Nov. 15, 1927.

1,649,775

F. F. CAMERON

ENGINE

Filed Aug. 14, 1924

3 Sheets-Sheet 1

FIG. 1.

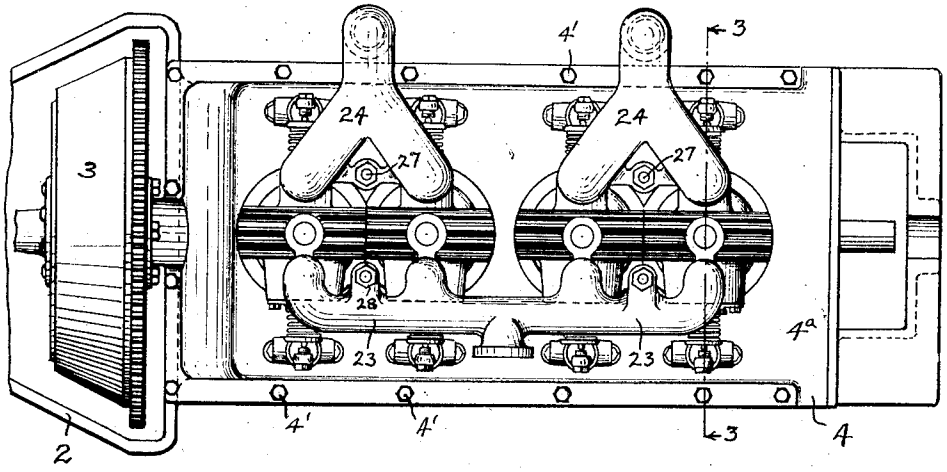
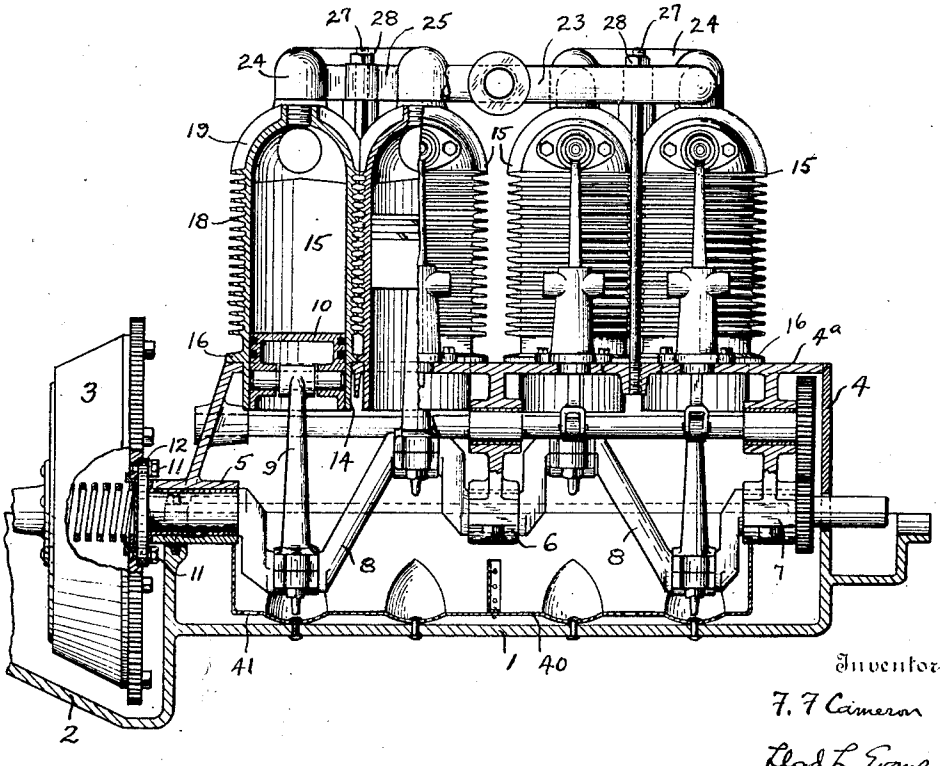


FIG. 2.



