T. L. & T. J. STURTEVANT.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED AUG. 5, 1914.

1,164,675. Patented Dec. 21, 1915.

Fig. 1.

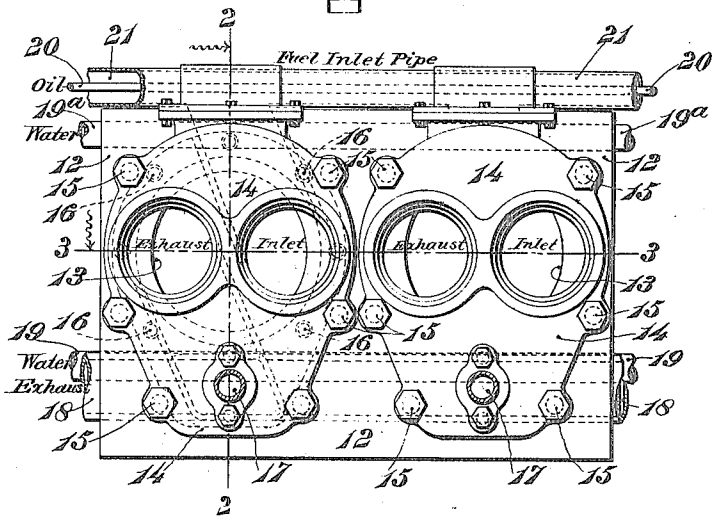


Fig. 2.

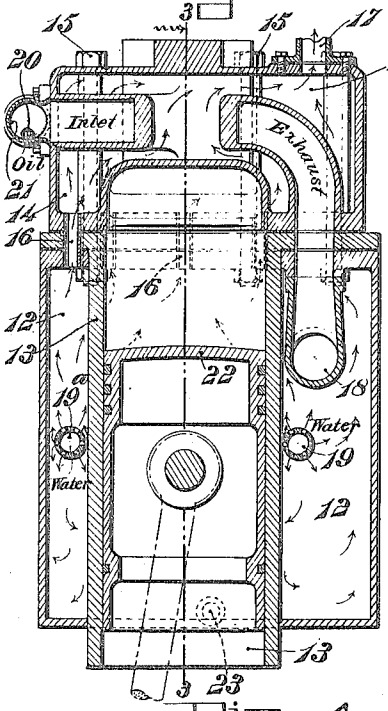


Fig. 3.

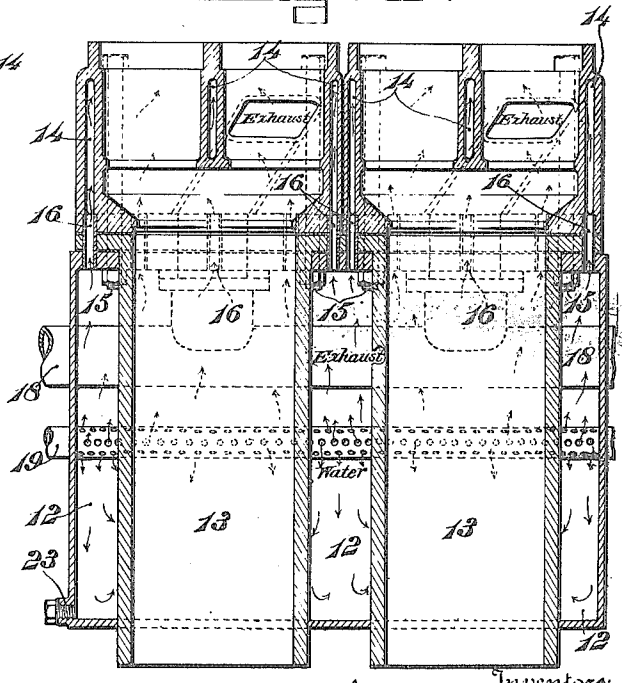


Fig. 4.

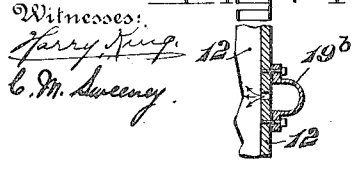
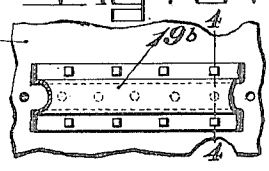


Fig. 5.



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UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION ENGINE.

1,164,675. Specification of Letters Patent. Patented Dec. 21, 1915.

Application filed August 5, 1914. Serial No. 855,166.

