

Nov. 24, 1959

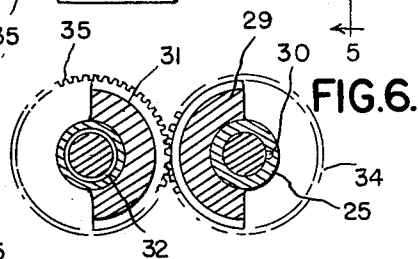
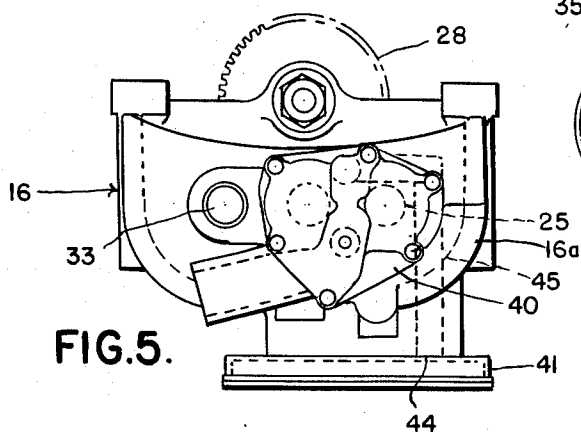
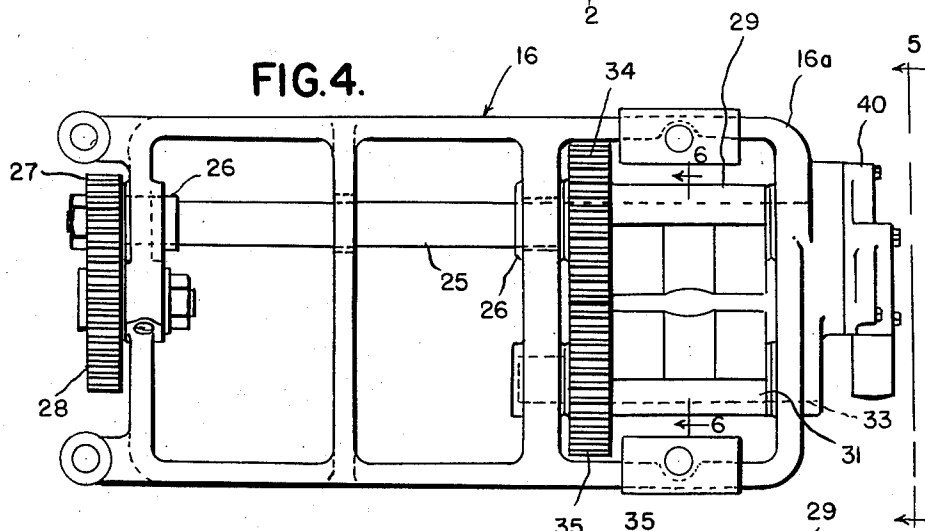
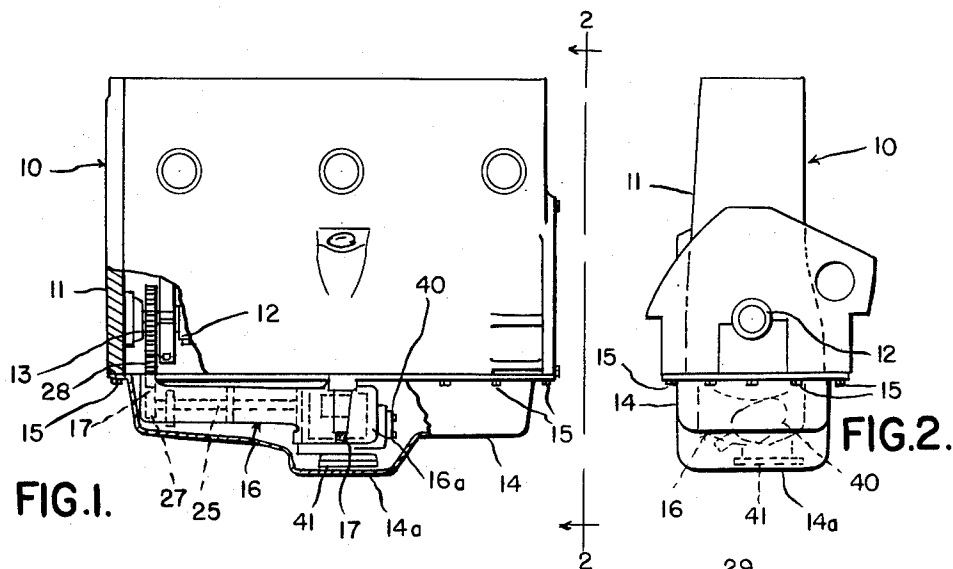
J. J. SYKES, JR

