July 29, 1941. J. F. MARTIN ET AL 2,250,809

ENGINE DRIVING MECHANISM FOR MAGNETOS

Original Filed March 19, 1940 3 Sheets-Sheet 1

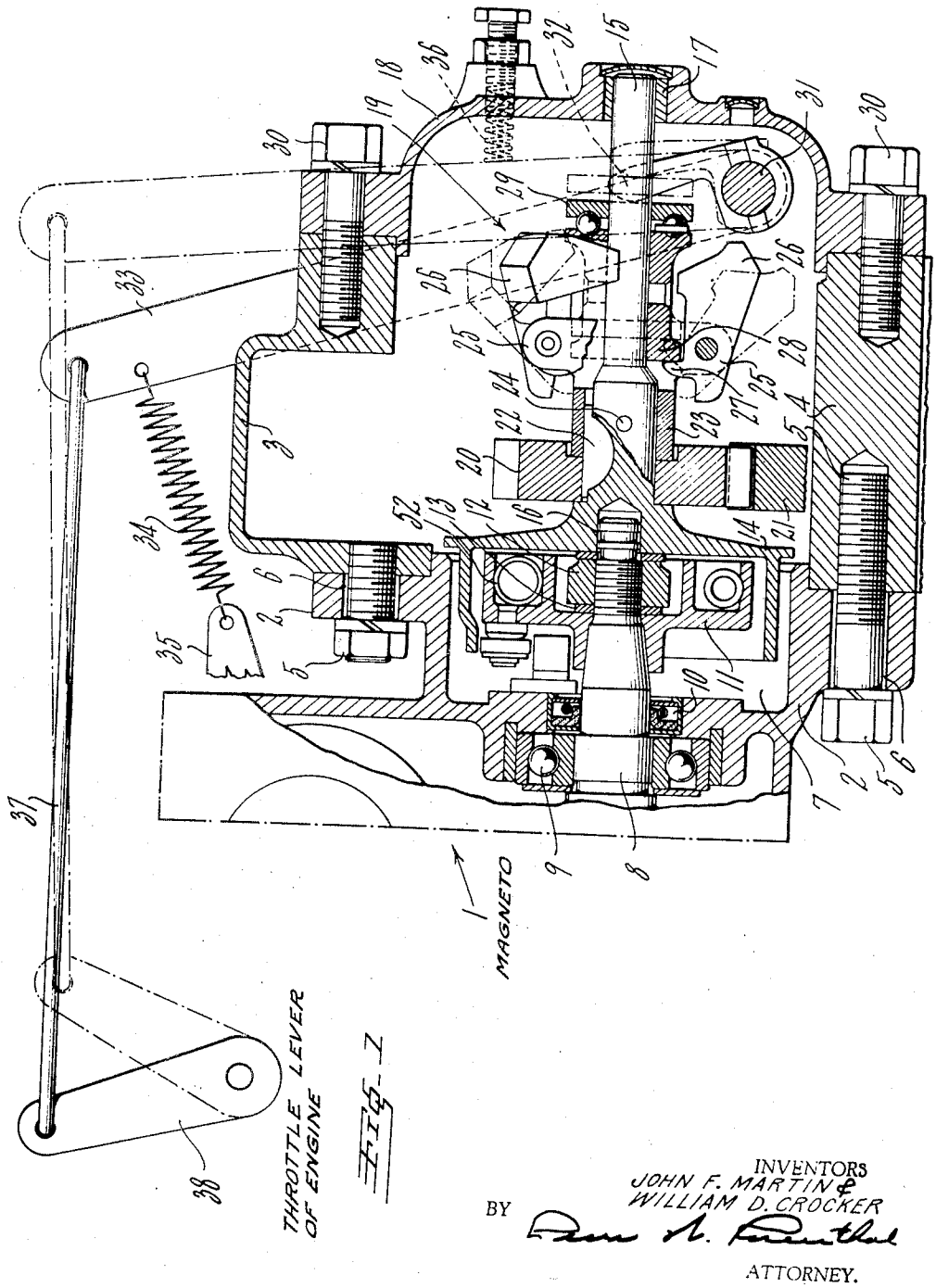


Fig. 1

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Original Filed March 19, 1940 3 Sheets-Sheet 2

