

No. 895,982.

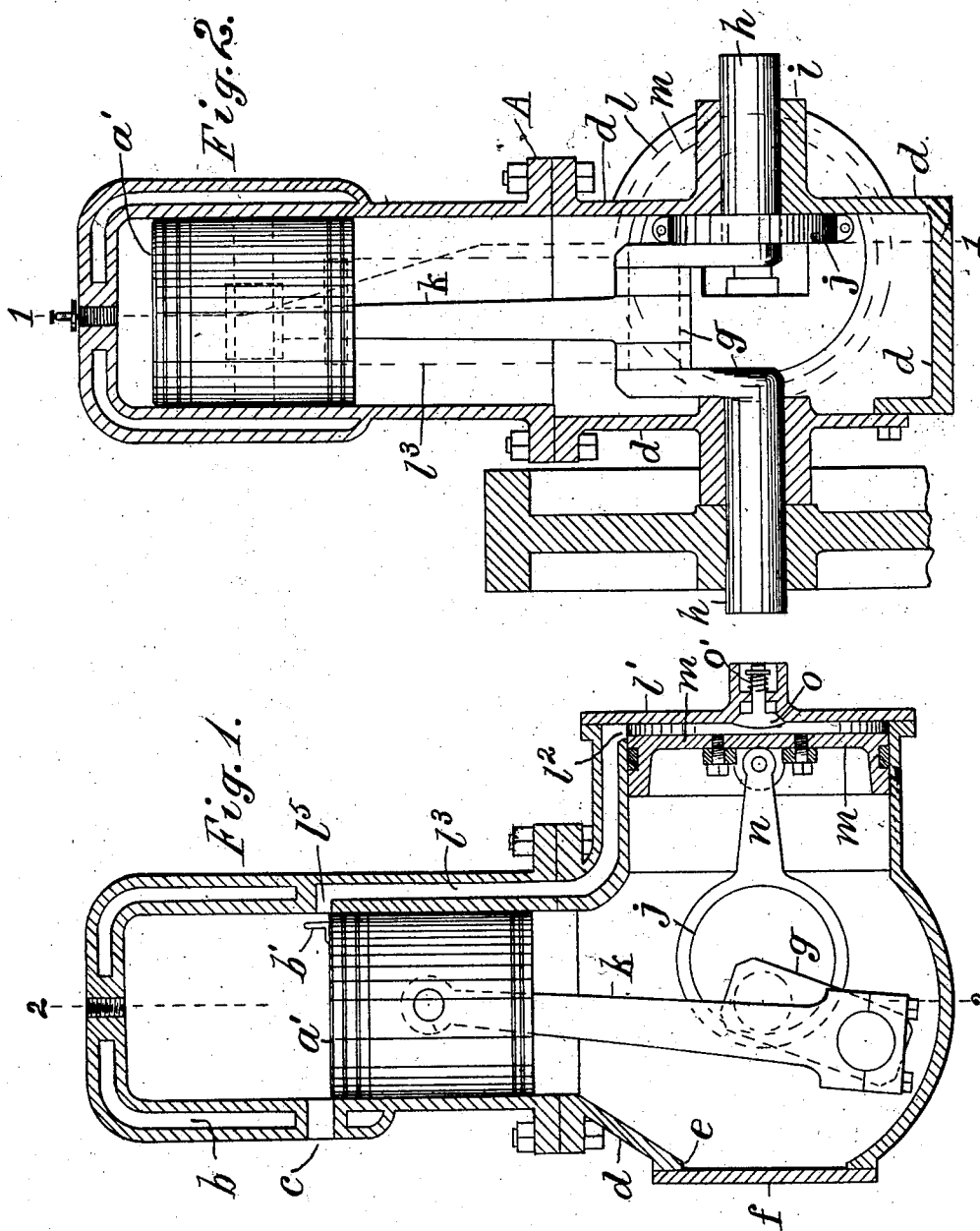
PATENTED AUG. 11, 1908.

F. A. DOBBINS.

GASOLENE ENGINE WITH MIXING CYLINDERS ON CRANK CASES.

APPLICATION FILED JUNE 21, 1907

3 SHEETS—SHEET 1.



Witnesses:
L. Low.
J. W. Greenbaum

Inventor.
Frederick A. Dobbins.
per Thomas S. Crane, Atty.

No. 895,982.

PATENTED AUG. 11, 1908.

