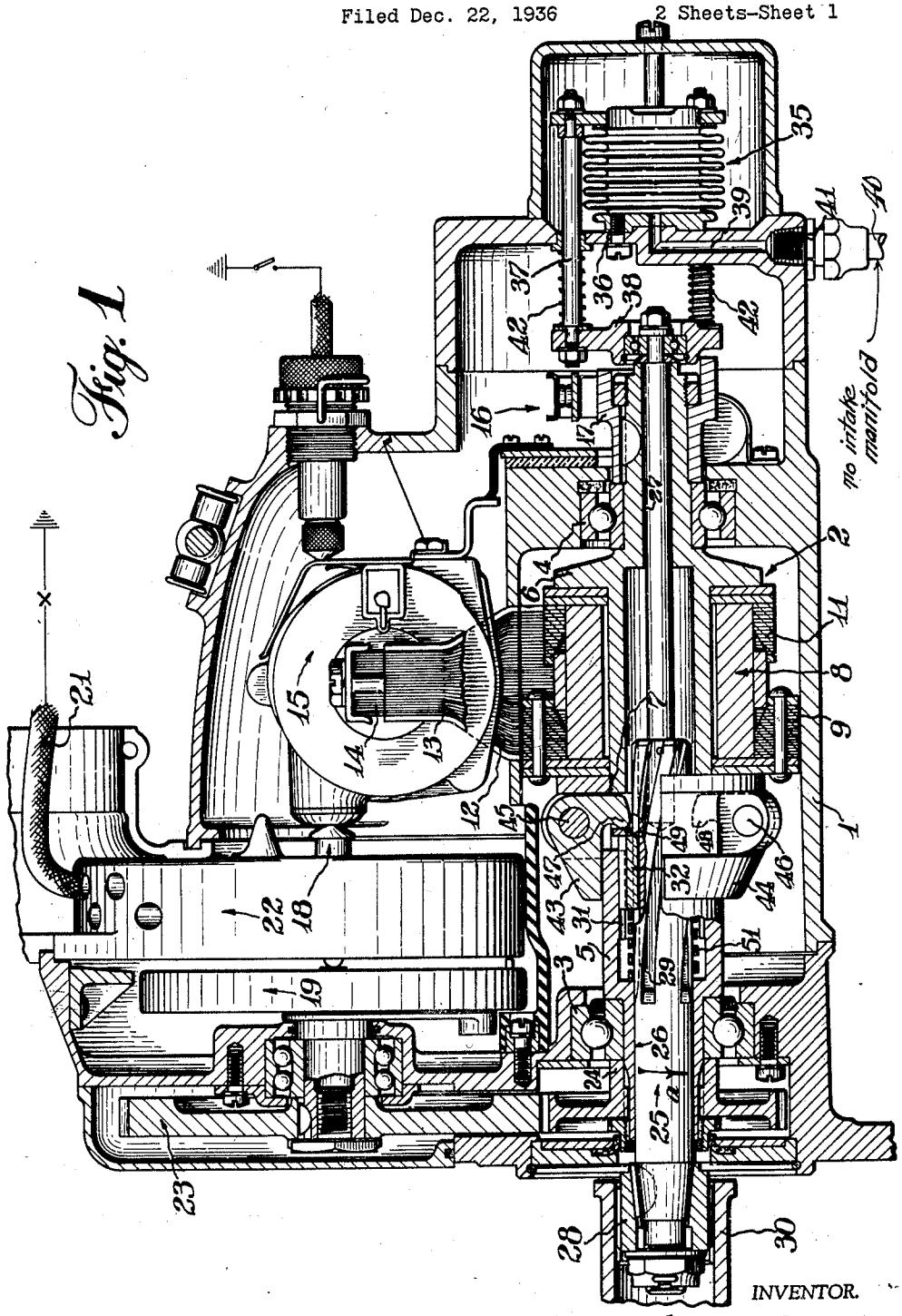
Nov. 29, 1938. W. J. SPENGLER 2,138,681

MAGNETO GENERATOR

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Fig. 1



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Fig. 2

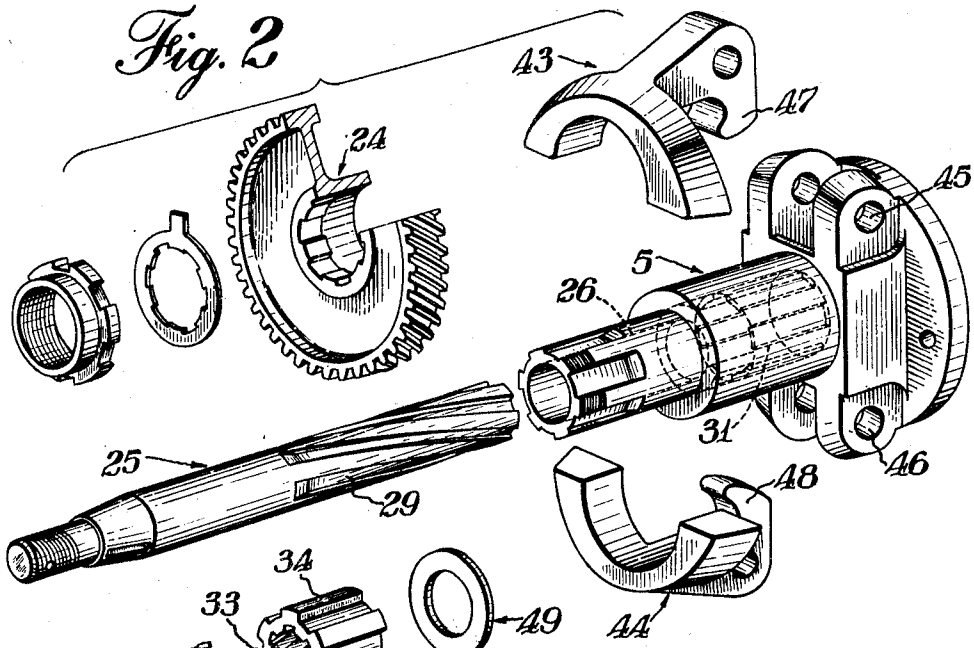


Fig. 3

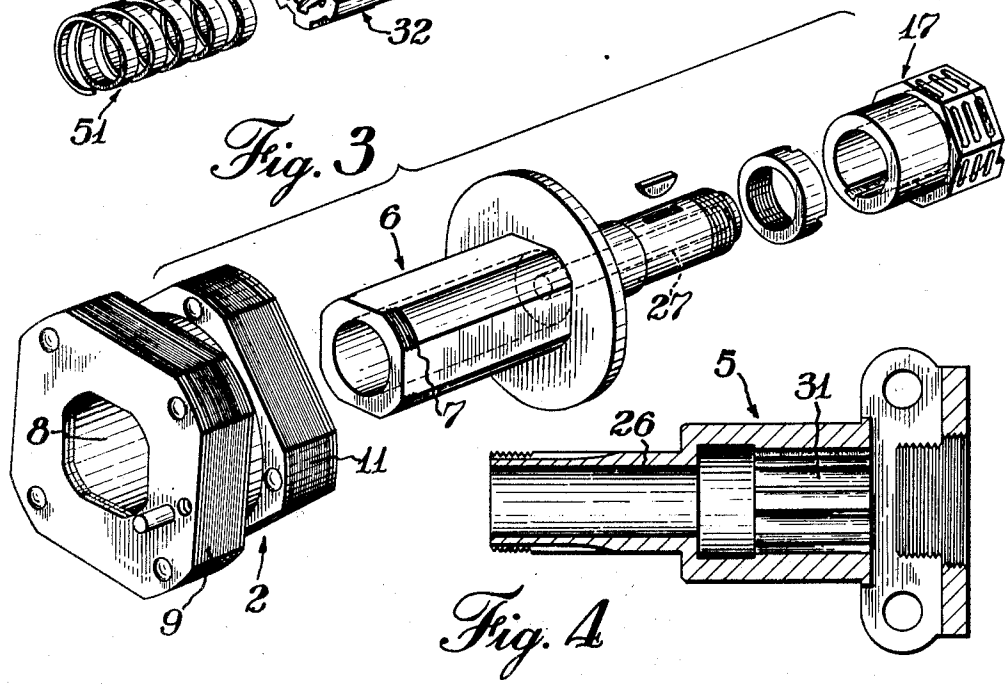


Fig. 4

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MAGNETO GENERATOR

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6 Claims. (Cl. 123—117)

The present invention relates to magneto generators and more particularly to a magneto incorporating an automatic control for timing the ignition of internal combustion engines.

In certain types of engine installation, especially those in which, as with aviation engines, the load increases with the speed, it has been found desirable to introduce a retarding effect on the timing mechanism as the speed—and consequently the load—increases. When this retarding effect is used in conjunction with a device which is operated by variations of the pressure in the intake manifold of the engine to control the timing mechanism in response to increases in intake pressure, it has been found possible to improve considerably the performance of aviation engines so equipped.

