air discharging conduit 43 which leads through the carburetor (not shown) and leaves through the several intake conduits 32 to the several cylinders.

In operation it will be understood that the engine functions as is usual with such engines and that the suction effect or reduced pressure conditions in the combustion chambers causes air to be drawn along the conduit 43 and into the liquid in the head. The reduced pressure condition in the conduit 43 will cause the air to bubble through the body of liquid in the liquid chamber. As the air is drawn through the liquid it will of course pick up particles thereof or will mix with the vapors or gases discharged from the liquid pool, this action is facilitated by the heating of the liquid pool from the combustion of the gases in the combustion chamber incidental to the firing of the fuel charge in the operation of the engine. The air is incidentally cleaned as it is passed through the liquid so that there is discharged to the carburetor, or other receptacle, clean air which has been humidified or charged with the products discharged from the liquid and which products will, of course, depend upon the character of liquid used in the pool. At the same time, it is appreciated that this liquid functions as the usual water jacketing of heads in internal combustion engines and tends to keep this head cool. It is a feature of this disclosure however that the liquid in the head is distinct and separated from the water or other liquid which may be used in the cylinder block. This separation of the two liquids would be particularly desirable where a hydrocarbon is used as the liquid for in this case

there would be no advantage in causing hydrocarbon to circulate through the entire cooling system.

In order to obtain access to the interior of the head it is simply necessary to remove the holding bolts which secure the head to the cylinder block and separate the castings and gaskets which go to make up the head.

Having thus described my invention, I claim:

1. An internal combustion engine comprising a cylinder block provided with piston containing chambers open through the top of the block and provided with water jacket spaces, a head for the block with its underside recessed to provide combustion chambers for each of the piston chambers, means for demountably securing the head to the block, said head provided with a liquid chamber adapted to contain a liquid, and provided with an air intake discharging into said chamber adjacent its bottom and into the liquid therein below its level, and said head provided with a discharge conduit leading off from the upper portion of said liquid chamber and from the free space above the liquid level therein, and a baffle provided with discharge vents positioned in the head and separating the liquid chamber into a lower liquid containing chamber and an upper gas or vapor containing chamber.

2. An internal combustion engine comprising a cylinder block provided with piston containing chambers open through the top of the block and provided with water jacket spaces, a head for the block with its underside recessed to provide combustion chambers for each of the piston chambers, means for demountably securing the head to the block, said head provided with a liquid chamber adapted to contain a liquid, and provided with an air intake discharging into said chamber adjacent its bottom and into the liquid therein below its level and said head provided with a discharge conduit leading off from the upper portion of said liquid chamber and from the free space above the liquid level therein.

3. An internal combustion engine including a cylinder block, a head therefor, means for demountably securing the head to the block, said head provided with a liquid chamber adapted to contain a liquid confined to the head and thus distinct from any liquid which may be used to cool the block, means for leading air through said liquid, said means including an air conduit discharging into the chamber below the level of the liquid therein and also including a discharge conduit leading from the upper portion of said chamber.

4. An internal combustion engine including a cylinder block, a head therefor, means for demountably securing the head to the block, said head provided with a liquid chamber adapted to contain a liquid confined to the head and thus distinct from any liquid which may be used to cool the block, and means for leading air through said liquid.

5. In an internal combustion engine, the combination of a cylinder block provided with a cooling system and with means for introducing fuel to the cylinder therein, a head provided with a cooling system distinct from the cooling system in the cylinder block, and means for causing air to pass through the head.

6. In an internal combustion engine, a head provided with a liquid chamber and means for causing air to pass through said chamber and its liquid content.

7. In an internal combustion engine, the combination of a cylinder block, a head therefor provided with a liquid chamber, an air conduit having a plurality of passageways discharging into said liquid chamber and an air conduit for drawing off from the top of said chamber gases which may form therein.

8. In an internal combustion engine, the combination of an open end cylinder provided with a fuel inlet, a head for the open end of the cylinder, said head provided with a liquid containing chamber in fluid communication with the fuel inlet, and an air conduit having its intake end open to the external atmosphere and its discharge end opening into said liquid chamber below the normal level of the liquid therein.

Signed at New York, in the county of New York and State of New York, this 13th day of February, A. D. 1926.

ALBERT B. STREETER.