

Nov. 2, 1926.

1,605,038

A. C. KLECKNER

IMPULSE STARTER FOR MAGNETOS

Filed Dec. 24, 1923

2 Sheets-Sheet 1

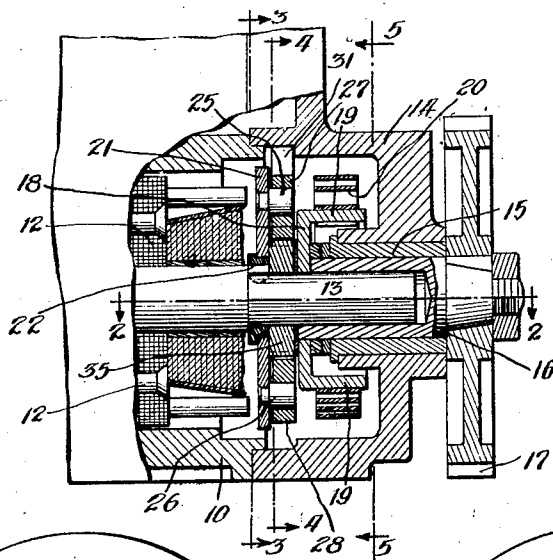


Fig. 1

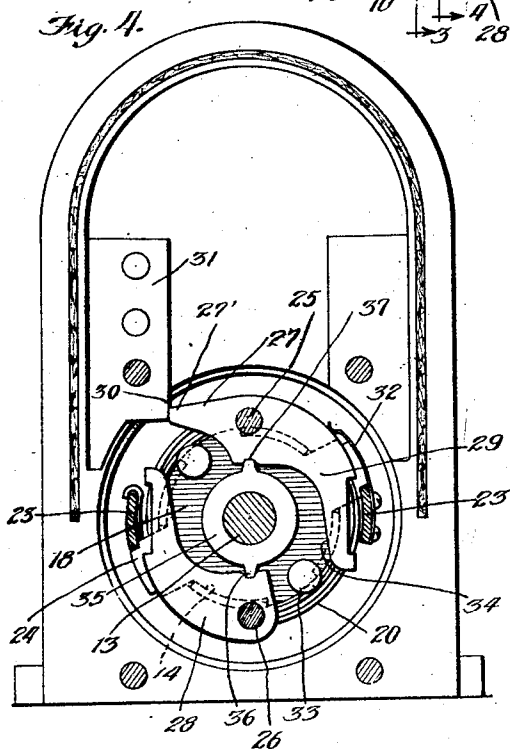


Fig. 4

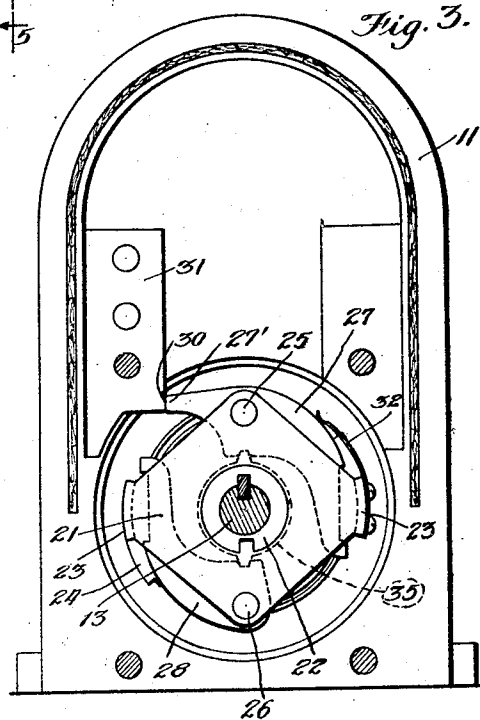


Fig. 3

Inventor
A. C. Kleckner
William Bradbury
McCall & Pincer
Attys

Nov. 2, 1926.

