No. 788,057. PATENTED APR. 25, 1905.

D. R. MORRISON.

CRUDE OIL ENGINE.

APPLICATION FILED APR. 16, 1904.

Fig. 1.

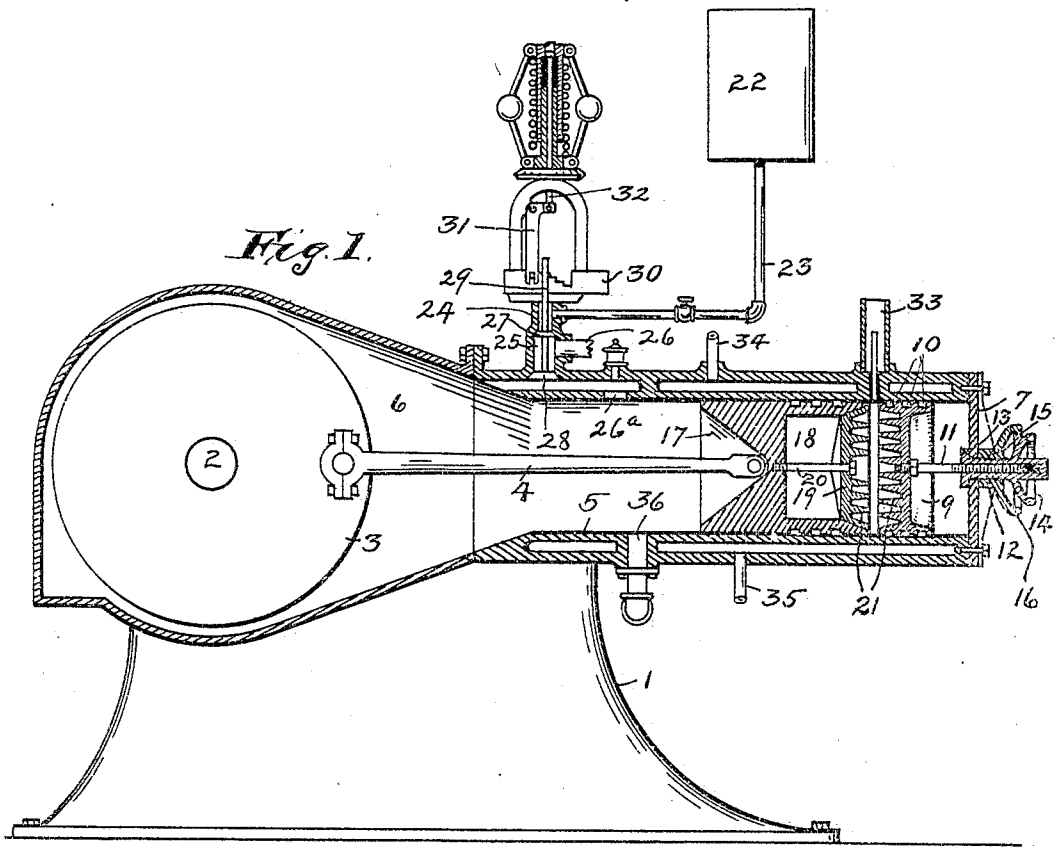


Fig. 2.

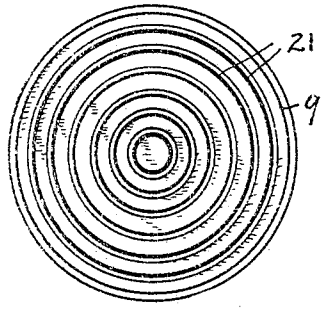
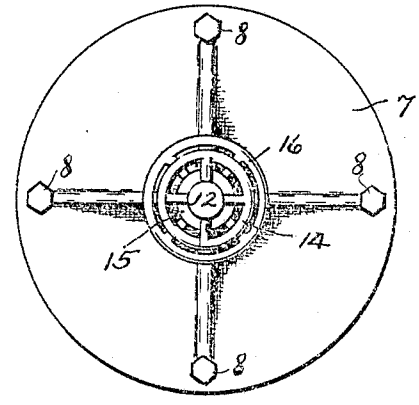


Fig. 3.



Witnesses,
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No. 788,057. Patented April 25, 1905.

UNITED STATES PATENT OFFICE.

DUDLEY R. MORRISON, OF HARTFORD CITY, INDIANA.

CRUDE-OIL ENGINE.

SPECIFICATION forming part of Letters Patent No. 788,057, dated April 25, 1905.

Application filed April 16, 1904. Serial No. 203,407.

To all whom it may concern:

Be it known that I, DUDLEY R. MORRISON, a citizen of the United States, residing at Hartford City, in the county of Blackford and State of Indiana, have invented certain new and useful Improvements in Crude-Oil Engines, of which the following is a specification.

This invention relates to explosive-engines in which crude oil is the base from which the hydrocarbon element is obtained. In engines of this class using crude oil the carbon deposit which accumulates on the walls of the explosive-chamber reduces the cubic dimensions of the chamber to such an extent that an explosion due to the compression of the air and vapors takes place before the dead-center has been reached by the pitman and crank, thereby causing the engine to pound and to work against itself.

The object of this invention is to provide what is practically a movable cylinder-head, which is adjustable longitudinally of the cylinder to vary the size of the explosion-chamber. This variation in the size of the explosion-chamber is also desirable to meet the variations in load on the engine, for the reason that when the load is light the quantity of air admitted is less than when the load is heavy, and a small influx of air will correspondingly delay the time of explosion, because the compression will not reach the maximum required to explode the charge at as early a period as would attend the introduction of a greater quantity of air.

Another object of varying the size of the explosive-chamber is to facilitate the starting of the engine. The compression required to give an explosion with a cold engine can be easier secured with a small chamber than with a large one; but after the engine is heated a larger body of vapor and more air to explode it can be handled and will be needed for practical work.