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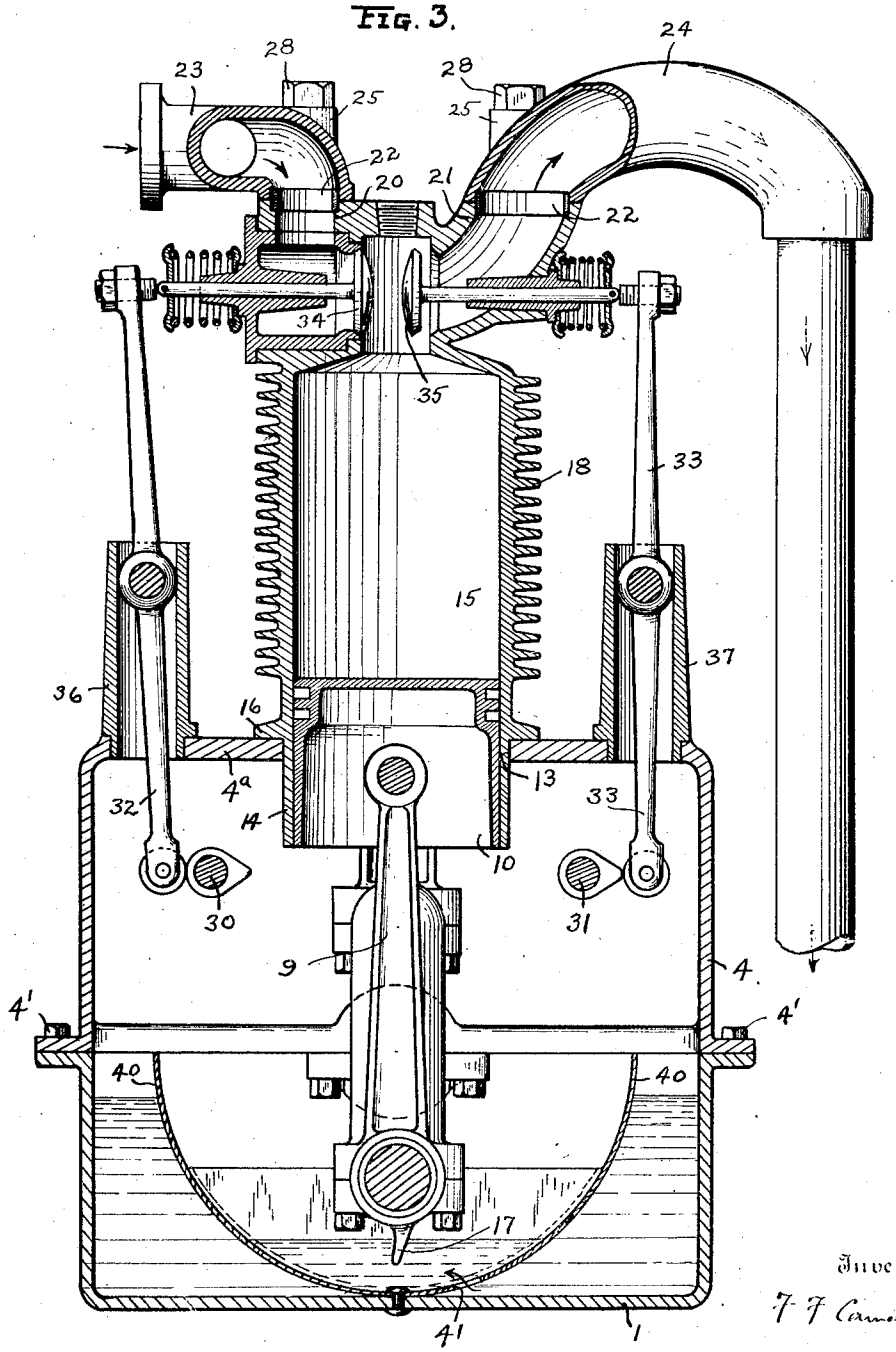
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FIG. 3.



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FIG. 4.

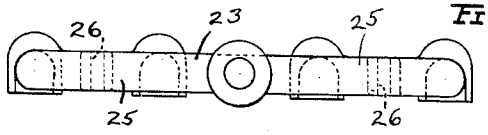


FIG. 5.