To all whom it may concern:

Be it known that we, THOMAS L. STURTEVANT and THOMAS J. STURTEVANT, citizens of the United States, residing, respectively, at Quincy and Wellesley, in the county of Norfolk and State of Massachusetts, have invented or discovered certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to multiple-cylinder internal combustion engines, and has for its object to provide efficient means for cooling the cylinders and other parts in a uniform manner so as to equalize, as nearly as possible, the temperature of the heated parts in such a way that expansion, due to heat, will be practically uniform, thereby avoiding distortion due to unequal expansion. For example, in a marine engine of the well-known Murray & Tregurtha type, in which the cylinders are arranged in tandem or in line with each other, if the water for cooling the engine cylinders and their parts be introduced into the water box at one end thereof, and be discharged at the other end thereof, it will be much warmer at the discharge end of the water box than at the entering end thereof, and the cylinders, for example, of a six cylinder engine, will therefore be unequally cooled, and more or less distortion of the engine, due to unequal expansion by heat, is thus liable to result. In accordance with the present improvement, however, the water supply pipe or pipes, extending longitudinally of the water box, are perforated throughout their lengths so as to discharge the cooling water in jets throughout the length of the box, thereby uniformly cooling the cylinders and other parts. In accordance with the present invention the exhaust pipe of the several engine cylinders is preferably located in the water box and adjacent to a perforated water pipe, so as to be cooled throughout its length by jets of water from said pipe. Also in accordance with the present invention the cylinder heads may be cooled by water flowing from the water box through an encircling series of pipes affording passages from the water box to the chambers of the jacketed cylinder heads, and the lubricating oil supply pipe is preferably located in the fuel inlet pipe so as to be cooled by the expansion due to the fuel spray in said fuel inlet pipe. The lubricating oil thus cooled is forced under pressure through said oil pipe and is streamed upon the engine bearings or surfaces which are to be lubricated and kept cool.

In the accompanying drawing Figure 1 is a plan view of a part of an internal combustion engine embodying the present invention. Fig. 2 is a vertical section of the same on line 2—2, Fig. 1. Fig. 3 is a vertical section of the same on line 3—3, Fig. 2. Figs. 4 and 5 illustrate a slight modification of the invention.

Referring to the drawing, 12 denotes the water box of an internal combustion engine and which water box may be of any desired length, according to the number of cylinders which the engine may have. The cylinders 13, of any desired number, are preferably removably mounted in the water box 12 into which they are tightly fitted in any suitable or well-known manner. The water box 12 is open from end to end and thus affords a single or continuous chamber throughout the length of the engine, and the cylinders 13 are surrounded by the space of this chamber so that they are nearly immersed in the water therein contained, when the chamber is filled.

In the drawings only two cylinders are shown, but it will be understood that an engine embodying the present invention may have four, six, or any other desired number of cylinders.

Mounted on each of the cylinders 13 is a water jacketed head 14, these cylinder heads being secured to the cylinders in any suitable manner, as by means of bolts 15 passing through flanges in the cylinder heads and cylinders, and suitable packings may be located between said flanges to make tight joints. The chamber of the water box communicates with the chambers of the water jackets of the cylinder heads by means of a series of pipes 16 arranged around or encircling the cylinders and cylinder heads, as indicated by dotted lines at the left of Fig. 1, so that the cooling water from the water box will be forced into the water jackets of the cylinder heads by a plurality of jets dis-

posed about the cylinder heads in such a manner as to effect a uniform cooling of the same, the cooling water flowing upward in the cylinder heads through the pipes 16, and being discharged therefrom at the exist 17 which will communicate with a suitable discharge pipe.

The exhaust pipe 18, which communicates with the several cylinder heads, is preferably arranged in the chamber of the water box through which it extends longitudinally, and the cooling water is introduced into the chamber of the water box through a pipe 19 preferably arranged adjacent to the exhaust pipe 18, said water pipe being provided along and preferably throughout its length with perforations so that jets of water will be discharged therefrom in such a manner as to cool the exhaust pipe uniformly and also so as to maintain the temperature of the water in the water box, throughout the length thereof, as nearly uniform as possible. A second longitudinally extending perforated water pipe 19^a may be employed, if desired, although this is not absolutely necessary. The water is forced through the pipe 19 by a suitable pump, as is usual.

The oil pipe 20, through which the oil for lubricating the bearings of the engine is supplied is, in accordance with the present invention, preferably partly located within the fuel inlet pipe 21, which latter communicates with the inlet ports of the cylinder heads in the usual manner. Thus the lubricating oil will be cooled by the evaporation or vaporization of the liquid hydrocarbon fuel in said fuel inlet pipe as said lubricating oil is forced under pressure to the engine bearings to which it is stream-applied.

The cylinders 13 will, of course, be provided as usual with pistons 22, but as these and other parts of the engine form no part of the present invention further description or illustration thereof is not necessary.

The water box 12 is preferably provided at or near its bottom with an opening closed by a removable plug 23 and through which opening all of the water may be withdrawn from said box and the jacketed cylinder heads when said plug is removed.

From the foregoing it will be understood that the present invention provides means whereby the temperature of the water in the chamber of the water box of the engine may be equalized throughout the length of said box, so that distortion of the engine parts, due to unequal expansion by heat, may be avoided, and also provides constructions whereby the cylinder heads may be uniformly cooled by means of water flowing through a plurality of water inlets to the chambers of the jackets thereof, as also means whereby the dangerous exhaust pipe may be cooled, and means whereby the pipe supplying the lubricating oil for the bearings of the engine may be safely located out of the way and kept properly cooled.