2,914,137

ENGINE CONSTRUCTION

Filed Dec. 26, 1956

2 Sheets-Sheet 1



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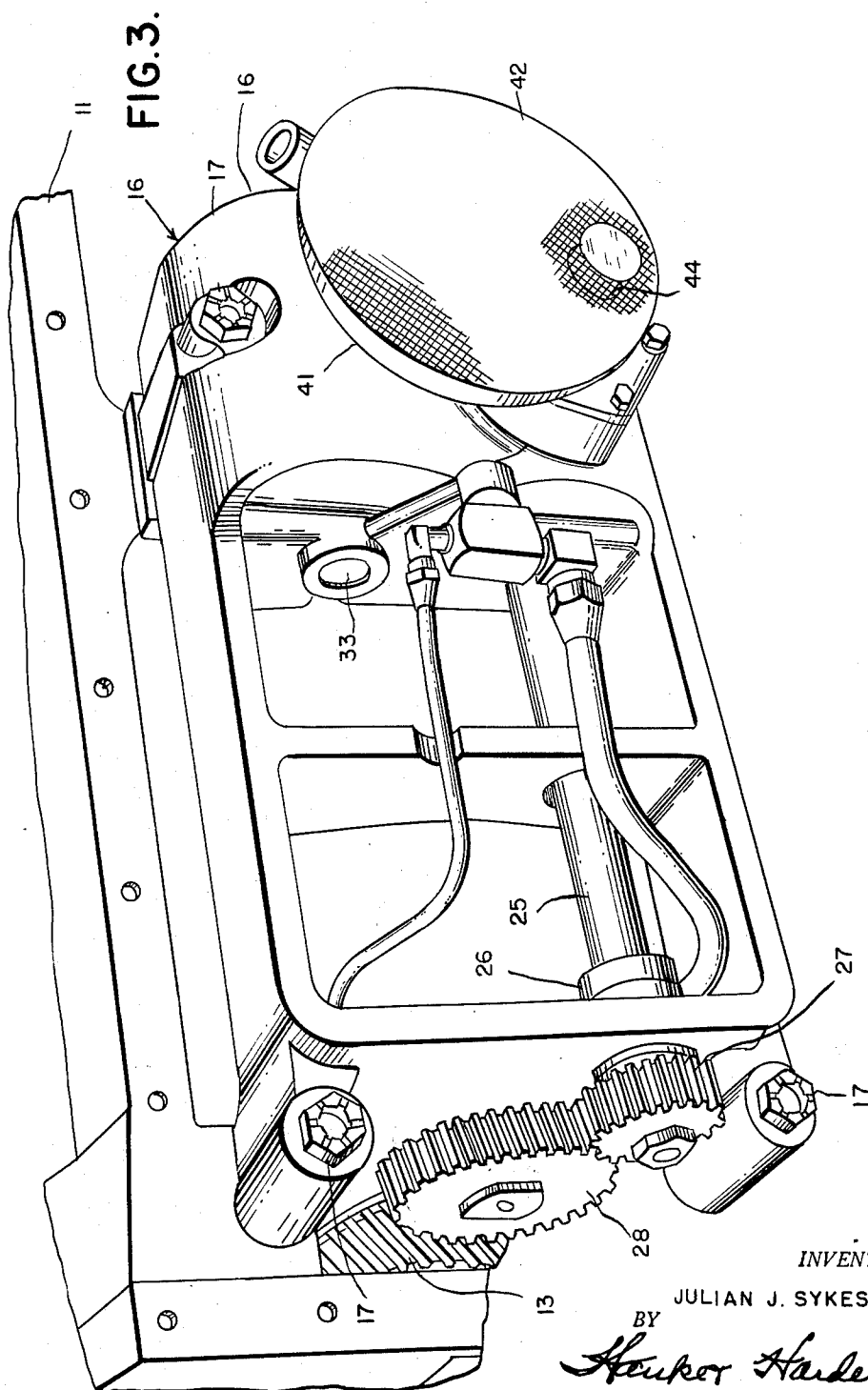
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ENGINE CONSTRUCTION