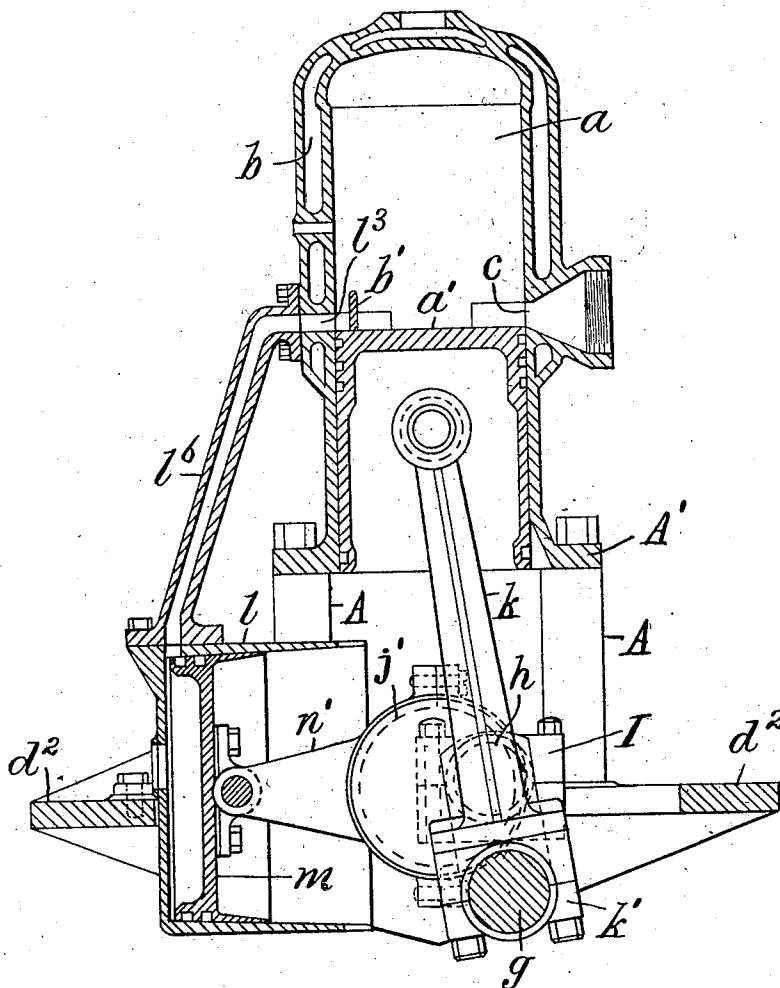
F. A. DOBBINS.

GASOLENE ENGINE WITH MIXING CYLINDERS ON CRANK CASES.

APPLICATION FILED JUNE 21, 1907.

3 SHEETS—SHEET 2.

Fig. 3.



Witnesses:

L. Lu

J. W. Greenbaum

Inventor.

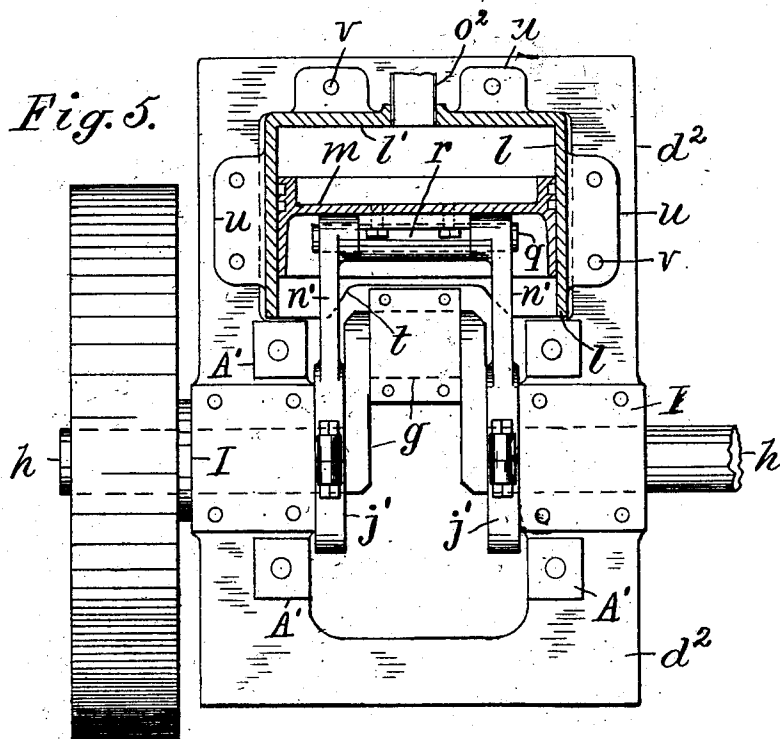
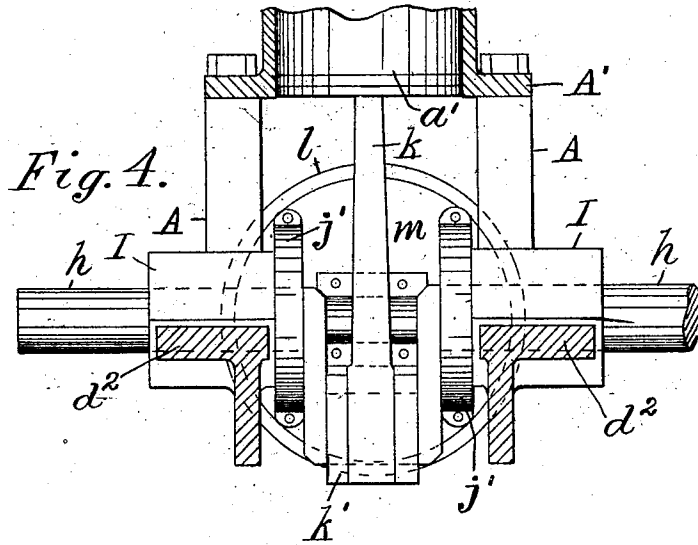
Frederick A. Dobbins, per
Thomas S. Crane, Atty.