The invention is not to be understood as being limited to the details herein shown, as other means than the longitudinally extending perforated inlet water pipe or pipes may be employed, as, for example, by jetting the water into the water box through its sides throughout the length thereof, as will be understood from Figs. 4 and 5, or by other constructions whereby the cylinders and other parts may be jet-cooled in such a manner as to keep them at equal temperatures, or approximately so.

In the construction shown in Figs. 4 and 5 the water will be jetted into the water box 12 from the water conduit 19^b through a longitudinal series of openings formed in the sides of said box.

Having thus described our invention we claim and desire to secure by Letters Patent:

1. In an internal combustion engine, the combination with a plurality of engine cylinders, of a water box providing a continuous chamber by which said cylinders are surrounded, and means whereby jets or streams of water may be discharged into said chamber of said box at separated points throughout its length, so that the temperature of the cooling water in said chamber will be approximately equalized in all parts of said chamber.

2. In an internal combustion engine, the combination with a plurality of engine cylinders, of a water box providing a continuous chamber by which said cylinders are surrounded, and a water supply pipe extending longitudinally in said chamber, about midway between the top and bottom thereof, and provided throughout its length with perforations to discharge the cooling water, whereby the temperature of the cooling water in said chamber will be approximately equalized in all parts of said chamber.

3. In an internal combustion engine, the combination with a plurality of engine cylinders, of a water box providing a continuous chamber by which said cylinders are surrounded, an exhaust pipe extending longitudinally in said water box, and means whereby jets or streams of water may be discharged into said chamber along its length and adjacent to said exhaust pipe.

4. In an internal combustion engine, the combination with a plurality of engine cylinders, of a water box providing a continuous chamber surrounding said cylinders, an exhaust pipe extending longitudinally in said water box, and a water supply pipe extending longitudinally in the chamber of said box adjacent said exhaust pipe and provided along its length with perforations.

5. In an internal combustion engine, the combination with a plurality of engine cylinders, of a water box providing a continuous chamber by which said cylinders are surrounded, a jacketed head for each of said cylinders, and a plurality of pipes spaced apart about said cylinder heads and affording a plurality of passages between the said chamber of said water box and the chambers of said water jackets, so that water may flow in a plurality of streams from the chamber of said water box to the chambers of the water jackets of said cylinder heads.

6. In an internal combustion engine, the combination with a plurality of engine cylinders, of a water box providing a chamber about said cylinders, a jacketed head for each of said cylinders, a plurality of water passages spaced apart about said cylinder heads and connecting the chambers of said jacketed heads with the chamber of said box, whereby water may flow in a plurality of streams from the said water box to the chambers of the water jackets of said cylinder heads, and means for discharging numerous jets of water into the chamber of said box.

7. In an internal combustion engine, the combination with a plurality of engine cylinders, of a water box providing a chamber about said cylinders, a jacketed head for each of said cylinders, a plurality of water passages about said cylinder heads, whereby water may flow in a plurality of streams from the said water box to the chambers of the water jackets of said cylinder heads, and means for discharging numerous jets of water into the chamber of said box, said means consisting of a water pipe extending longitudinally in the chamber of said box and provided along its length with perforations.

8. In an internal combustion engine, the combination with a water box, of a plurality of engine cylinders removably mounted in said box, the latter providing a continuous chamber surrounding said cylinders, means for mixing the cooling water in said box so that its temperature may be approximately equalized throughout said box, individual, removable, jacketed cylinder heads carried by said box, and means providing a plurality of water passages between the chamber of said box and each of said heads, the latter being each provided with a water outlet.

9. In an internal combustion engine, the combination with a plurality of engine cylinders, of a water box providing a common chamber for cooling said cylinders, a removable jacketed head for each of said cylinders carried by said water box, and a plurality of pipes or passages spaced apart around each of said jacketed cylinder heads and affording a plurality of passages whereby water may be forced from said water box to the chamber of the jacket of each cylinder head; each of said jacketed heads having means whereby the water may be discharged therefrom.

10. In an internal combustion engine, the combination with a plurality of engine cylinders having a common water box for containing water for cooling the same, each of said cylinders having a removable jacketed head, a plurality of water pipes or passages between the chamber of said water box and the chamber of the jacket of each head, and means for equalizing the temperature of the water in said box.

11. In an internal combustion engine, the combination with a plurality of engine cylinders, of a water box common to all and in the water of which each cylinder will be nearly immersed, said box also carrying for each cylinder a removable jacketed head with water passages connecting the chamber of each jacket with the chamber of said water box, an exhaust pipe arranged in the chamber of said water box and connected by a gas passage way with each cylinder head, said exhaust pipe extending through one end of said water box and discharging, outside of said box, the exhaust gases delivered to it from said heads.

In testimony whereof we affix our signatures, in presence of two witnesses.

THOMAS L. STURTEVANT.
THOMAS JOSEPH STURTEVANT.

Witnesses:
HENRY CALVER,
M. E. RATHVON.