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3 Claims. (Cl. 184-6)

My invention relates to the construction of internal combustion engines and more particularly to the construction and assembly of an engine crankcase, oil pan and crankshaft balancer housing.

In the development of modern internal combustion engines, compactness of construction, readily accessible and demountable components, as well as free adaptability to modifications without the necessity of major construction changes, are all desirable features to have. However, the incorporation of such features in a practical construction is not an easy matter, particularly with regard to the structure and operation of crankshaft balancing means.

An object of my invention is to improve engine construction by providing a compact assembly of the crankcase, oil pan, and crankshaft balancing means.

Another object of the invention is to provide for a compact engine construction by removably mounting a crankshaft balancer housing in a readily accessible position in the engine oil pan.

A further object of the invention is to provide an improved internal combustion engine by constructing a crankshaft balancer housing adapted to support the crankshaft balancing means and all other related parts and removable as unitary structure from the bottom of the engine.

A still further object of my invention is to construct a readily modified engine by providing a unitary crankshaft balancer housing removably mounted on the lower face of the crankcase and disposed entirely within the engine oil pan.

Yet another object of the invention is to incorporate the aforesaid desirable features in an internal combustion engine by constructing a unitary crankshaft balancer housing adapted to carry all crankshaft balancing components as well as the engine oil pump and related components in a readily accessible position on the lower face of the crankcase and in the engine oil pan.

For a more complete understanding of my invention, reference may be had to the accompanying drawings illustrating a preferred embodiment of the invention in which like characters refer to like parts throughout the several views and in which

Fig. 1 is a side elevational view shown partly in section of a preferred internal combustion engine embodying the present invention.

Fig. 2 is an end elevational view of the engine as seen from the line 2-2 of Fig. 1.

Fig. 3 is a perspective bottom view of the balancer assembly incorporated in the engine of Fig. 1.

Fig. 4 is a top elevational view of the balancer assembly of Fig. 3.

Fig. 5 is an end elevational view of the balancer assembly as seen from the line 5-5 of Fig. 4, and

Fig. 6 is a cross-sectional view taken substantially on the line 6-6 of Fig. 4.

Referring to the figures in detail, an internal combustion engine 10 is illustrated as comprising a crankcase

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structure 11 supporting therein a crankshaft 12 having a driving gear 13 mounted on the end thereof. An oil pan 14 having a lower sump portion 14a in a substantially medial location is removably mounted on the lower face of the crankcase structure 11 by any suitable means such as bolts 15.

A crankshaft balancer housing structure 16 is removably mounted on the lower face of the crankcase structure 11 by any suitable fastening means such as bolts 17, and is wholly contained and disposed within the oil pan 14 as illustrated in Figs. 1 and 2. The housing structure 16 extends from the end of the crankcase to a medial position, and has an enlarged portion 16a which is adapted and arranged to lie in the space provided by the oil pan sump portion 14a. The oil pan 14 thereby conveniently and compactly shrouds the housing structure 16, providing the most effective utilization of space.

