E. A. FIELD, JR.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED APR. 29, 1919.

**1,333,611.**

Patented Mar. 16, 1920.

2 SHEETS—SHEET 1.

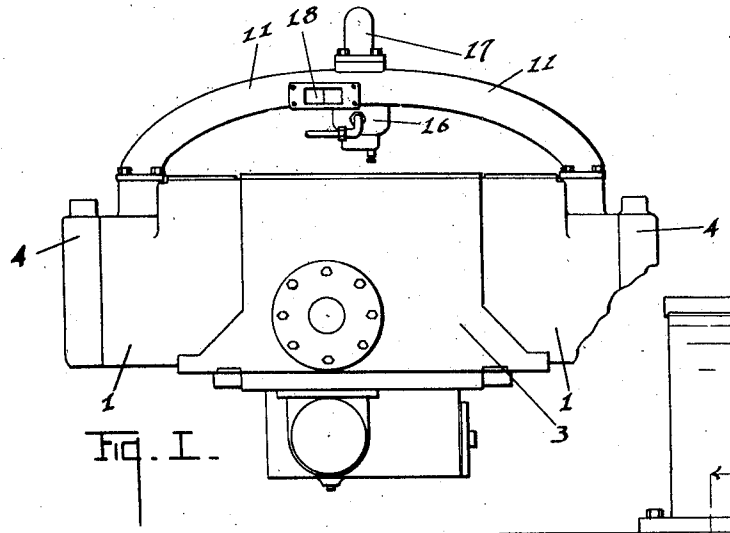



FIG. I.

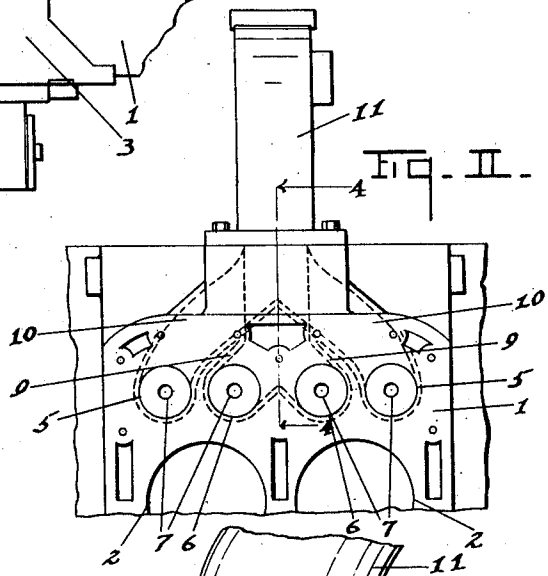



FIG. II.

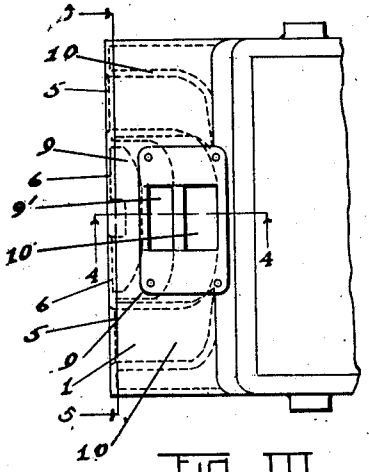



FIG. III.

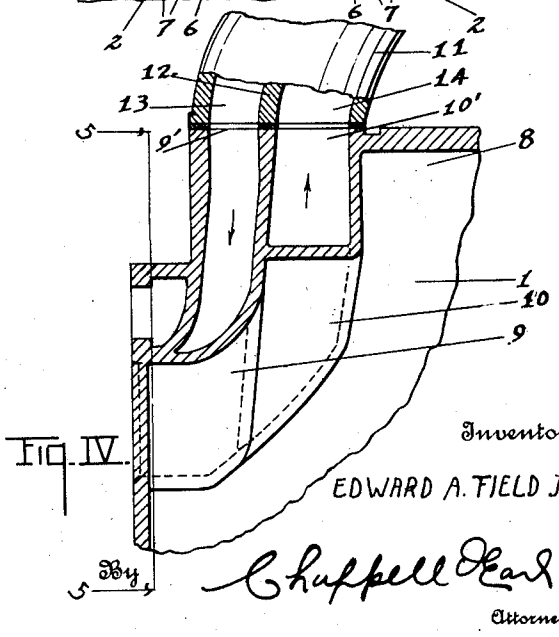



FIG. IV.

