

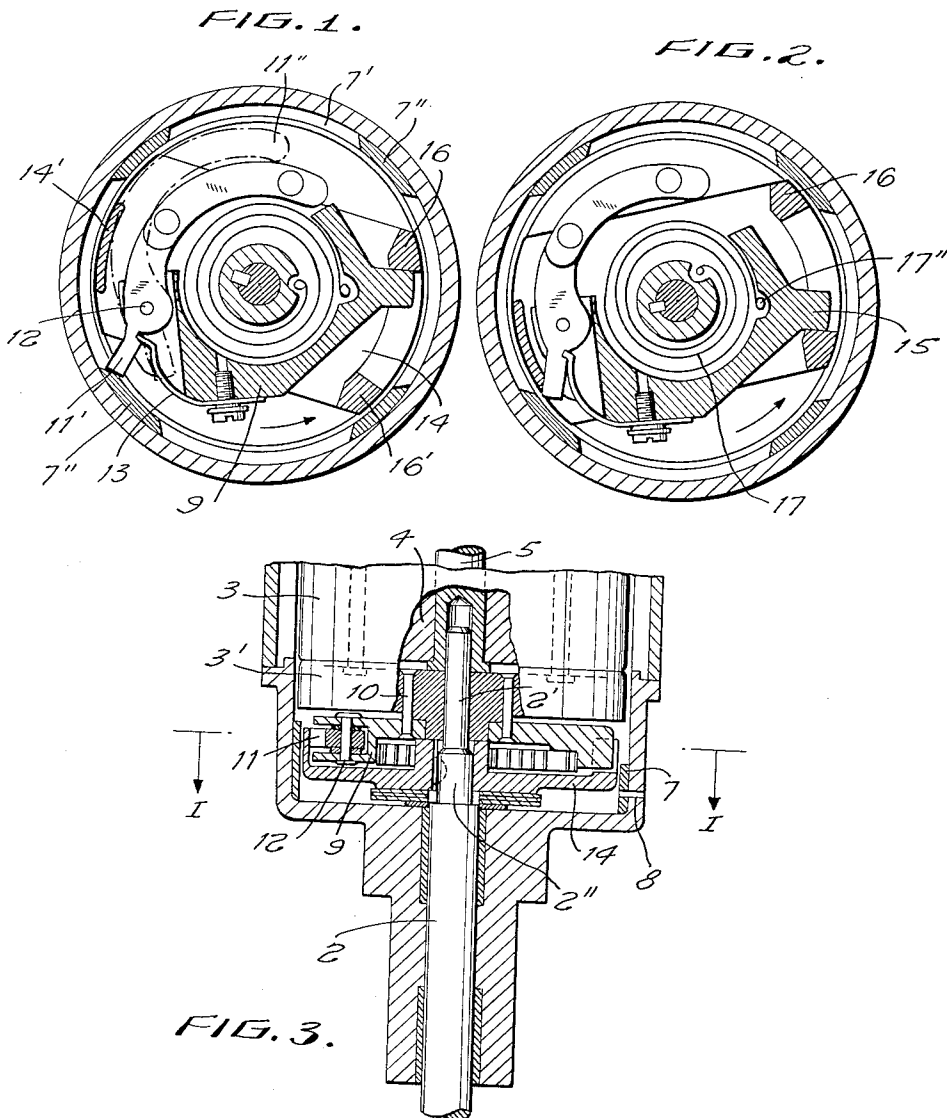
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A. BUCHMANN

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DRIVE ARRANGEMENT FOR MAGNETOS AND THE LIKE

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INVENTOR.
ALBIN BUCHMANN
BY
Michael S. Stuber
—Cgt.

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DRIVE ARRANGEMENT FOR MAGNETOS AND THE LIKE

Albin Buchmann, Soleure, Switzerland, assignor to Scintilla Ltd., Soleure, Switzerland

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The present invention relates to magnetos.

More particularly, the present invention relates to drive arrangements for magnetos.

As is well known, internal combustion engines whose ignition systems include magnetos turn the drive shaft of the magnetos at a speed which is a predetermined fraction of the rotating speed of the crank shaft. For example, the drive shaft of the magneto may be connected to the cam shaft of the engine to be rotated thereby. The magnets of the magneto must be turned at a predetermined minimum speed so that the lines of flux will be cut fast enough to produce a current of desired intensity. This creates certain difficulties when the magneto drive shaft turns below a predetermined speed, as, for example, when the engine is being started. Numerous auxiliary devices have been provided to overcome this difficulty.

One of the objects of the present invention is to provide a drive arrangement for the magneto rotor which automatically turns the latter independently of the drive shaft when the latter turns below a predetermined speed.

A further object of the present invention is to arrange a magneto rotor with respect to the magneto drive shaft in such a way that the magneto rotor will automatically turn intermittently at an accelerating rate when the magneto drive shaft rotates at a speed below a predetermined value.