Fig. 2

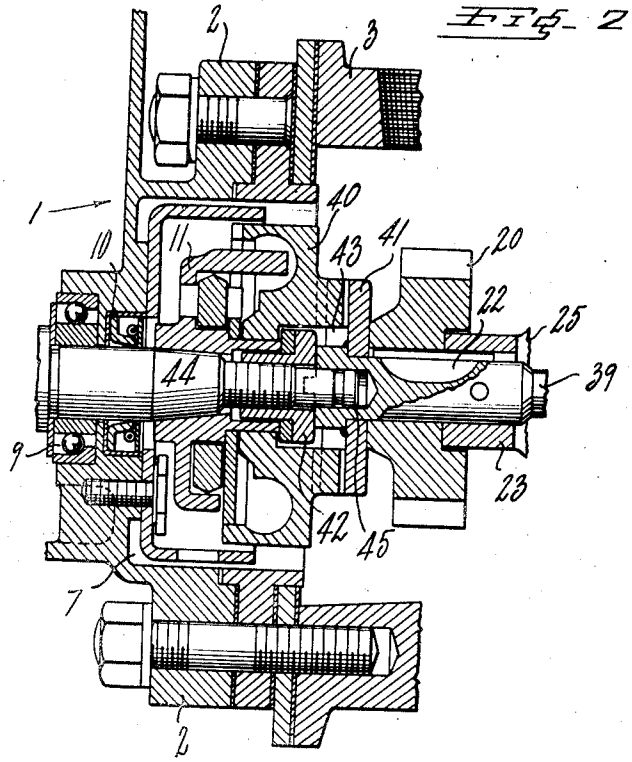
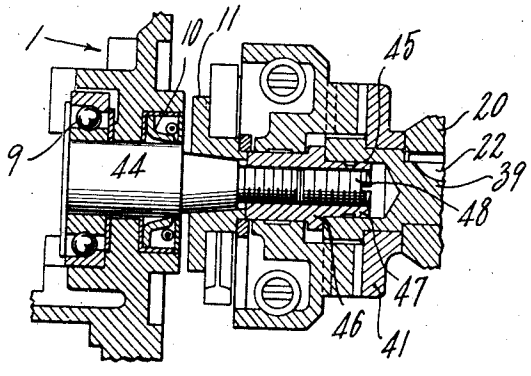


Fig. 3



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Original Filed March 19, 1940 3 Sheets-Sheet 3

Fig. 4

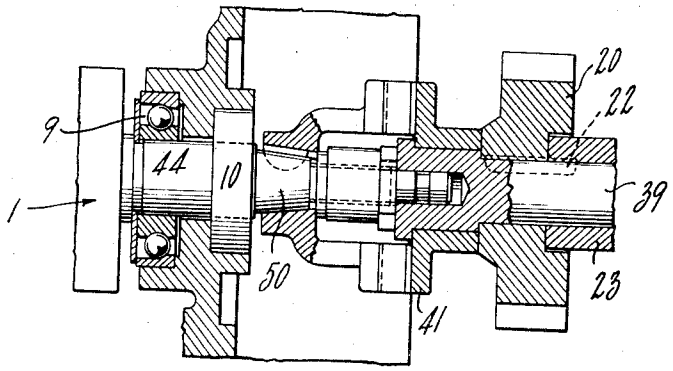
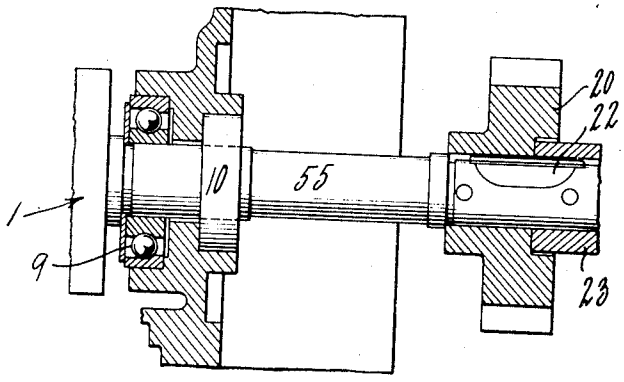


Fig. 5



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ENGINE DRIVING MECHANISM FOR MAGNETOS

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Original application March 19, 1940, Serial No. 324,778, now Patent No. 2,239,650, dated April 22, 1941. Divided and this application March 21, 1941, Serial No. 384,483

9 Claims. (Cl. 123—195)

This application is a division of our copending application, Serial No. 324,778, filed March 19, 1940, now Patent No. 2,239,650.

