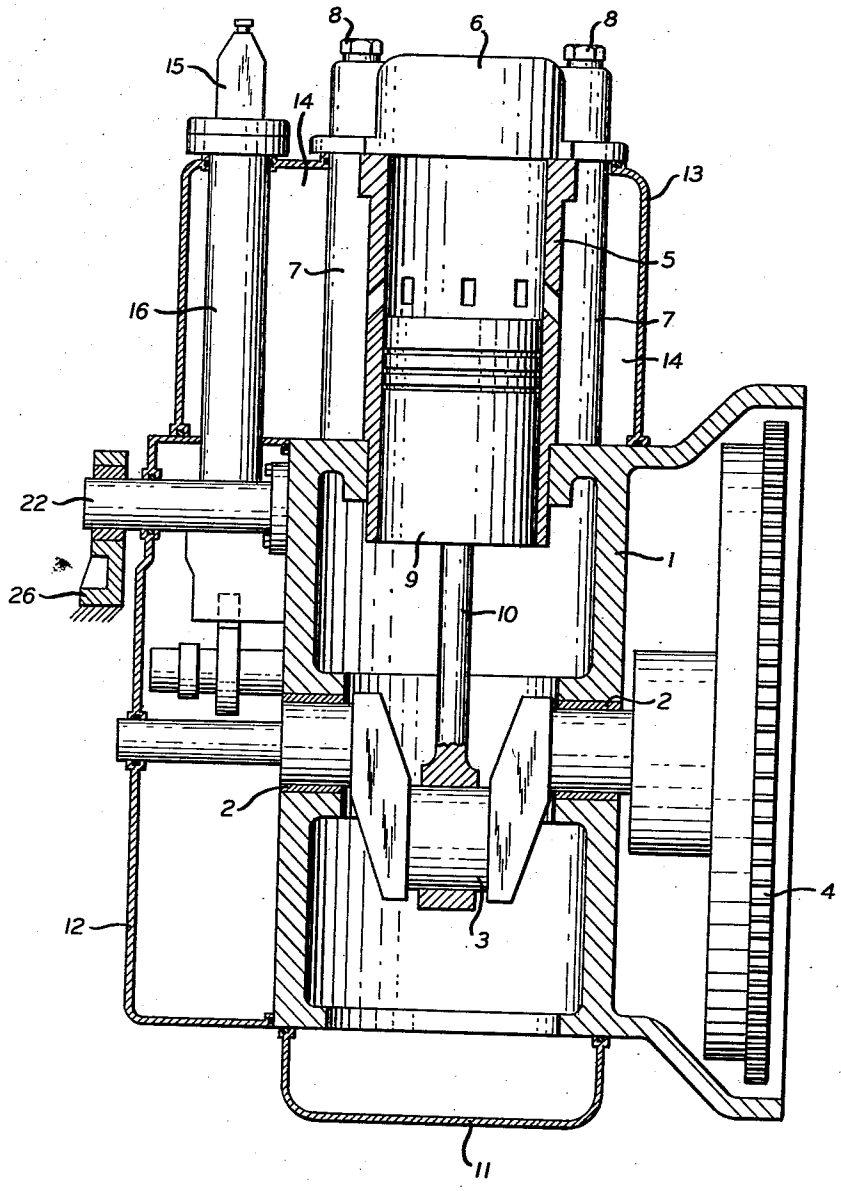
Aug. 21, 1956 J. KREMSER 2,759,470

INTERNAL COMBUSTION ENGINE

Filed Oct. 6, 1953

2 Sheets-Sheet 1

FIG. 1.



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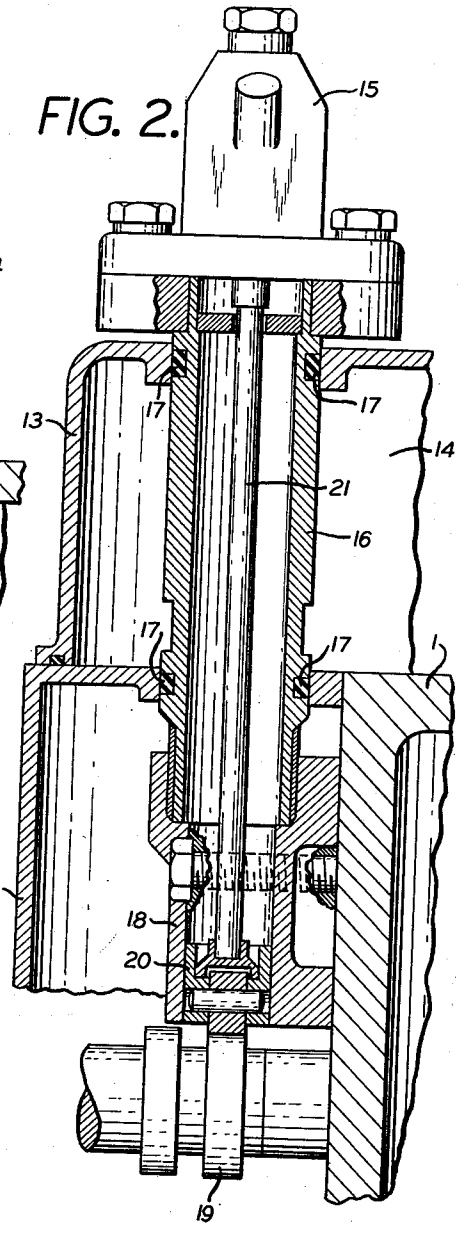
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FIG. 2.