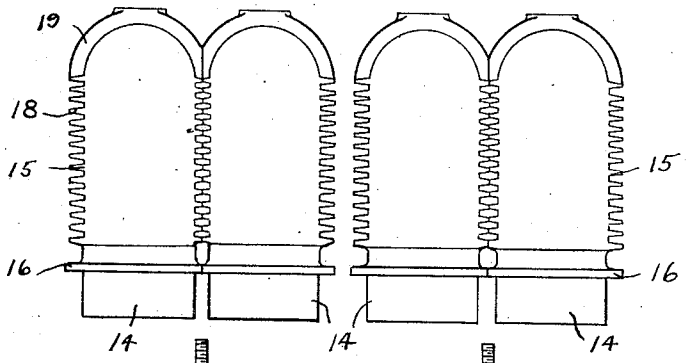


FIG. 6.

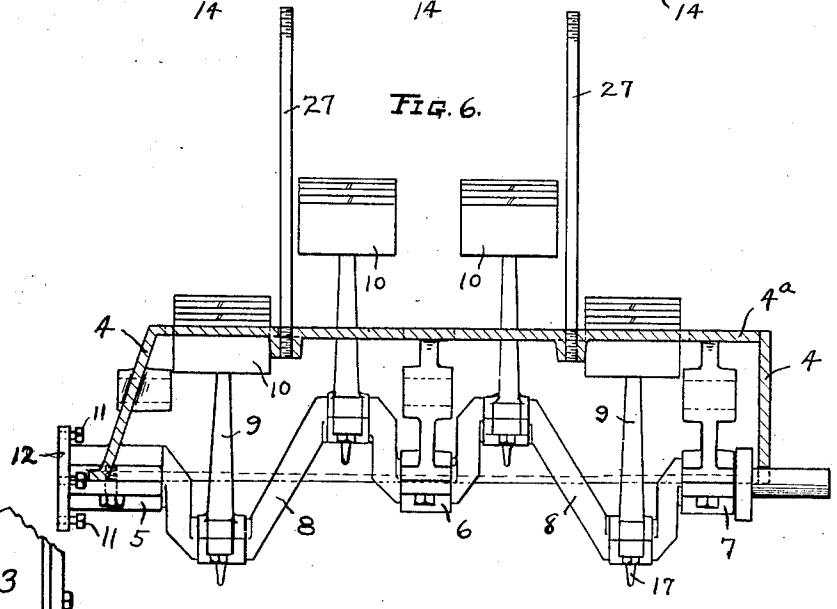
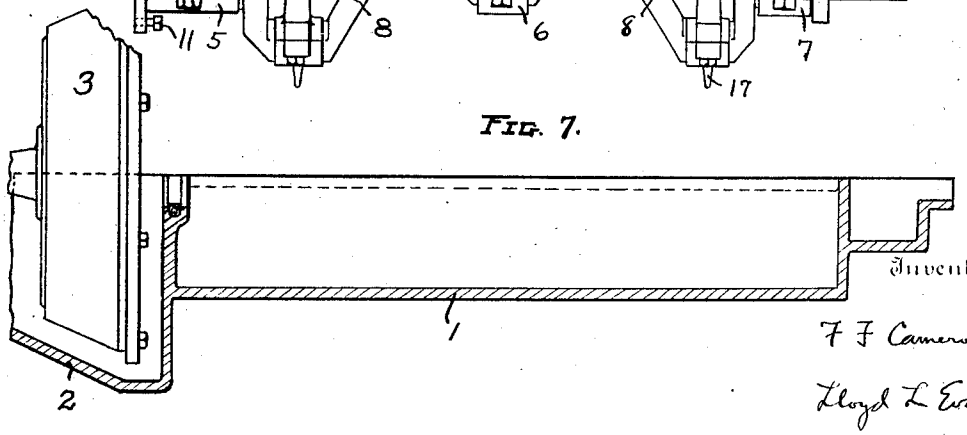


FIG. 7.



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UNITED STATES PATENT OFFICE.

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ENGINE.

Application filed August 14, 1924. Serial No. 732,027.

This invention relates to internal combustion engines, and more particularly to an air-cooled engine suitable for use in automotive vehicles and the like.

An object of the invention is to provide an engine construction in which the assembly and disassembly is comparatively simple.

Another object of the invention is to reduce the number of parts in such an engine and to make the cylinders removable with a minimum amount of work.

A further object of the invention is to improve the means for reducing the amount of oil thrown into the engine cylinders by the crank shaft.