The present invention relates to engine driving mechanisms for magnetos, with engine governors, whether or not associated with couplings of either the impulse or drive types, and whether or not associated with a drive gear, for the ignition and control of the associated internal combustion engines.

The primary object of the invention is to provide compact and inexpensive driving mechanisms which, by reason of their few and simple parts, result in rugged and durable constructions producing effective ignition and control for reliable operation of engines over long periods of service under severe field conditions. These results are attained principally by constructions in which the magneto bearing or the magneto operating shaft provides the sole support, whether directly or indirectly, for one end of the engine driving mechanism, whereby the necessity for a separate bearing and oil seal for that end of said mechanism is obviated.

Another object is to provide a housing for the parts which not only supports the magneto but also supports the outer end of the drive shaft of the engine driving mechanism, so that the magneto and drive shafts may be assembled and maintained in proper alinement.

Other objects will appear from the following description of several illustrative embodiments of the invention taken in connection with the accompanying drawings, of which Fig. 1 shows an arrangement, mostly in sectional elevation, in which the projecting end of the operating shaft of a rotary magneto is journaled in the driving member of an impulse coupling for the magneto to support the inner end of the engine driving mechanism incorporating a governor also, the magneto being flange-mounted on the engine casing; Fig. 2 is a fragmentary view in section of a similar arrangement except that a drive coupling in addition to the impulse coupling is incorporated in the engine driving mechanism; Fig. 3 is a fragmentary view in section on reduced scale of an arrangement similar to Fig. 2 except that the magneto operating shaft supports one end of the engine driving mechanism by means of a nut journaled in the shaft of said mechanism and fastened on the magneto shaft in position to hold the members of the impulse coupling in position thereon; Fig. 4 is a fragmentary view in section on reduced scale of an arrangement similar to Fig. 2 except that no impulse coupling is used but the drive coupling alone; and Fig. 5 is a fragmentary view in section of an arrangement in which neither an impulse coupling nor a drive coupling is used, the magneto operating shaft being extended to form also the shaft of the engine driving mechanism.

Referring to Fig. 1, the magneto 1 of any suitable type has an integral mounting flange 2 of well known kind fastened in angularly adjusted position to the engine casing members 3 and 4 by bolts 5 passing through the circular slots 6 of the flange. This mounting provides a pocket at 7 for the exteriorly projecting end of the magneto operating shaft 8, which is supported by the ball bearing 9 in the magneto and extends through the oil seal 10. On shaft 8 is rigidly fastened the driven member 11 of an impulse coupling of any suitable type, which member is preferably keyed and held longitudinally thereon by nut 12 and lock washer 13. The cooperating driving member of the impulse coupling has a cup-shaped housing 14 integral with the engine drive shaft 15 and a bearing 16 in which the end of shaft 8 is journaled. The engine driving mechanism, incorporating the impulse coupling and the engine drive shaft, as well as the gear and governor hereinafter referred to, is thus supported at its inner end by the magneto operating shaft 8 or primarily by the magneto bearing 9, and is supported at its outer end in the bearing 17 of the end cover 18. Intermediate the ends of shaft 15 is mounted a governor 19, and near the impulse coupling member 14, between it and the governor, is mounted a gear 20 which is meshed or otherwise driven by the engine gear 21 in proper ratio and timing. The gear 20 is fixed on shaft 15 by a key 22 and is held longitudinally thereon by a hub 23 pinned at 24 to the shaft. The hub carries oppositely disposed bracket arms 25 to which are pivoted respective governor weights 26. Each weight has a camming projection 27 adapted to push against the collar 28 which has a ball thrust bearing against disc 29 loose on the shaft. Surrounding the engine driving mechanism is a housing including the members 3 and 4 and the end cover 18 fastened thereto by bolts 30. This cover also carries bearings (not shown) for the cross shaft 31 on which is fixedly mounted the cam 32 abutting the disc 29 inside the housing and the arm 33 outside the housing. A tension spring 34 is fastened between this arm and an ear 35 projecting from a part of the engine, while an adjustable bumper spring 36, mounted in the end cover 18, is adapted to abut the arm near the outward position of its throw to limit through

link 37 the maximum open position of throttle lever 38 of the engine.