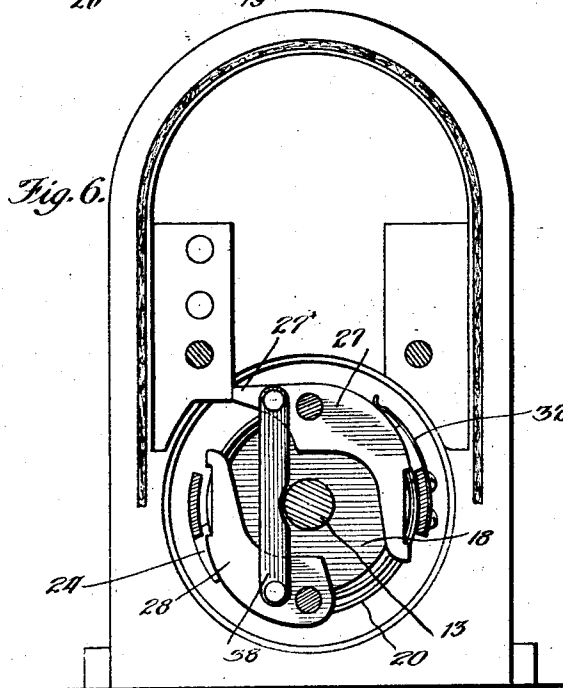
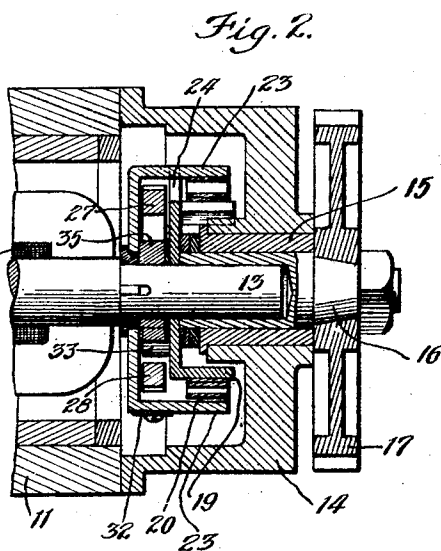
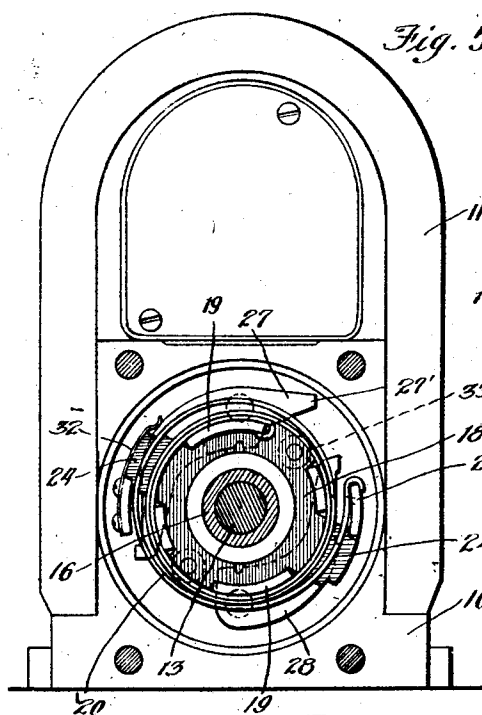
1,605,038

A. C. KLECKNER

IMPULSE STARTER FOR MAGNETOS

Filed Dec. 24, 1923

2 Sheets-Sheet 2



Inventor
A. C. Kleckner
William Bradbury
McCalt & Prince
Attys.

UNITED STATES PATENT OFFICE.

ARTHUR C. KLECKNER, OF RACINE, WISCONSIN, ASSIGNOR TO WEBSTER ELECTRIC COMPANY, OF RACINE, WISCONSIN, A CORPORATION OF WISCONSIN.

IMPULSE STARTER FOR MAGNETOS.

Application filed December 24, 1923. Serial No. 682,592.

My invention relates to improvements in impulse starters for magnetos, which secure a rapid throw of the magneto armatures even though the internal combustion engines with which they are associated be running at low speeds. A typical device of this kind would comprise a driving member, a driven member, and a spring connected therebetween, the driven member having a centrifugally actuated pawl which engages a stationary stop at low speeds, but at high speeds is held out of contact with the stop. When the magneto is rotated at a low speed, this pawl is moved by gravity or other means into position for engagement with the stop, allowing the connecting spring to be wound up to a predetermined point at which the pawl is released from its catch position, by means of a cam or pin on the driving member, whereby the spring connection will rapidly force the driven member or rotor to produce a satisfactory spark. The disadvantage of such an apparatus has been that the force of gravity is not sufficient to overcome the tendency of the parts to stick, and also that it is impossible to turn the magneto on its side or to invert the magneto, as certain installations require, without redesigning a number of parts. For this reason a universal magneto could not be made.

The chief object of my invention is the provision of an impulse starter for a magneto which will act independently of gravity and by more certain means so that the sticking of the parts will not impede the successful operation of the device, and so that the magneto may be placed in any desired position without changing or adjusting any of the parts thereof.