It is an object of the present invention to provide a magneto incorporating a novel form of combined speed and load control of the timing mechanism.

It is another object to provide such a device embodying a speed-controlled retarding mechanism in combination with an intake-pressure-operated controlling mechanism.

It is a further object to provide such a device in which the two controlling means act in concert upon a unitary coupling device so that their combined effect is the sum of their separate effects thereon.

It is another object to provide such a device which is incorporated as component structure of the magneto generator.

Further objects and advantages will be apparent from the following description taken in connection with the accompanying drawings in which:

Fig. 1 is a side elevation partly broken away and in section of one preferred embodiment of the present invention, the parts being illustrated in the positions assumed responsive to low engine speed and low intake pressure;

Fig. 2 is a detail in perspective of the parts of the driving connection for the magneto rotor including the centrifugal timing control device, the parts being shown in disassembled relation;

Fig. 3 is a similar view of the parts of the magneto rotor and breaker cam; and

Fig. 4 is a substantially vertical sectional view of the rotor shell member which carries the centrifugal controlling elements.

Referring first to Fig. 1 of the drawings, there is illustrated a frame 1 in which a magneto rotor indicated generally by numeral 2 is journalled as by means of bearings 3 and 4. The rotor 2 comprises a pair of shell members 5 and 6 journalled respectively in the bearings 3 and 4 and maintained in assembled relation by means of a screw-threaded engagement indicated at 7.

A permanent magnetic element in the form of a cylinder 8 magnetized with the poles at its ends is clamped between the shell members 5 and 6 of the rotor, and pole members 9 and 11 of suitable laminated construction are mounted at the ends of the magnet 8 in position to cooperate with an external magnetic circuit including magnetic conductors 12 and 13 and the core 14 of an induction coil 15. The primary currents generated in the coil by the flux from the rotor are controlled by breaker mechanism indicated generally at 16 operated by a cam 17 fixed to the shell member 6 of the rotor, and the secondary current from the coil is conducted as indicated at 18 to a distributor rotor 19 which distributes the ignition current to output cables 21 located in an output terminal block 22. The rotor 19 is driven by a gear 23 operated by a pinion 24 keyed on the shell member 5 of the rotor.

A drive shaft 25 slidably journalled in the members 5 and 6 of the rotor at 26 and 27 carries a driving coupling member 28 which is arranged to slidably engage a coupling member 30 operated by the engine, not illustrated, for which the magneto is designed to furnish the ignition current.

According to the present invention, means are provided for coupling the driving shaft 25 to the shell 5 of the rotor, which means is angularly variable under the control of a pressure-responsive device and a centrifugal device. As here shown, this is accomplished by forming helical splines 29 on the shaft 25, forming straight internal splines 31 in the shell member 5, and interposing therebetween a slidable sleeve 32 having internal helical splines 33 (Fig. 2) cooperating with the helical splines of the drive shaft, and external straight splines 34 cooperating with the splines 31 of the shell 5, and controlling the longitudinal positions of the drive shaft 25 and intermediate sleeve 32 by means of the agencies above stated.

The pressure-responsive control for timing the rotor comprises a pressure-responsive device such as a chamber 35 with elastic walls, one end of which is anchored as indicated at 36 to the casing 1 of the magneto, and the other end of which is suitably connected as by means of sliding transmission members 37 to a cross-head 38 swiveled to the end of the drive shaft 25. A conduit 39 is arranged to communicate with the interior of the chamber 35 and is formed with a suitable connec-

tion 41 whereby communication may be made with the intake manifold of the engine, not illustrated. Springs 42 are preferably provided for balancing the expansive force of the elastic wall of chamber 35, thus maintaining the chamber in partially contracted position whereby the drive shaft 25 is normally positioned medially of its longitudinal travel. Pressures below atmospheric in the intake manifold cause the chamber to contract and move shaft 25 to the left as illustrated in Fig. 1, while positive pressures cause the shaft to be moved to the right from its medial position. It will be readily appreciated that the pressures existent in the intake manifold are dependent upon load conditions and the degree of supercharge then existent, and variations in these conditions thus cause corresponding variations in the longitudinal position of the drive shaft. The longitudinal motion of the drive shaft 25 causes the rotor 2 to be angularly adjusted with respect thereto by virtue of the spiral splined connection 29, 33. The relation of the parts is preferably such that longitudinal motion of the drive shaft to the right in Fig. 1 due to increased intake manifold pressure, causes the rotor to be retarded with respect to the direction of rotation of the drive shaft as indicated by the arrow *a*.