A still further object of the invention is to reduce as much as is consistent with rigidity and safety the number of securing means used in holding the engine assembled and to produce an engine of the character described which is simple in construction, efficient in operation and easy to assemble or disassemble.

These and other objects will be apparent from the following description and annexed drawings, in which:

Figure 1 is a plan view of a form of my invention which I now consider preferable.

Fig. 2 is an elevation partly in section of this construction.

Fig. 3 is a transverse sectional elevation substantially along the plane indicated by the line 3—3, Figure 1.

Figs. 4, 5 and 6 show, respectively, in outline a manifold, cylinders and crank case, partly in section, just as removed from the oil pan.

Fig. 7 is a longitudinal section in outline through the oil pan.

Referring more in detail to these drawings, numeral 1 designates the oil pan having at one end an enlarged portion 2 in which is located the fly wheel 3.

The oil pan 1 underlies the crank case 4, which latter is removably secured thereto by bolts 4′ which pass through the apertures in the peripheral flange on the crank case and engage threaded openings in the corresponding, peripheral flange of the oil pan 1 on which the crank case 4 rests. Suitable supports 5, 6 and 7 in the crank case 4 carry the crank shaft 8. On this crank shaft are mounted the connecting rods 9, carrying the pistons 10. At its rearward end the crank shaft 8 is connected to the fly wheel 3 by bolts 11, which pass, in the construction shown, through a flange 12 into a part of the fly wheel.

The upper face 4^a of the crank case 4 is preferably substantially horizontal and contains openings 13 through which the lower ends 14 of the cylinders 15 extend. The cylinders 15 carry annular flanges or shoulders 16, preferably integral with the cylinder, which rest on the upper face 4^a of the crank case. The lower portions of the cylinders 15 form skirts 14 which extend through the face 4^a and a substantial distance into the interior of the crank case. These ends of the cylinders are substantially smooth and of a uniform diameter of sufficient size so that these ends closely fit in the openings 13 with a frictional fit. It will thus be seen that when the cylinders are inserted into the openings they will be sufficiently filled so that there will be no rattling of the parts and yet the cylinders can be easily withdrawn from these openings when it is desired to disassemble the engine.

The ends 14, which project into the crank case, serve as baffles to reduce the amount of oil which is splashed into the cylinders by reason of the rotation of the crank shaft and the projecting oil engaging fingers 17 carried thereby. This wall also serves as a pilot to guide the piston 10 in its reciprocating movement at the lower extremity of its course, thus making it possible to shorten the length of the cylinder above the top of the crank case.

The cylinders 15 are formed with any suitable heat radiating ribs 18 on the sides and ribs 19 on the upper portions so that heat will be dissipated, as is well understood.

At the upper extremity of the cylinders, and preferably cast integral therewith, are formed inlet and outlet gas passages 20, 21, respectively, which are adapted to receive nipples 22 at their upper portions. Intake manifold 23 and exhaust manifold 24 are formed to rest on the cylinder and engage the apertures therein, the nipples 22 being adapted to form a tight joint between the manifolds and the cylinder ports. Between each pair of cylinders each manifold is formed with a web portion 25 provided with an aperture 26. Suitable rods 27 threaded at

each end are adapted to engage threaded apertures formed in bosses in the crank case 4 and to have their upper ends pass through the apertures 26 in the webs 25 of the manifolds to receive nuts 28. When the nuts 28 are tightened it is obvious that the manifolds will be tightly secured in place on the cylinders and the cylinders will be tightly clamped and held in place in the top of the crank case.

Mounted in the crank case 4 are the cam shafts 30, 31 which engage the lower ends of the rods 32, 33, respectively, which operate the poppet valves 34, 35, as is well understood in the art. The rods 32, 33 are supported by pins journaled in extensions, carried by the sleeves 36, 37 which are secured to the crank case in any suitable manner, as by bolting. The rods are provided with enlarged or ball portions which substantially fill the sleeves 36, 37 and thus close them to prevent oil from escaping out of the engine.