F. A. DOBBINS.

GASOLINE ENGINE WITH MIXING CYLINDERS ON CRANK CASES.

APPLICATION FILED JUNE 21, 1907.

3 SHEETS—SHEET 3.



Witnesses.
L. Lee.
J. W. Greenbaum

Inventor.
Frederick A. Dobbins, per
Thomas S. Crane, Atty.

UNITED STATES PATENT OFFICE. 2

FREDERICK A. DOBBINS, OF NEWARK, NEW JERSEY.

GASOLENE-ENGINE WITH MIXING-CYLINDERS ON CRANK-CASES.

No. 895,982.

Specification of Letters Patent.

Patented Aug. 11, 1908.

Application filed June 21, 1907. Serial No. 380,024.

To all whom it may concern:

Be it known that I, FREDERICK A. DOBBINS, a citizen of the United States, residing at Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Gasolene - Engines with Mixing-Cylinders on Crank-Cases, fully described and represented in the following specification, and the accompanying drawings, forming a part of the same.

This invention relates to that class of explosion engines, in which a mixture of explosive vapor and air is supplied to the explosion cylinder under compression, and in which the crank-shaft is supported by bearings upon a casing attached directly to the cylinder.

The invention is especially applicable to engines for small motor boats, in which the space occupied by the engine and the compression pump is exceedingly limited.

The crank-casing for stationary engines of this class is commonly made air-tight, to protect the working parts from dust, but in marine engines of this class where the engine is not exposed to dust, the casing is made open with the cylinders supported upon upright columns.

The object of the present invention is to cheapen and simplify the construction of the vapor-pump and to economize the space occupied by the engine, and these objects are effected by making the vapor compression pump with a piston about twice as great as that of the explosion piston and therefore requiring only half the stroke, by which proportions the vapor-pump can be supported directly upon the side of the crank-casing without any considerable projection, and the pump piston may receive its motion by a short direct connection to an eccentric upon the crank-shaft within the casing. In such engines, the crank-shaft is formed with a bent crank revolving between bearings upon the casing, and in the present invention one or both of the bearings is set far enough from the bent crank to admit an eccentric, and where only one eccentric is used, the center line of the vapor-pump is set at one side of the center line of the explosion cylinder, so as to stand in line with the center of the eccentric.

By operating the pump-piston with a direct connection to an eccentric upon the crank-shaft, within the bearings of the casing, the pump is connected with the engine in the

most direct and compact manner that is possible.

The construction will be understood by reference to the annexed drawing, in which

Figure 1 is an elevation of a vertical engine with a so-called "closed casing," the view being in section where hatched on line 1, 1 in Fig. 2; Fig. 2 is a vertical section where hatched on line 2—2 in Fig. 1; Figs. 3, 4 and 5 show the construction with the open casing, Fig. 3 being a vertical section where hatched, through the centers of the explosion cylinder and mixing pump-cylinder. Fig. 4 is a vertical section of the open casing on line 4—4 in Fig. 5, which is a plan of the open casing and the mixing pump-cylinder, with a dotted circle showing the relation of the explosion cylinder to the crank.