Witnesses

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2 SHEETS—SHEET 2.

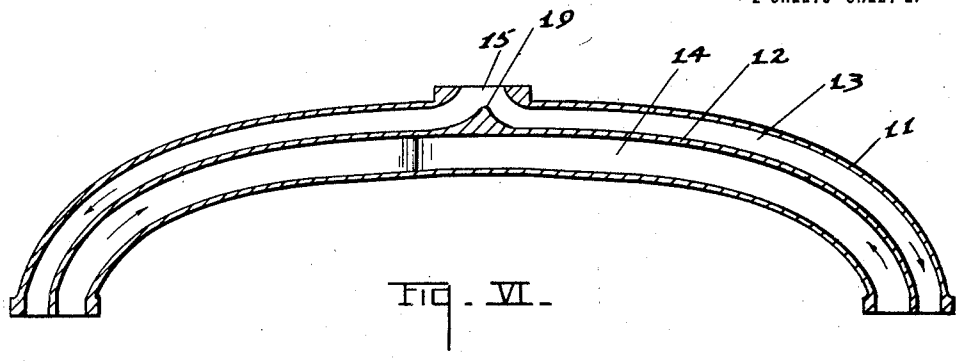



FIG. VI.

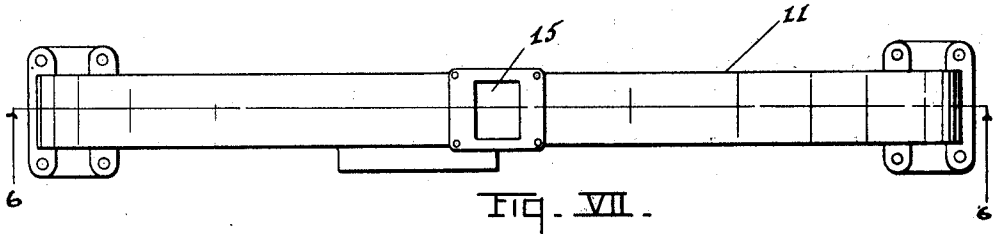



FIG. VII.

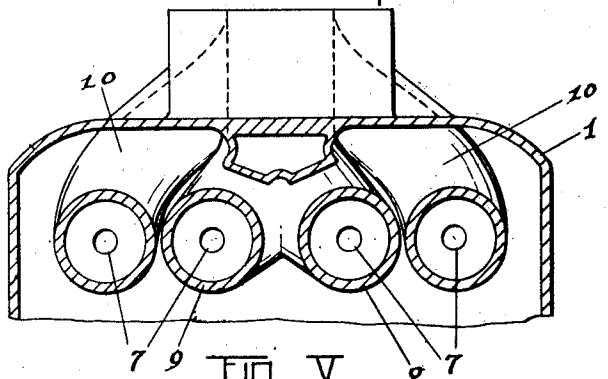



FIG. V.

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# UNITED STATES PATENT OFFICE.

EDWARD A. FIELD, JR., OF GRAND RAPIDS, MICHIGAN, ASSIGNOR OF ONE-HALF TO EDWARD A. FIELD, SR., OF CHICAGO, ILLINOIS.

## INTERNAL-COMBUSTION ENGINE.

1,333,611. Specification of Letters Patent. Patented Mar. 16, 1920.

Application filed April 29, 1919. Serial No. 293,519.