The engine may be lubricated in any desired manner. For example, I have shown secured to the oil pan 1 an inner oil pan 40 which is provided with one or more apertures 41 therein to permit oil from the oil pan 1 to flow into the inner oil pan 40 where it is engaged by the projecting fingers 17 and splashed onto the cylinder walls and cam shaft mechanism. It will be understood, however, that, if preferred, a force feed lubricating system can be utilized in connection with my invention as well as the splash system indicated herein.

While it has not been indicated in the drawing, it is of course to be understood that, if it is deemed sufficiently desirable in my engine to gain access to the cam shaft and connecting rod without disassembling the engine, a detachable bottom can be provided for the oil pan 1 and can be secured thereto in any suitable manner.

It will be obvious from the foregoing that, if it is desired to remove one or more of the cylinders 15, it is only necessary to remove the four fastening means 28, and the manifolds 23 and then lift the appropriate cylinder from its place. If one desires to go further than this and remove the crank case, together with the crank shaft and pistons, it is only necessary, after having removed the cylinders 15, to take out the bolts 4′ and 11, and the crank case and assembled parts can then be lifted off. If it is desired to work upon the crank shaft or connecting rods or any other parts within the crank case, these will be entirely exposed when the top has been removed. It is desired to point out particularly the simplicity of this construction and the ease with which the whole assembly may be put together or disassembled.

It is, of course, understood that the specific description of the structure set forth above may be departed from without departing from the spirit of my invention, as set forth in this specification and the appended claims.

What I claim is:

1. In an engine, the combination of an oil pan, a crank case imposed therein and having openings therein, a crank shaft mounted in the crank case, engine cylinders having shoulders to engage the top of the crank case and positioned to fit closely in said openings in the crank case, said cylinders being provided with inlet and outlet ports, manifolds communicating with said ports, and securing means removably fastening said manifolds to the crank case and holding them tightly against the cylinders whereby said cylinders are clamped in place solely through said manifold securing means.

2. In an automobile engine, an oil pan having engine supporting portions constituting the sole support for said engine, a crank case cooperating therewith and having openings therein, securing means removably fastening the latter to the former, a crank shaft mounted in the crank case, engine cylinders fitting closely in the openings in said cover, said cylinders being provided with inlet and outlet ports, manifolds communicating with said ports, and securing means fastening the manifolds detachably to the crank case and holding them tightly against the cylinders, so that, upon removal of the crank case securing means and the manifold securing means, the manifolds, cylinders and crank case cover may be removed from the oil pan.

3. In an automobile engine, an oil pan having engine supports by means of which the engine is mounted on the vehicle, a fly wheel located adjacent one end thereof, a crank case cooperating with the oil pan and having openings therein, a crank shaft carried by said crank case, pistons and connecting rods operated by said crank shaft, cylinders fitting said openings in the crank case, manifolds communicating with the cylinders, removable means connecting the crank shaft to the fly wheel, removable means connecting the crank case to the oil pan, and removable means holding the manifolds against the cylinders and holding the cylinders against the crank case, so that, upon removal of all said removable means, the manifolds, cylinders and crank case may all be bodily removed from the engine supporting means.

4. In an engine, a fixed oil pan for supporting the crank case and having outturned, peripheral flanges, a crank case having cooperating flanges to engage said oil pan, and means for removably securing said crank case to said oil pan, cylinders, pistons, connecting rods and a crank shaft carried by said crank case, a fly wheel located adjacent one end of the oil pan, said crank shaft being removably connected to said fly wheel, whereby upon removal of the means securing the

crank case to the oil pan and the crank shaft to the fly wheel said crank case may be bodily removed from the oil pan.

5. An internal combustion engine comprising a plurality of cylinders, said cylinders being arranged in pairs and each cylinder being provided with an intake and an exhaust port, a manifold communicating with each of the intake ports, and a bolt engaging the manifold in alignment with the intake ports of each pair and positioned intermediate said intake ports to secure the manifold in place.

6. An internal combustion engine comprising a plurality of engine cylinders, said cylinders being arranged in pairs, each cylinder having intake and exhaust port openings communicating therewith, and a removably mounted manifold having a plurality of branches, each branch being provided with a pair of port openings adapted to register with said port openings connecting with said cylinders, said manifold being removably secured in position by clamping means exerting pressure between each pair of port connecting portions of the maifold, said securing means being arranged substantially in alignment with the port openings.

In testimony whereof, I hereunto affix my signature.

FORREST F. CAMERON.