The present invention may be regarded as an improvement over the impulse starter disclosed in patent application, Serial No. 516,270, filed November 19, 1921, by John Roy Stark, which quite fully discloses an entire magneto of the type here shown and described only in part.

In the accompanying drawings which illustrate an embodiment of my invention, Figure 1 is a longitudinal vertical section of one end of a rotary tension magneto;

Figure 2 is a horizontal longitudinal section taken on the line 2—2 of Figure 1;

Figure 3 is a transverse vertical section taken on the line 3—3 of Figure 1;

Figure 4 is a similar view taken on the line 4—4 of Figure 1;

Figure 5 is a transverse vertical section, looking in the opposite direction, taken on line 5—5 of Figure 1, and

Figure 6 is a view similar to Figure 4, but illustrating a modification thereof.

In the drawings I have shown a magneto which comprises a frame 10 and a horseshoe magnet 11 provided with suitable pole pieces, not shown, which co-operate with a rotor 12 which is mounted upon a longitudinally disposed shaft 13. One end of the frame 10 is closed by an end casing 14, which is provided with a bearing bushing 15 in alignment with the rotor shaft 13 for forming a journal for a hollow driving shaft 16, to the outer end of which is secured a driving gear 17 which is adapted to engage any suitable timing gear for driving the magneto. The hollow shaft 16 is provided with a bore which in turn journals the outer end of the rotor shaft 13, so that while the driving shaft 16 and the driven shaft 13 are mounted concentrically, they may rotate independently.

At the inner end of the hollow driving shaft 16 is secured a driving plate 18 provided with four outwardly turned peripheral flanges 19, which form a cutaway drum upon which is wound a clock spring 20.

At a spaced distance inwardly from the driving plate 18, the rotor shaft 13 is provided with a driven plate 21 secured to the shaft by means of a keyed hub 22. The driven plate 21 which, as shown in Figure 3, is substantially diamond-shaped, is provided with diametrically opposed outwardly projecting lugs 23 which extend as far outwardly as do the flanges 19 of the driving plate. The inner end of the clock spring 20 is hooked over one of the flanges 19 while the outer end is hooked over one of the lugs 23, the spring being under an initial tension, whereby it tends to force the driven plate 21 clockwise (Figure 5) away from the driving plate. This movement is limited by diametrically opposed arms 24 extending radially from the driving plate 18 which engage the lugs 23. Since the hollow shaft 16 is rotated clockwise (Figure 5), it will be seen that it will drive the rotor through the yielding connection afforded by the spring 20.

The driven plate 21 carries two diametri-

cally opposed pivot pins 25 and 26 upon which are pivotally mounted a pawl 27 and a counterbalance 28, respectively. The pawl and the counterbalance are disposed in the space between the plates 18 and 21 but are, as just mentioned, carried by the driven plate 21. The pawl 27 comprises a forward tooth portion 27' (Figure 4) and a rearward tail portion 29 of greater length and mass, whereby the moment afforded by centrifugal action on the pawl will cause the tail portion 29 to fly radially outwardly. Such outward swinging is limited by the adjacent lug 23 which the tail portion 29 is adapted to contact. The forward tooth portion 27' of the pawl is adapted to engage an abutment 30 on a stop plate 31 secured to the end casing 14.

From the description thus far, it will be seen that at low speeds, when the centrifugal force is negligible, the hollow driving shaft 16 will drive the driven plate 21 through the spring 20 until the pivot pin 25 comes to its upper position, as shown in Figure 4. Under such conditions, the tail portion 29 of the pawl is urged inwardly by a spring finger 32 which throws the tooth portion 27' of the pawl outwardly so that it will engage the stationary abutment 30. This, obviously, will lock the driven plate against further rotation so that continued movement of the driving plate 18 will cause the clock spring 20 to be wound further. This relative movement of the plates 18 and 21 causes a pin 33 projecting inwardly from the driving plate 18 to come into contact with the cammed inner edge 34 of the pawl tail portion 29 for the purpose of swinging the pawl out of engagement with the abutment 30. By the time that the pin 33 has disengaged the pawl 27, the spring 20 will be in its cocked position so that it will snap the driven plate 21 to generate a quick spark. It will be seen that as the spring 20 is moved to its cocked position, the arms 24 will move away from the lugs 23, but when the pawl is released, the lugs 23 will be snapped forwardly until they contact the arms 24. The reaction of the spring 20 during the snapping movement is borne, of course, by the driving plate 18 which is held in definite position by means of the timing gearing associated with the driving gear 17.