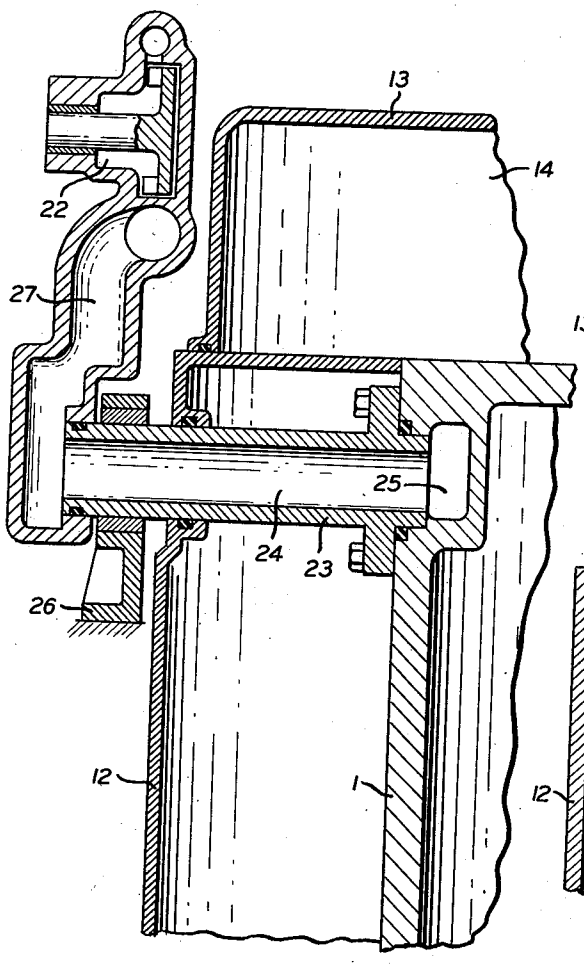


FIG. 3.

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INTERNAL COMBUSTION ENGINE

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Application October 6, 1953, Serial No. 384,416

Claims priority, application Germany July 25, 1953

6 Claims. (Cl. 123—195)

The present invention relates to an internal combustion engine and deals particularly with its suitable construction. So far, internal combustion engines have been built by mounting a cylinder block, carrying a cast cylinder head, on a cast crank case. In later designs the crank case and the cylinder block were cast integral and the cylinder sleeves were inserted dry or wet. At the same time said cast engine block was provided with the cooling medium rooms, and with the scavenging receiver in two-stroke engines. Auxiliary engine components, as for instance, the injection pump, the coolant pump, etc. were flanged to the engine block at a suitable place. The engine timing gears were usually enclosed by a cast housing which in turn could be provided with auxiliary equipment. A construction as described above necessitated a great number of large and complicated castings, and manufacturing costs were accordingly high. Furthermore, engines constructed in this way were of a considerable weight.

This invention completely eliminates the above mentioned disadvantages by applying a new design.

It is, therefore, one object of the present invention to provide a cast base forming the crank case which receives the cylinders and the crank shaft and serves to absorb all stresses. All compartments which receive or form other engine components, as for instance, the scavenging receiver, the coolant rooms, the oil chambers, gear housings, etc. are designed as shells of low strength material which are fitted to the cast base, and all stresses caused by the engine's auxiliary equipment, as for example, by the injection pump, the blower, etc., as well as by the engine suspension, are transmitted immediately to the crank case by means of supports extending through the shells. Thus, the auxiliary units are fitted outside the shells enclosing the cast base and are easily accessible. This design allows for the use of simple and light-weight castings. The jackets, the scavenging receiver, etc. are formed of light-weight shells, made, for instance, of pressed sheet metal.