A drive shaft 25 is rotatably supported by any means such as bearings 26 in the housing structure 16. A driven gear 27 is mounted on one end of the driveshaft 25 and is driven preferably at twice crankshaft speed through an idler gear 28, which is rotatably supported on the housing structure, by the crankshaft driving gear 13.

A counterweight member 29 is keyed at 30, as shown in Fig. 6, or otherwise mounted to the drive shaft 25. A second counterweight member 31 is rotatably supported by a bearing 32 on a lay shaft 33 which is mounted in the portion 16a of the housing structure 16. The counterweight members 29 and 31 are provided respectively with meshed gears 34 and 35, so that the counterweight members will rotate in opposite directions in the conventional manner.

A conventional gear-type oil pump 40 is mounted on the end of the housing structure 16 opposite the gears 27 and 28, and is driven by the driveshaft 25, which extends through the housing structure 16 and the counterweight member 29. An oil intake structure 41 having an oil screen 42 is mounted on the lower face of the housing portion 16a and is open to the lowermost portion of the sump 14a. An oil intake port 44 and an intake oil passage 45 are provided in the housing portion 16a connecting the oil pump intake with the oil intake structure 41.

As will be seen, this unitary construction of a crankshaft balancer housing and oil pump components, located as it is within the oil pan, provides for convenient disassembly and maintenance. In addition, with only minor modifications of the housing structure 16 and the oil pan 14, any desired balancer position may be achieved, since the housing may be made longer or shorter and the sump portion 14a may be appropriately located, to position the balancing counterweight members 29 and 31 at the most effective location, as determined by the particular engine operating characteristics. This may be accomplished without making any major change in the crankcase 11 whatsoever.

Although I have described but one preferred embodiment of my invention, it will be apparent to one skilled in the art to which the invention pertains that various changes and modifications may be made therein without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. In an internal combustion engine having a crankcase, a crankshaft supported thereby and provided with a driving gear, and an oil pan removably mounted on the lower face of said crankcase, a separable unitary balancer housing structure removably mounted on the lower face of said crankcase and enclosed by said oil pan, an engine balancing means supported only by said unitary housing structure, driving means supported only by said

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housing structure and operably connecting said crankshaft driving gear with said engine balancing means, said housing having accessory support means, and an oil pump supported only by said support means and operatively connected with said driving means, oil intake means supported only by said housing structure and open to said oil pan, and said housing structure having oil passages therein connecting said intake means with said oil pump.

2. In an internal combustion engine having a crankcase, a crankshaft supported thereby and provided with a driving gear, and an oil pan removably mounted on the lower face of said crankcase, said oil pan having an enlarged medial portion at a substantially lower level to provide a sump, a separable unitary balancer housing structure removably mounted on the lower face of said crankcase and enclosed by said oil pan, said unitary housing structure having an enlarged portion at a substantially lower level and disposed in said oil pan sump, said housing structure having accessory support means, an oil pump supported only by said housing structure, oil intake means supported only by said housing structure and disposed in said oil pan sump near the lowest level thereof, and said housing structure having oil passages therein connecting said intake means with said oil pump.

3. In an internal combustion engine having a crankcase, a crankshaft supported thereby and provided with a driving gear disposed adjacent one end of said crankcase, and an oil pan removably mounted on the lower face of said crankcase, a separable unitary balancer housing structure removably mounted on the lower face of

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said crankcase and enclosed by said oil pan, said unitary housing structure extending from the gear end of said crankcase to a medial portion thereof, engine balancing means supported only by said housing structure and positioned below and approximately medially of the ends of said crankshaft, and driving means supported only by said housing and operably connecting said crankshaft gear with said balancing means, said housing structure having an accessory support means at the inner end thereof, and an oil pump supported only by said support means and drivingly connected with said driving means, said oil pan having an enlarged lower medial portion providing a sump, and an oil intake means supported only by said housing structure and disposed in said oil pan sump.

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