As the engine with which the magneto is associated gains speed, the increased speed of rotation of the magneto will cause the tail portion 29 of the pawl 27 to fly radially outwardly under centrifugal force against the pressure of the spring finger 32, so that the pawl no longer engages the abutment 30 whereby the impulse starter no longer functions. The strength of the spring finger 32 is so adjusted that the impulse starter will become ineffective as soon

as the magneto speed is sufficient to produce a satisfactory spark.

Again referring to Figure 4, it will be seen that when the pivot pin 25 which carries the pawl 27 reaches its uppermost position, the force of gravity will tend to pull the tail portion 29 downwardly, swinging the pawl into engagement with the abutment 30, thus adding to the strength of the spring finger 32. While this would not be objectionable were the magneto always set in the vertical position here shown, it impairs the efficient operation of the device when the magneto is so installed that it lies on its side or at an angled position, in which case the force of gravity would act on the pawl 29 at some other point in its revolution so that the adjustment of the spring finger 32 would not be universal for all installations. It is to overcome this objection that I provide the counterbalance 28 mounted on the pivot pin 26, the counterbalance 28 being in all respects similar to the pawl 27, except that it does not carry the forward tooth portion 27'. Disposed about the shaft 13 and in the plane of the pawl 27 and the counterbalance 28 is a washer 35 provided with diametrically opposed teeth 36 engaging tooth depressions 37 in the pawl 27 and the counterbalance 28, respectively. The washer 35 is virtually a two tooth pinion which engages as gear segments on the pawl 27 and the counterbalance 28. It will be seen that when the spring finger 32 swings the pawl 27 in one direction, the toothed washer 35 will cause the counterbalance to be swung in a similar direction, and that whatever action gravity may have on the tail portion 29 of the pawl 27 will be exactly offset by the similar action of gravity on the counterbalance 28, tending to turn the latter in an opposite direction.

In Figure 6 I have shown a modified means for accomplishing the same result. In this form, the washer 35 is omitted and a link 38 connects the tooth portion 27' of the pawl 27 with the tail portions of the counterbalance 28. The advantage of the form shown in Figures 1 to 5 inclusive over the modification shown in Figure 6 is that the washer 35 may be placed in the plane of the pawl and the counterbalance, permitting a closer spacing of the plates 18 and 21 than is possible with the link 38 which lies at the side of the pawl and counterbalance.

While I have shown my invention applied to but this particular form of magneto and have shown but this particular counterbalancing means, it is to be understood that many changes may be made without departing from the scope and spirit of my invention.

I claim:

1. An impulse starter comprising a rotary driven member, a rotary driving member, a

spring driving connection therebetween, a stationary stop, a pawl pivoted on said driven member for engaging said stop, releasing means for said pawl, said pawl being swung out of engagement with said stop by centrifugal force, means tending to urge said pawl into engagement with said stop, a counterbalance pivoted on said driven member, said counterbalance clearing said stop in all pivotal positions on said driven member, and an intermediate washer pivoted about the axis of said rotary members, said washer having toothed connections with said pawl and said counterbalance, whereby the force of gravity on said counterbalance will counter-act the force of gravity on said pawl.

2. The combination with a magneto, of a rotor, a driven plate connected to said rotor, a driving plate, means projecting from one of said plates affording a drum surface, a flat clock spring wound spirally relative to said drum surface and having one end connected thereto, a lug projecting from the other of said plates into the plane of said spring, the other end of said spring being connected to said lug, a pawl pivotally mounted on said driven plate, a stationary abutment, means for holding said pawl in position to engage said abutment, said means yielding to the centrifugal force of said pawl, a centrifugally actuated mass for dis-

abling said pawl at high magneto speeds, and a counterbalance pivotally mounted on said driven plate and operatively connected for offsetting the action of gravity on said mass.

3. The combination with a magneto, of a rotor, driven plate connected to said rotor, a driving plate spaced from said driven plate, a pawl pivotally mounted on said driven plate in said space, lugs projecting laterally from said driving plate away from said space, said lugs affording a drum surface, a flat spiral spring wound on said drum surface with its inner end connected to one of said lugs, lugs projecting laterally from said driven plate and overlying the plane of said first lugs, the outer end of said spring being connected to one of said second lugs abutment shoulders between said driving plate and said driven plate, a stationary abutment, means for holding said pawl in position to engage said stationary abutment, said means yielding to the centrifugal force of said pawl, means on said driving plate for disengaging said pawl from said stationary abutment, and gravity counterbalancing means pivotally mounted on said driven plate in the space between said plates.

In witness whereof, I hereunto subscribe my name this 12th day of December, 1923.

ARTHUR C. KLECKNER.