Referring now to the embodiment of Fig. 2, it will be observed that shaft 39 of the engine driving mechanism is not integral with the driving member 40 of the impulse coupling, as in Fig. 1, but is mechanically connected thereto by a coupling member 41 of the Oldham type of drive coupling so that the impulse coupling with its fastening nut 42 and tongue 43 may be standard. Furthermore, the exteriorly projecting end of the magneto shaft 44 extends into bearing 45 in shaft 39 on which member 41 of the coupling is brazed against a shoulder at the end of the shaft 39. In this embodiment also, the engine driving mechanism, including in this case a drive coupling as well as an impulse coupling, is directly supported at one end by the magneto operating shaft and indirectly by the mangeto bearing 9.

The embodiment of Fig. 3 is like that of Fig. 2, except that the lock nut 46 not only holds the impulse coupling members in place longitudinally but its extended end portion 47 is journaled in an interior bearing 45 of shaft 39. The lock screw 48 holds nut 46 securely in place. In Fig. 4 there is no impulse coupling for the magneto as in the previous embodiments, but a drive coupling only, the end of the operating shaft 50 being journaled in an interior bearing of shaft 39. However, as noted before, in these embodiments it is the magneto operating shaft directly and the magneto bearing indirectly that support one end of the engine driving mechanism.

In the embodiment of Fig. 5 there is no coupling, impulse or drive coupling, but the shaft 51 is both the operating shaft of the magneto and the drive shaft of the engine driving mechanism. In this case, the magneto bearing 9 supports that shaft directly.

During the starting period of the engine with any of the driving mechanisms of Figs. 1 to 3, the magneto is impulsed by the impulse coupling in the well known way, the magneto and engine shafts appropriately turning with respect to one another, but above a predetermined speed the drive of the magneto is direct through the spring 52 of the impulse coupling. In the other embodiments, the magneto is driven directly during the starting period also, through the drive coupling in Fig. 4 and by an integral shaft in Fig. 5. As the engine speed increases further in any of the embodiments, the governor weights 26 fly out, moving the disc 29 to the right in Fig. 1 and through the cam 32 swinging the arm 33 toward the broken line position against the tension of spring 34. At a predetermined high speed of the engine the arm begins to compress the bumper spring 36 until the solid position thereof prevents further movement of the engine throttle beyond this fully open position. As the engine throttle is moved toward its closed position at any time, the spring 34 keeps the cam 32 against the disc 29. The shape of the face of the cam 32 fixes the relation between the longitudinal movement of the disc 29 and the swinging movement of the arm 33, and therefore predetermines the control of the gas supply in accordance with the speed of the engine.

From the foregoing it will be observed that by mounting the gear 20 between the magneto 1 and the governor 19, and near the coupling when such is provided, the engine drive shaft is subjected to the minimum torsional effects. Also by this construction, the magneto bearing 9 directly or indirectly, and in some cases the overhanging end of the magneto operating shaft directly, forms the sole support for one end of the engine driving mechanism, whether an impulse coupling and a drive coupling are used or either or neither of them is used. Thereby the necessity for an additional bearing and engine oil seal at that end of the drive shaft is eliminated. This results in a reduction in wear, vibration and noise and an increase in efficiency, dependability and life of the engine driving mechanism, including the governor. Furthermore, the engine driving mechanism is more compact and less expensive.

It is obvious that in any of the illustrated embodiments, the magneto may be base-mounted or otherwise supported to be driven by the engine driving mechanism, for rotary, oscillatory or other kind of operation; also the impulse coupling of the embodiment of Fig. 1, 2 or 3 may be dispensed with, as in Fig. 4 or 5, or the drive coupling of Fig. 2, 3 or 4 may be dispensed with as in Fig. 1 or 2. Furthermore, the nut construction of Fig. 3 may be adapted to the embodiments of Figs. 1, 2 and 4. The gearing 20, 21 may or may not be incorporated in any of the embodiments, and the governor may be of any other suitable kind or type to appropriately affect the engine, and thereby the magneto, in operation. It will be understood that these and other modifications are intended to be covered by the appended claims within the broad terms thereof.

Having thus described our invention, what we claim is:

1. In combination; an engine casing; a member having a bearing; a magneto which is supported by the engine casing and which has a rotor for operation by the engine and a bearing arranged within the magneto; and engine driving mechanism including an engine drive shaft which is connected to the magneto rotor and which is supported at the magneto end by the magneto bearing solely and at the other end by the member bearing solely, and also including an engine governor supported by the engine drive shaft between said bearings and arranged to affect the operation of the engine and thereby the operation of the magneto.