*To all whom it may concern:*

Be it known that I, EDWARD A. FIELD, Jr., citizen of the United States, residing at Grand Rapids, county of Kent, State of Michigan, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention relates to improvements in internal combustion engines.

The main objects of this invention are:

First, to provide an internal combustion engine which is well adapted for the use of kerosene and like hydrocarbons as a fuel.

Second, to provide an improved internal combustion engine having a plurality of cylinders in which the fuel distribution to the several cylinders is very uniform.

Further objects, and objects relating to structural details, will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification. The invention is clearly defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is clearly illustrated in the accompanying drawing, forming a part of this specification, in which:

Figure I is a detail side elevation of an internal combustion engine embodying the features of my invention, certain of the engine parts being omitted and others shown conventionally.

Fig. II is an end elevation with one of the head members removed, the inlet and exhaust passages being indicated by dotted lines.

Fig. III is a detail plan view with the manifold removed, the inlet and exhaust passages being indicated by dotted lines.

Fig. IV is a detail vertical section on a line corresponding to line 4—4 of Figs. II and III.

Fig. V is a detail transverse section on a line corresponding to line 5—5 of Figs. III and IV showing the arrangement of the inlet and exhaust passages.

Fig. VI is a vertical central section through the manifold on a line corresponding to line 6—6 of Fig. VII.

Fig. VII is a plan view of the manifold.

In the drawing similar reference characters refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

Referring to the drawing, 1, 1, represent the cylinder body members each having a pair of cylinders 2 therein, the cylinders being disposed horizontally and, in the structure illustrated, in oppositely disposed pairs, 3 represents the crank case or housing between the cylinders and 4, 4, the cylinder head members.

The body members 1 have valve seats 5, 5, and 6, 6, in the faces thereof, the seats 6, 6 being the seats for the inlet valves and the seats 5, 5 being the seats for the exhaust valves. These are arranged in the same horizontal plane,—see Fig. I.

The valve stems project through openings 7 into the chamber 8 above the cylinders. The valves are not shown as their details form no part of this invention.

Each body member has formed therein branching inlet passages 9 and branching exhaust passages 10 leading to and from the valve seats 5 and 6 respectively. These branching passages are uniform and are disposed with the inlet passages embracing the exhaust passages as clearly shown in Fig. V.

The inlet passages open at 9′ at the top of the body member while the exhaust passages open at 10′,—see Figs. III and IV.

The manifold 11 is upwardly curved and provided with a horizontal partition 12 forming an upper inlet passage 13 and a lower exhaust passage 14 coacting with the openings 9′ and 10′ respectively.

The inlet passage of the manifold has a central inlet opening 15 at the top connected to the carbureter 16 by means of the pipe 17. The exhaust passage has a central opening 18 connected to an exhaust pipe, not shown.

Below the inlet opening 15 is a deflecting lip 19 disposed so that it tends to divide the incoming fuel and any unvaporized fuel which may enter falling upon this dividing lip is divided and directed toward the ends of the manifold. The exhaust gases passing to the central discharge opening 18 heat the inlet passage, particularly its bottom formed by the partition 12 so that the fuel on its passage to the cylinders is effectively vaporized even where relatively heavy fuel such as kerosene is employed.

The arrangement of the manifold and passages leading to and from the inlet and

exhaust valves is such that uniform charges are delivered to the several cylinders which results in increased efficiency and fuel economy. Further, the parts are all readily accessible should occasion require and are simple and economical to produce.

I have illustrated and described my improvements as I have embodied the same in four cylinder motors. I have not attempted to illustrate or describe other adaptations and embodiments as I believe the disclosure made will enable those skilled in the art to which my invention relates to embody or adapt the same as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In an internal combustion engine, the combination of pairs of horizontally and oppositely disposed cylinders comprising body members and head members, said body members having valve seats disposed in the faces thereof and uniform branching inlet and exhaust passages disposed with the exhaust passage branches embracing the inlet, said passages opening at the top of the body members with the exhaust passages at the rear of the inlet, a curved manifold having a horizontal partition providing an upper inlet passage and a lower exhaust passage communicating respectively with the inlet and exhaust passages of said body members, the inlet passage of said manifold having a central inlet opening at the top with a central deflecting lip below said opening, the exhaust passage having a centrally disposed exhaust outlet, and a carbureter delivering to said inlet passage.