In Figs. 1 and 2, *a* shows the explosion cylinder having an exhaust port *c* opening from the side near the top of the piston *a'* when retracted, as shown in Fig. 1.

d designates the closed casing shown with hand-hole *e* in one side provided with cover *f*. The casing has bearings *i* upon its opposite sides, and the shaft *h* is extended across the same and provided with a bent crank having crank-arms *g* connected to the explosion piston *a'* by a link *k*, and having an eccentric *j* between one side of the crank and the adjacent bearing.

The crank-casing is shown made in one casting with the mixing pump-cylinder *l*, which is projected from the shell of the crank-casing horizontally at one side of the crank-shaft in a line with the center of the eccentric with the strap of which it is directly jointed by a connecting-rod *n*. The center of the pump-cylinder is thus several inches at one side of a vertical line drawn through the center of the explosion cylinder.

The pump-cylinder *l* is much larger than the explosion cylinder with a piston *m* having an area about twice that of the explosion piston *a'*, and therefore requires only one-half the stroke to compress and deliver a gas charge to the explosion cylinder. Such a short stroke enables the pump-piston to be operated by a direct connection to the eccentric *j*, and to be set very close to the crank-shaft, at such a distance as to merely clear the crank-arms in its rotations.

A head *l'* is shown upon the outer end of the pump-cylinder with a port *l²* extended from its outer end through a passage *l³*, to an opening *l⁴* in the side of the explosion cylinder,

where it delivers the vapor into such cylinder when the piston a' is retracted, as shown in Fig. 1.

The passage l^2 is shown extended from the pump port l^2 along the upper side of the cylinder l and contiguous to the same and to the cylinder a until it reaches the opening l^2 ; so that the passage is formed in the castings which constitute the explosion cylinder, the casing and the gas pump-cylinder.

The exhaust port c is shown in the side of the explosion cylinder a opposite to the gas-inlet l^2 .

The head l' upon the gas-pump is provided with a nozzle containing a valve-seat having a valve o opening inwardly and held normally closed by a spring o' . Such nozzle is for connection with a carbureter in the usual manner.

The inward movement of the pump-piston n draws a charge of mixed air and gasoline or oil into the mixing-pump, the movement of these elements into the valve o and into the pump-cylinder and upward through the passage l^2 , thoroughly mixing the same so that they are fitted for the most effective operation in the explosion cylinder a . The outward movement of the pump-piston compresses the gas and forces it into the passage l^2 while the explosion piston a' is descending, so that the compressed charge enters the explosion cylinder as soon as the opening l^2 is uncovered.

The usual deflector or guard b' is shown upon the top of the piston a' opposite to the gas opening or inlet l^2 , to prevent the vapor from striking across the cylinder to the exhaust port c .

A foot-plate d' is shown upon the closed casing d in Fig. 1, by which it may be set upon any suitable foundation; but with the open casing shown in Figs. 3 to 5 inclusive, a flat bed-plate d^2 is employed, having bearings I close to its surface at opposite sides of an opening p , in which the bent crank g and two eccentrics j' rotate. The cylinder is shown supported upon the bed-plate by four columns A , the bottom end of the cylinder having a square plate A' , shown in Fig. 3 bolted to the tops of the columns.

Two eccentrics are employed with the open casing to secure a central arrangement of the compression pump-cylinder l upon the bed, as the raising of the bed nearer to the crank-shaft causes the cylinder to penetrate the bed, and it is desirable to have the opening for the pump-cylinder central to avoid needlessly increasing the width of the bed.

Where the construction is applied to a two-cylinder or a four-cylinder engine, it is obviously a more compact construction to arrange each pump-cylinder in line with its explosion cylinder.

Figs. 4 and 5 show the central arrangement of the pump-cylinder, with the rods n from

the two eccentrics j' jointed by a pivot q to a common bracket r upon the pump-piston m . To bring the pump-cylinder as close to the crank-shaft as possible and thus avoid widening the bed-plate d^2 , a notch t is shown cut into the inner end of the pump-cylinder upon its open side toward the crank-shaft, to clear the crank-box k' at the lower end of the crank-link k . This is clearly shown in Fig. 5, and can be arranged to save from one and a half to three inches in the width of the bed-plate, upon engines of different sizes. Such notches do not effect the operation of the casing, as the contents of the casing are not under compression when the piston moves outward over such notches, and compression does not occur until the piston has moved inward near its mid stroke, which is represented in Fig. 5.