Yet another object of the present invention is to incorporate, into the magneto, structure capable of accomplishing the above objects while at the same time being made of relatively few, simple, ruggedly constructed parts.

With the above objects in view the present invention mainly consists of a drive arrangement for magnetos and the like which includes a support means supporting a drive shaft for rotation about its axis. A rotor is mounted on the drive shaft for free rotation with respect to the same, and a spring means interconnects the rotor and drive shaft for rotation together. A stop means is located on the support means, and a pawl means is carried by the rotor for turning movement with respect to the same under the influence of centrifugal force so as to engage the stop means and stop rotation of the rotor when the drive shaft rotates at a speed below a predetermined value, so that the continued rotation of the drive shaft tensions the spring means. A release means is provided to release the pawl means from the stop means so as to thereby release the rotor to the influence of the thus tensioned spring means, and this release means is carried by the drive shaft for rotation therewith.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a sectional view taken along line I—I of Fig. 3 in the direction of the arrows;

Fig. 2 is a view of the structure of Fig. 1 in a different position thereof; and

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Fig. 3 is an elevational, sectional view of one embodiment of an apparatus constructed in accordance with the present invention.

Referring now to the drawings, there is shown therein the magneto housing 1 which is adapted to be mounted on an internal combustion engine. A magneto drive shaft 2 is turnably carried for rotation about its axis by the housing 1, and when the parts are mounted on the engine, the drive shaft 2 is substantially vertical, as shown in Fig. 3. This drive shaft 2 has a top free end portion 2' and a portion 2'' next to the portion 2' thereof.

The rotor 3 carries the permanent magnets 4 and is provided with a lower portion 3' fixedly connected to the rotor 3 and adapted to house a device for automatically regulating the timing of the ignition, this latter device forming no part of the present invention. The rotor shaft 5 is fixedly connected to the rotor 3 and is formed with a lower bore into which the free end portion 2' of shaft 2 freely extends so that the rotor 3 is turnably mounted on the shaft 2 for free rotation about the axis thereof and with respect to the shaft 2.

A sleeve 7 is fixed by rivets 8 to the interior of the housing 1 and extends about the axis of shaft 2, this sleeve 7 being formed with cutouts 7' so as to provide stop members 7'' distributed about the axis of shaft 2, as shown in Figs. 1 and 2.

A plate 9 is connected to the rotor 3 through the medium of rivets 10 for rotation therewith, this plate 9 extending about the shaft 2. A pawl member 11 is pivotally mounted on the plate 9 for turning movement therewith about the axis of shaft 2 and for turning movement with respect to plate 9 through the medium of the pivot pin 12 which is fixed to plate 9 and which turnably supports the pawl 11. On one side of the pivot pin 12 the pawl 11 is provided with an operating end 11', and on the opposite side of pivot 12 the pawl 11 carries a weight 11' which acts as a flyweight to turn the pawl about pivot 12 by centrifugal force. A leaf spring 13, or the like, is fixed to the plate 9 and engages the operating end 11' of pawl 11 to urge the end 11' outwardly away from the axis of shaft 2 and toward the stop members 7''.

A second plate 14 is keyed to portion 2'' of shaft 2 for rotation with the latter and is located adjacent to the plate 9 while being spaced slightly therefrom. At one side of the plate 14 there is provided a projection 14' integral therewith and extending therefrom, this projection 14' being adapted to engage the operating end 11' of the pawl 11. On the opposite side of plate 14 from projection 14' thereof there are located a pair of spaced projections 16 and 16' which also are integral with the plate 14, all of these projections 14', 16 and 16' extending in a direction substantially parallel to the axis of drive shaft 2. As is apparent from Figs. 1 and 2, the plate 9 is provided with an integral projection 15 located on the opposite side thereof from the pivot pin 12 of pawl 11, and this projection 15 extends into the space between projections 16 and 16', the projection 15 having opposite substantially radial side faces adapted to respectively engage the projections 16 and 16'.

A spiral spring 17 is located between the plates 9 and 14 and extends about the axis of drive shaft 2, this spiral spring 17 being fixed at its inner end 17' to a hub portion of plate 14 and being fixed at its outer end 17'' to the plate 9, as shown in Figs. 1 and 2 where the ends of spiral spring 17 are shown as being respectively located in suitable grooves of the plates 14 and 9.

The above described structure operates in the following manner:

When the drive shaft 2 turns at a speed above a predetermined value, it tends to tension the spiral spring 17 and the latter urges the projection 15 into engagement with the projection 16, the spring 17 being provided with

a predetermined residual tension when the parts are assembled. As long as the shaft 2 turns at a speed above this predetermined value, the flyweight 11" will cause the pawl 11 to assume the position shown in dot dash lines in Fig. 1 so that the operating end 11' thereof will not engage any of the stop members 7" and in this way the apparatus provides a continuous drive for the rotor 3, the centrifugal force of the weight 11" being sufficient to overcome the action of the spring 13.