The centrifugal controlling device comprises a pair of weight members 43 and 44 pivoted at 45 and 46 to the rotor shell member 5 and having inwardly extending arms 47 and 48 bearing on a thrust ring 49 which rests against the end of the intermediate coupling sleeve 32. The parts are normally maintained in their idle or advanced position by means of an expansive spring 51 located in the shell member 5 and bearing against the coupling sleeve 32. The arrangement is such that outward movement of the centrifugal members 43 and 44 will cause the arms 47 and 48 thereof to move the coupling member 32 to the left in Fig. 1, whereby the coupling member and consequently the rotor 2 are angularly retarded with respect to the drive shaft 25 by virtue of the spiral splines 29, 33 of the shaft and coupling member.

In the operation of the device, the drive shaft 25 is rotated in constant timed relation with the engine to be ignited by virtue of its connection therewith through the member 28. During such operation, the longitudinal position of the drive shaft 25 is determined by the state of the pressure within the flexible chamber 35 which reflects the conditions existing in the intake manifold, and thereby causes the shaft 25 to be moved in a direction to retard the rotor in response to increases in intake pressure of the engine.

Simultaneously with such action, the centrifugal members 43 and 44 operate to move the coupling sleeve 32 to the left in Fig. 1 in response to increases in speed of the engine, thereby additionally retarding the rotor with respect to the drive shaft in response to accelerations of the engine.

It will be understood that the structure herein disclosed is flexible as to its operation and design and is readily adaptable to secure any desired type of control. Thus the centrifugal control may be used either to advance or to retard the timing of the device in response to increases in the speed of rotation thereof, and the pressure-controlled device may be arranged to operate in response to any desired range of absolute pressures either above or below atmospheric pressure at sea level or any specified altitude, and the variations in such absolute pressure may be arranged to cause any desired retarding or advancing effect upon the timing mechanism.

Although but one embodiment of the invention has been shown and described in detail, it will be understood that other embodiments are possible and various changes may be made in the proportions and arrangements of the parts without departing from the spirit of the invention as defined in the claims appended hereto.

What is claimed is:

1. In a magneto generator for internal combustion engines, a frame, a rotor journalled therein having a portion of its length interiorly splined, a drive shaft slidably mounted in the rotor having a portion of its length spirally splined, a sleeve interiorly splined to fit the spiral splines of the shaft, and exteriorly splined to fit the interior splines of the rotor, means responsive to variations in intake pressure of the internal combustion engine for moving longitudinally said drive shaft to vary the angular relation of the rotor and drive shaft, and speed-controlled means for moving the splined sleeve longitudinally to further vary said angular relation.

2. In a magneto, a drive shaft, a rotor to be driven thereby, coupling means therebetween including an intermediate member having a helical connection with the shaft, fluid-pressure responsive means for moving the shaft longitudinally, and speed-responsive means for moving said intermediate member longitudinally.

3. In an ignition magneto for internal combustion engines, a drive shaft, a rotor to be driven thereby, coupling means therebetween including an intermediate member having a helical connection with the shaft, means responsive to variations in the intake pressure of the internal combustion engine for moving the shaft longitudinally, and means responsive to the rotative speed of the engine for moving said intermediate member longitudinally.

4. In a magneto, a drive member, a rotor, connecting means including an intermediate member having a helical connection with said drive member, speed-responsive means for moving one of said members longitudinally, and pressure-responsive means for moving the other member longitudinally.

5. In a magneto generator for internal combustion engines, a drive shaft, means for rotating said shaft in timed relation with the engine, a rotor, a coupling member connected thereto for rotation therewith and longitudinal motion thereof, and having a spirally splined connection with the shaft, means responsive to variations of pressure in the intake of the engine for varying the longitudinal position of the shaft, and centrifugal speed-controlled means for moving the coupling member longitudinally.

6. In an ignition generator for internal combustion engines, a rotor, a drive shaft journalled and longitudinally slidable therein, a slidable coupling member having a spiral splined connection with the shaft, and non-rotatably connected to the rotor, a spring normally maintaining the coupling member at one limit of its travel, a centrifugal element pivoted on the rotor operative to overcome said spring and slide the coupling member longitudinally, a spring urging said shaft to a normal position, and fluid-pressure means actuated by the intake pressure of the engine for sliding said shaft longitudinally.

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