The common feature in the construction with either an open or closed casing, is the arrangement of the pump-cylinder horizontally at the side of the crank-shaft with a diameter much greater and stroke much less than that of the explosion piston, and one or more eccentrics upon the crank-shaft by one or both sides of the crank within the bearings, such eccentric or eccentrics having a direct connection with the pump-piston, by which construction the space required to actuate the compression pump is greatly reduced.

The pump-cylinder l is shown in Fig. 5 secured upon the bed-plate by means of foot-lugs u and bolts v , and a pipe o^2 is shown extended from the outer pump-cylinder head, which may be connected with a check-valve and with a carbureter in any suitable manner.

It is immaterial how the compressed gas is conducted from the outer end of the gas mixing pump-cylinder to the gas-inlet or opening l^2 upon the cylinder a ; but where the closed casing is used, it is possible to extend the passage l^2 contiguous to the pump-cylinder and the explosion cylinder so as to avoid using any external connections.

In Fig. 3, an external passage is formed by a flat tube l^2 bolted to the top of the pump-cylinder at the outer end, and to the side of the explosion cylinder over the port c .

Having thus set forth the nature of the invention what is claimed herein is:

1. The explosive vapor engine having an explosion cylinder, the crank-casing below such cylinder having bearings at opposite sides, with crank-shaft extended across the same and provided with a bent crank below the explosion cylinder and with an eccentric at the side of each crank arm within the bearings, a gas mixing pump-cylinder projected horizontally at one side of the casing, and the two eccentrics having direct connections to the pump-piston n , equi-distantly from the center of the piston whereby the pump-cylinder may be disposed upon the center line of the bent crank and bed-plate.

2. The explosive-vapor-engine having the

explosion cylinder *a* with crank-casing *d* attached, with shaft *h* extended across the casing and provided with crank *g* and eccentric *j*, and the piston *a'* in the explosion cylinder connected to the crank, the gas mixing pump-cylinder *l* projected from one side of the casing, the pump piston *m* therein connected with the eccentric *j*, the head *l'* upon the outer end of the gas mixing cylinder having the valve *o* connected with a carbureter, and the port *l²* leading from the side of the gas pump cylinder adjacent to such head and contiguous to the sides of the gas mixing pump-cylinder and the explosion cylinder, and connecting the outer end of the mixing pump-cylinder with the middle portion of the explosion cylinder by the opening *l³* in the side of the same.

3. The explosive-vapor-engine having the explosion cylinder *a* with crank-casing *d* attached, with shaft *h* extended across the casing and provided with crank *g* and eccentric *j*, and the piston *a'* in the explosion cylinder connected to the crank, the gas mixing pump-cylinder *l* projected from one side of the casing and having a diameter greater and length less than the explosion cylinder; the pump-piston *m* therein of greater area and shorter stroke than the explosion piston and connected to the eccentric *j*, the head *l* upon the outer end of the gas mixing pump-cylinder having the valve *o* connected with a carbureter, and the port *l²* leading from the side of the gas pump-cylinder, adjacent to such

head, to an opening in the side of the explosion cylinder, to supply the same with gas when the piston *a'* is retracted.

4. The explosive-vapor-engine having the explosion cylinder *a* with crank-casing *d* attached, with shaft *h* extended across the casing and provided with crank *g* and eccentric *j*, and the piston *a'* in the explosion cylinder connected to the crank, the gas mixing pump-cylinder *l* integral with the crank-casing *d* at one side of the same, and having a diameter greater and length less than the explosion cylinder; the pump-piston *m* therein of greater area and shorter stroke than the explosion piston and connected to the eccentric *j*, the head *l'* upon the outer end of the gas mixing pump-cylinder having the valve *o* connected with a carbureter, and the casting of the explosion cylinder, the crank-casing and the gas pump-cylinder, having the passage *l³* formed therein contiguous to the sides of the two cylinders and connecting the port *l²* upon the outer end of the pump-cylinder with the opening *l³* upon the side of the explosion cylinder at the middle of its length, to supply the same with gas when the explosion piston is retracted.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FREDERICK A. DOBBINS.

Witnesses:

L. LEE,

THOMAS S. CRANE.