2. In an internal combustion engine, the combination of pairs of horizontally and oppositely disposed cylinders comprising body members and head members, said body members having valve seats disposed in the faces thereof and uniform branching inlet and exhaust passages disposed with the exhaust passage branches embracing the inlet, said passages opening at the top of the body members, a manifold having a partition providing an inlet passage and an exhaust passage communicating respectively with the inlet and exhaust passages of said body members, the inlet passage of said manifold having a central inlet opening, the exhaust passage having a centrally disposed exhaust outlet, and a carbureter delivering to said inlet passage.

3. In an internal combustion engine, the combination of horizontally and oppositely disposed cylinders comprising body members and head members, said body members having valve seats disposed in the faces thereof and inlet and exhaust passages opening at the top of the body members, a curved manifold having a horizontal partition providing an upper inlet passage and a lower exhaust passage communicating respectively with the inlet and exhaust passages of said body members, the inlet passage of said manifold having a central inlet opening at the top with a central deflecting lip below said opening, the exhaust passage having a centrally disposed exhaust outlet, and a carbureter delivering to said inlet passage.

4. In an internal combustion engine, the combination of horizontally and oppositely disposed cylinder comprising body members and head members, said body members having valve seats disposed in the faces thereof and inlet and exhaust passages opening at the top of the body members, a manifold having a partition providing an inlet passage and an exhaust passage communicating respectively with the inlet and exhaust passages of said body members, the inlet passage of said manifold having a central inlet opening, the exhaust passage having a centrally disposed exhaust outlet, and a carbureter delivering to said inlet passage.

5. In an internal combustion engine, the combination of pairs of horizontally and oppositely disposed cylinders comprising body members having uniformly branching inlet and exhaust passages opening at the top of the body members, the exhaust passages being on the inner side of the inlet, and an upwardly curved manifold having a horizontal partition providing an upper inlet passage and a lower exhaust passage communicating with the said inlet and exhaust passages of said body members, the inlet passage of said manifold having a central inlet opening at the top communicating with a carbureter, the exhaust passage having a centrally disposed exhaust outlet.

6. In an internal combustion engine, the combination of pairs of horizontally and oppositely disposed cylinders comprising body members having uniformly branching inlet and exhaust passages opening at the top of the body members, the exhaust passages being on the inner side of the inlet, and a manifold having a partition providing an inlet passage and an exhaust passage communicating with the said inlet and exhaust passages of said body members, the inlet passage of said manifold having an inlet opening communicating with a carbureter, the exhaust passage having a centrally disposed exhaust outlet.

7. In an internal combustion engine, the combination of oppositely disposed cylinders comprising body members having inlet and exhaust passages, and an upwardly curved manifold having a horizontal partition providing an upper inlet passage and a lower exhaust passage communicating with the said inlet and exhaust passages of said body members, the inlet passage of said manifold

having a central inlet opening at the top communicating with a carbureter, the exhaust passage having a centrally disposed exhaust outlet.

8. In an internal combustion engine, the combination of oppositely disposed cylinders comprising body members having inlet and exhaust passages, and a manifold having a partition providing an inlet passage and an exhaust passage communicating with the said inlet and exhaust passages of said body members, the inlet passage of said manifold having a central inlet opening communicating with a carbureter, the exhaust passage having a centrally disposed exhaust outlet.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

EDWARD A. FIELD, JR. [L. S.]

Witnesses:
EDMUND P. WANDEL,
CORNELIUS VAN HOUTIN.