2. In combination; an engine casing; a member having a bearing; a magneto which is supported by the engine casing and which has a shaft projecting exteriorly of the magneto for operation by the engine and a bearing for the magneto shaft arranged within the magneto; and engine driving mechanism including an engine drive shaft which is connected to the projecting end of the magneto shaft and which is supported at that end by the magneto shaft solely and at the other end by the member bearing solely, and also including an engine governor supported by the engine drive shaft between said bearings and arranged to affect the operation of the engine and thereby the operation of the magneto.

3. In combination; an engine casing; a member having a bearing; a magneto which is supported by the engine casing and which has a shaft projecting exteriorly of the magneto for operation by the engine and a bearing for the magneto shaft arranged within the magneto; and engine driving mechanism including an engine drive shaft having an interior bearing in which the projecting end of the magneto shaft is journaled to form the sole support for the engine driving mechanism at that end and also having its other end journaled in the member

bearing to form the sole support at that other end, and an engine governor supported by the engine drive shaft between said bearings and arranged to affect the operation of the engine and thereby the operation of the magneto.

4. In combination; an engine casing; a housing fastened to the engine casing and to the magneto and having a bearing; a magneto which is supported by the engine casing and which has a rotor for operation by the engine and a bearing arranged within the magneto; and engine driving mechanism arranged within the housing and including an engine drive shaft which is connected to the magneto rotor and which is supported on the magneto end by the magneto bearing solely and at the other end by the housing bearing solely, and also including an engine governor supported by the engine drive shaft between said bearings and arranged to affect the operation of the engine and thereby the operation of the magneto.

5. In combination; an engine casing; a member having a bearing; a magneto which is supported by the engine casing and which has a shaft for operation by the engine and a bearing for the magneto shaft arranged within the magneto; and engine driving mechanism including an engine drive shaft which is connected to the magneto shaft and which is supported at the magneto end by the magneto bearing solely and at the other end by the member bearing solely, and also including an engine governor supported by the engine drive shaft between said bearings; said member also supporting another shaft which is operated by the governor and is arranged to affect the operation of the engine and thereby the operation of the magneto.

6. In combination; an engine casing; a member having a bearing; a magneto which is supported by the engine casing and which has a shaft projecting exteriorly of the magneto for operation by the engine and a bearing for the magneto shaft arranged within the magneto; and engine driving mechanism including an engine drive shaft journaled in the member bearing, a coupling having its driving member rigidly connected to the engine drive shaft and its driven member rigidly connected to the projecting part of the magneto shaft, and an engine governor supported by the engine drive shaft and arranged to affect the operation of the engine and thereby the operation of the magneto.

7. In combination; an engine casing; a member having a bearing; a magneto which is supported by the engine casing and which has a shaft projecting exteriorly of the magneto for operation by the engine and a bearing for the magneto shaft arranged within the magneto; and engine driving mechanism including an engine drive shaft, an impulse coupling having its driven member fastened on the magneto shaft, a drive coupling having its drive member fastened on the engine drive shaft and having its driven member connected to the driving member of the impulse coupling, and an engine governor supported by the engine drive shaft and arranged to affect the operation of the engine and thereby the operation of the magneto, the projecting end of the magneto shaft being journaled in the driving member of the impulse coupling to form the sole support of the engine drive shaft at that end and the other end of the drive shaft being journaled in the member bearing.

8. In combination; an engine casing; a magneto which is supported by the engine casing and which has a shaft for operation by the engine and a bearing for the magneto shaft arranged within the magneto; and engine driving mechanism including a drive shaft which is connected to the magneto shaft and which is supported at the magneto end by the magneto bearing solely and at the other end by the member bearing solely, an engine governor supported by the engine drive shaft and arranged to affect the operation of the engine and thereby the operation of the magneto, and a drive gear fastened on the engine drive shaft between the governor and the magneto.

9. In combination; an engine casing; a member having a bearing; a magneto which is supported by the engine casing and which has a shaft for operation by the engine and a bearing for the magneto shaft arranged within the magneto; and engine driving mechanism including a drive shaft which is connected to the magneto shaft and which is supported at the magneto end by the magneto bearing solely and at the other end by the member bearing solely, a coupling between the engine drive shaft and the magneto shaft, an engine governor supported by the engine drive shaft and arranged to affect the operation of the engine and thereby the operation of the magneto, and a drive gear for the engine drive shaft arranged between the governor and the coupling.

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