A further object of the invention is to provide extension-surfaces on the piston and movable cylinder-head for the generation of oil-vapors by the bathing of said heated surfaces with the atomized hydrocarbon coming into the cylinder through the inlet-port; and as these surfaces gradually accumulate a coating of carbon which must be frequently removed another object of my invention is to render said parts readily accessible for such cleaning operations.

I accomplish the objects of the invention by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of an engine embodying my invention; Fig. 2, an elevation viewed from the inside of the cylinder of the movable cylinder-head, and Fig. 3 an outside view of the end of the cylinder.

Like characters of reference indicate like parts throughout the several views of the drawings.

1 is the base or bed of the engine; 2, the crank-shaft; 3, the crank; 4, the pitman; 5, the cylinder, and 6 a housing surrounding the crank-shaft and pitman and communicating with the open inner end of the cylinder. The outer end of the cylinder is closed by the fixed head 7, which is preferably connected by means of four bolts 8, so as to be readily removable. Located within the cylinder is the auxiliary movable head 9, which has the expansion-rings 10, similar to those used on the ordinary piston, whereby a tight joint is secured between it and the walls of the cylinder for all positions of its adjustment.

11 is a threaded bolt which is fastened to the head 9 and extends into the threaded bore of the sleeve 12. The sleeve 12 passes through the fixed head 7. It has the flange 13 on its end inside of the cylinder and has the hand-wheel 14 on its extension outside. The sleeve 12 is externally threaded to receive the internally-threaded sleeve 15, which has the hand-wheel 16. By turning the sleeve 12 the movable head 9 may be changed in its position in the cylinder, and that position will be retained by screwing the sleeve 15 tightly against the fixed head 7, by which it acts as a lock-nut.

17 is the piston, which is connected with the pitman 4 in the usual manner. The outer end of the piston is recessed, as shown at 18, and the outlet to said recess is closed by the

disk 19, which is secured by the bolt 20. This closure forms a dead-air space within the piston, which acts as a non-conductor of heat.

Formed on the outer face of the disk 19 and also on the inner face of the movable head 9 are the annular concentric flanges 21, the purpose of which will be hereinafter explained.

Oil contained in the tank 22 is admitted through pipe 23 to the chamber 24, which has a bottom outlet into chamber 25. Air admitted through pipe 26 to chamber 25 atomizes the oil and furnishes the necessary oxygen for the proposed explosion, which takes place in the cylinder when the proper conditions are reached. This oil and air mixture is accumulated in the housing 6 ready to be admitted into the cylinder through the inlet-port 26^a when the latter is opened into the cylinder by the inward movement of the piston. The quantity of oil and air admitted will be controlled by the valves 27 and 28, mounted on a common stem 29. The opening of these valves is regulated by the notched bar 30, which slides through a slot in the stem under the action of the lever 31, which is moved by the stem 32 of the centrifugal governor, as shown.

In starting the engine the hydrocarbon vapors are ignited by the tube 33 of usual construction. The latter is heated by gasolene from a suitable tank, (not shown,) after which the gasolene is turned off and the ignition-tube is no longer used for that run. After the engine has become thoroughly heated the explosions occur whenever the mixture of oil and air reaches a predetermined compression, and as that is regulated largely by the size of the explosion-chamber formed in the cylinder it is obvious that the time of the explosion is subject to regulation by moving the head 9 in or out.

The proper timing of the explosions and the economical use of the oil depend upon the thorough vaporization of the latter. I have found that this can only be accomplished in a practical way by depositing or bathing a metallic surface heated to a very high temperature with a spray of finely-divided oil particles. The greater the heated metallic area the more thorough and rapid will be the volatilization of the oil which is brought in contact with it. Therefore I provide the flanges 21 on the movable head 9 and the disk 19 of the piston, as previously described. The oil spray coming in contact with the hot surfaces of these flanges is immediately and completely vaporized.

The cylinder is surrounded with the usual water-jacket, which is supplied through pipe 34 and discharges through pipe 35.

36 is the exhaust-port of the engine.

When it is desired to remove the layer of carbon which forms on the flanges 21 of head 9 and disk 19, the head 7 is removed by removing the bolts 8, which allows the head 9 to be taken out, and when the head 9 is out of the way the disk 19 is readily removable by removing the bolt 20, which is done through the then open end of the cylinder.

Having thus fully described my invention, what I claim as new, and wish to secure by Letters Patent, is—

1. In an explosive-engine, a cylinder, a piston reciprocating therein, a movable head mounted in one end of the cylinder having an outwardly-extended threaded bolt, an internally-threaded sleeve to receive said threaded bolt said sleeve having capacity for rotation without translation.

2. In an explosive-engine, a cylinder, a piston reciprocating therein, a movable head mounted in one end of the cylinder having an outwardly-extended threaded bolt, an internally-threaded sleeve to receive said threaded bolt said sleeve being capable of a motion of rotation but not of translation and means for locking the sleeve against rotation.

3. In an explosive-engine, a hollow piston having a removable outer end closure, with outwardly-projecting annular concentric flanges, said closure having conical walls to contact with a correspondingly-shaped seat in the hollow end of the piston, and a center bolt to connect the piston and end closure.

4. In an explosive-engine, a cylinder, a piston reciprocating therein, an adjustable head in one end of the cylinder having an outwardly-extended threaded bolt, a threaded member to receive said bolt, and means for locking said threaded member against rotation, said piston and removable head having projecting flanges on their adjacent surfaces.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 31st day of March, A. D. 1904.

DUDLEY R. MORRISON. [L. S.]

Witnesses:
JOSEPH A. MINTURN,
S. MAHLON UNGER.