When the shaft 2 turns at a speed below this predetermined value, however, as when the engine is being started, the weight 11" cannot overcome the force of spring 13 and therefore the pawl 11 assumes the position shown in solid lines in Fig. 1. Thus at this time the operating end 11' of the pawl 11 engages one of the stops 7" to prevent rotation of the rotor 3, and this is the position of the parts shown in Fig. 1. The drive shaft 2 continues to turn, however, and therefore tensions the spring 17 while moving the projection 16 away from one side of projection 15 and the projection 16' toward the opposite side of projection 15. The projection 16' is symmetrical to projection 16 whereby for opposite direction of rotation only plate 9 need be replaced and the position of pawl 11 and spring 17 reversed.

Just before the projection 16' reaches the projection 15, the projection 14' engages the operating end 11' of the pawl 11 to release the pawl from one of the stops 7", and the rotor 3 is thereby released to the influence of the tensioned spring 17. This is the position of the parts shown in Fig. 2. The tensioned spring 17 therefore causes the rotor 3 to turn at an accelerating rate so as to move the projection 15 toward the projection 16 turning with the shaft 2, and if the latter is still turning at a speed below the above-mentioned predetermined value, the rotor will again have its rotation interrupted, and in this way the drive shaft continues to rotate while the rotor is intermittently rotated at an accelerating rate during those times when the speed of rotation of the drive shaft 2 is below the predetermined value.

This intermittent turning of the rotor 3 at an accelerating rate enables the rotor to cut lines of flux at a very fast rate so as to cause a current of high intensity to be produced even though the drive shaft turns at a relatively low speed, and therefore, with the apparatus of the invention, an internal combustion engine will immediately start up.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of magnetos differing from the types described above.

While the invention has been illustrated and described as embodied in a drive arrangement for magnetos and the like, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. Drive arrangement for magnetos and the like comprising, in combination, a housing adapted to be mounted on an internal combustion engine; a drive shaft turnably mounted for rotation about its axis in said housing and extending vertically when said housing is mounted on the internal combustion engine, said drive shaft having a top free end portion; a rotor turnably mounted on said top free end portion of said drive shaft for free rotation with

respect thereto; a first spring interconnecting said rotor and drive shaft for rotation together; limiting means operatively connected to said rotor and drive shaft for limiting the rotation thereof with respect to each other to maintain a predetermined residual tension in said first spring; a plurality of stop members mounted on said housing about said axis of said drive shaft; a pawl member turnably carried by said rotor for rotation with respect to the same; a second spring connected to said pawl member for urging the same into engagement with one of said stop members to thereby stop the rotation of said rotor so that the continued rotation of said drive shaft tensions said first spring; a weight connected to said pawl member for urging the latter by centrifugal force against the action of said second spring away from one of said stop members and toward said drive shaft axis, so that said pawl member engages said one of one of said stop members only when said drive shaft rotates below a predetermined speed; and release means connected to said drive shaft for rotation therewith for releasing said pawl member successively from said stop members so that said rotor is intermittently rotated at an accelerating rate when said drive shaft turns below said predetermined speed.

2. Drive arrangement for magnetos and the like comprising, in combination, a housing adapted to be mounted on an internal combustion engine; a drive shaft turnably mounted for rotation about its axis in said housing and extending vertically when said housing is mounted on the internal combustion engine, said drive shaft having a top free end portion; a rotor turnably mounted on said top free end portion of said drive shaft for free rotation with respect thereto; a first plate extending about said drive shaft and being carried by said rotor for turning movement therewith; a second plate located adjacent to said first plate, also extending about said drive shaft, and being connected to the latter for rotation therewith; a spiral spring connected at one end to said first plate and at an opposite end to said second plate and also extending about said drive shaft; a first projection fixed to and extending radially from said first plate; a second projection fixed to and extending from said second plate toward said first plate and being located opposite a side of said first projection to be engaged thereby to maintain a predetermined residual tension in said spiral spring; a plurality of stop members fixed to said housing and being distributed about said plate at a predetermined radial distance from said axis of said drive shaft; a pawl member pivotally mounted on said first plate at a portion thereof opposite from said first projection and having an operating end located approximately at said radial distance from said drive shaft axis; resilient means operatively connected to said pawl member for turning said operating end thereof away from said drive shaft axis toward one of said stop members to engage the same to stop said first plate and rotor so that the continued rotation of said drive shaft and second plate tensions said spiral spring; a weight fixed to said pawl member at an end portion thereof opposite from said operating end thereof for turning the latter against the action of said resilient means toward said drive shaft axis by centrifugal force when said rotor and drive shaft turn above a predetermined speed; and a third projection fixed to said second plate at a portion thereof opposite from said second projection, extending toward said second plate, and being located from said drive shaft axis by a distance slightly less than said radial distance so that said third projection engages said operating end of said pawl member to successively release the same from said stop members.

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