It is another object of the present invention to employ pipes as a support for fitting the auxiliary units, said pipes extending through the shells and acting immediately on the cast base, while said units, as water pump, injection pump, etc. are arranged outside said shells. The pipes may at the same time be designed to act as feed or discharge lines for the coolant, as engine supports, or as guide sleeves and housings for the gear elements driving said auxiliary units. Suitable gaskets are provided at the openings in the shells through which said pipes pass.

With these and other objects in view which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view through a single-cylinder two-stroke engine,

Fig. 2 is a cross sectional view through the injection pump drive of the engine according to Fig. 1, and

Fig. 3 is a cross sectional view through the coolant pump arrangement of the engine according to Fig. 1.

As can be seen from the drawing, the engine according to Fig. 1 comprises a cast base **1**, forming the crank case, in which the bearings **2** for the crankshaft **3** are arranged. On the crank case **1** the cylinder **5** is mounted which carries the cylinder head **6** and which is secured by the cylinder head studs **8** extending through pipes **7**. The piston **9** with the conrod **10** is fitted in the cylinder **5**.

The oil sump **11** which is also made of pressed sheet metal is fixed to the underside of the crank case **1**, with gaskets fitted in between.

At the engine front end a shell **12** forms the timing gear cover which encloses the gearing for the drive of the auxiliary units.

A further shell **13** is fitted to the crank case **1**, forming the scavenging receiver **14**. This shell completely encloses the cylinder **5** and may be fixed, for example, between the cylinder head **6** and the crank case **1**.

Outside said shell **13** the injection pump **15** is fitted and carried by a support pipe **16** which passes through the scavenging receiver **14**, and, respectively, through the timing gear cover or shell **12**, with gaskets **17** interposed where necessary. Said pipe **16** is arranged in a lifter guide **18** fixed to the crank case **1**. A cam **19** operates a lifter **20**, and a push rod **21** transmits the motion to the injection pump **15**. The pipe **16** acts also as a housing and guide sleeve for the push-rod **21**.

For the arrangement of the water pump **22** a supporting pipe **23** is provided which extends through the timing gear cover. Said pipe **23** is flanged to the crank case **1** and acts as a feed line **24** for the coolant. The pipe **23** ends in the cooling medium rooms **25** in the crank case **1** and also forms the engine suspension bracket, as it is fixed in a bracket **26** outside of the shell **12**. Furthermore, the water pump **22** with the feed line **27** may be mounted to said bracket. In the way illustrated all auxiliary units of the engine may be fixed to the crank case **1** without putting any stress on the shells **11**, **12**, and **13**, which are of a low strength only. Preferably, the shells are made of pressed sheet metal. They may, however, also be made of some artificial material or they may form thin pressure die castings.

While I have disclosed one embodiment of the present invention, it is to be understood that this embodiment is given by example only and not in a limiting sense, the scope of the present invention being determined by the objects and the claims.

I claim:

1. An internal combustion engine, comprising a crank shaft and a crank case forming a base and being provided with journals for said crank shaft, individual cylinders placed on and projecting from said crank case, a cylinder head for each of said cylinders, means for fixing said cylinder head to said crank case, said means for fixing said cylinder head, said crank case and said cylinder head being sufficiently dimensioned so that they can take all strains resulting from the combustion inside the cylinder, shells made of low-strength material comprising a scavenging receiver, coolant chambers, oil compartments, and gear housings, said shells being arranged on said crank case and said cylinder, respectively, and auxiliary units adapted to assist the operation of said engine, and supports for said auxiliary units, said supports extending through said shells and acting on said base directly, so that strains resulting from said auxiliary units are transferred directly to said base.

2. The internal combustion engine, as set forth in claim 1, in which said supports for said auxiliary units extending through said shells are pipes forming simultaneously feed lines and enclosures for the said auxiliary units.

3. The internal combustion engine, as set forth in claim 1, which includes a lifter guide secured to said base, a support pipe extending through said scavenging receiver, and an injection pump secured to said support pipe outside said scavenging receiver.

4. The internal combustion engine, as set forth in claim 1, which includes a gasket disposed at each joint between said supports carrying said auxiliary units and said shells.

5. The internal combustion engine, as set forth in claim 1, which includes means for supporting and suspending said engine, and in which said supporting means act directly on said base and extend through said shells.

6. The internal combustion engine, as set forth in claim 1, which includes a coolant pump, and a support pipe

mounted on said crank case, and in which the said support pipe forms the coolant feed line to said coolant pump, carries the latter and extends through said shells enclosing said engine.

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