G. W. WACKER.

MAGNETO.

APPLICATION FILED DEC. 23, 1915.

1,224,244. Patented May 1, 1917.

Fig. 1.

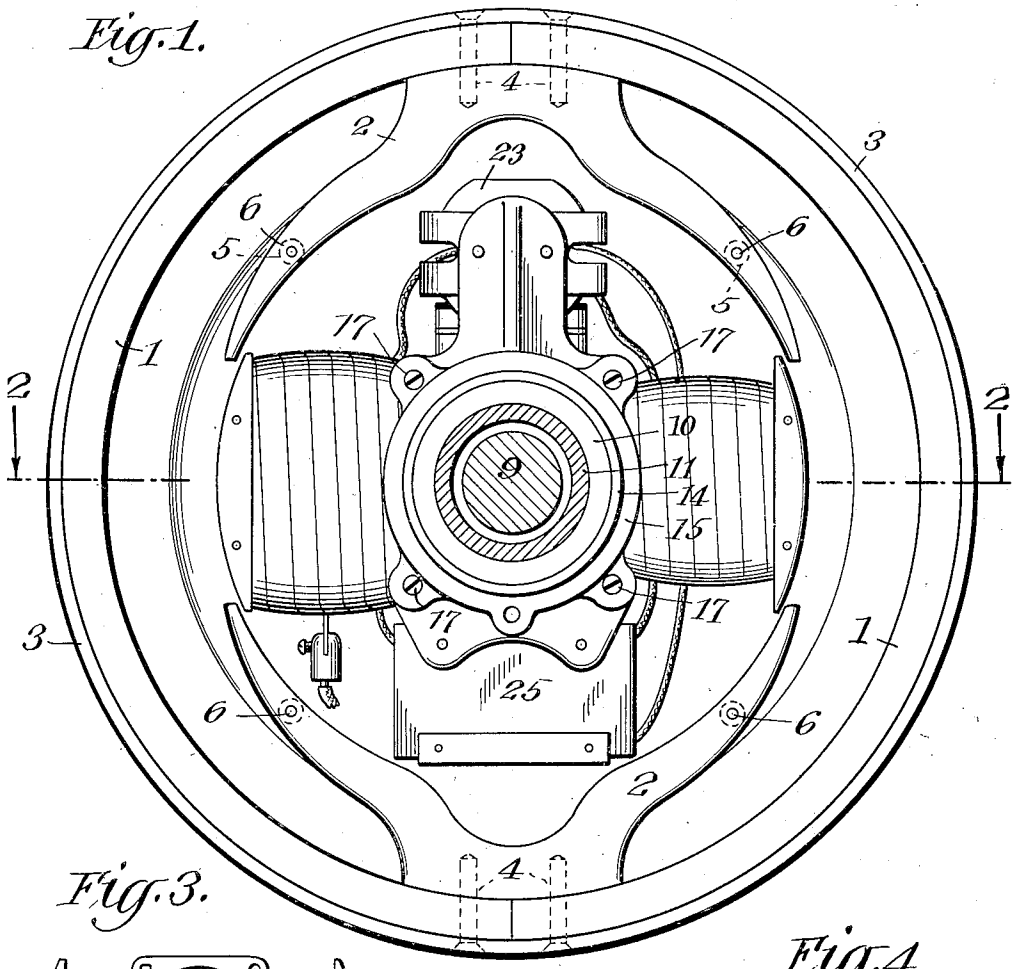


Fig. 3.

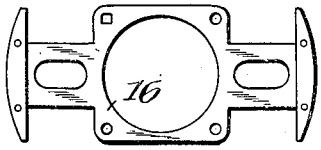


Fig. 2.

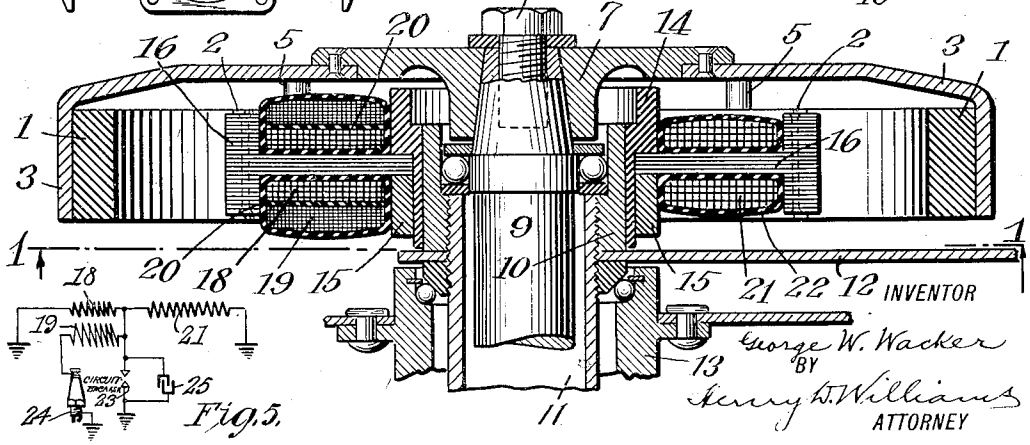


Fig. 4.

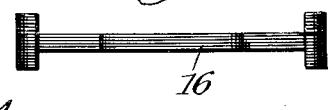


Fig. 5.

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MAGNETO.

1,224,244. Specification of Letters Patent. Patented May 1, 1917.

Application filed December 23, 1915. Serial No. 68,443.

To all whom it may concern:

Be it known that I, GEORGE W. WACKER, a citizen of the United States, residing at Rutherford, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Magnetos, of which the following is a specification, reference being had therein to the accompanying drawings, forming part thereof.

My invention relates to magnetos such as are employed for ignition purposes in connection with the internal combustion engines of self-propelled vehicles. The magneto of my present invention is particularly adapted for use upon motorcycles and upon other motor vehicles where inexpensiveness of construction, lightness in weight and best utilization of available space are desirable. My present invention relates more particularly to the construction of and the inductive relation of the magneto armature and its magnetic field. Other features of construction in the same magneto illustrated in the accompanying drawings and in part disclosed therein form the subject of three other applications for patent filed by me on even date herewith, Serial Numbers 68,444 and 68,445 and 68,446, these three other applications being directed to or relating more particularly, respectively to the circuit-breaking means, to the means for making electrical connection with the end of the winding of the high tension coil, and to means for clearing the magneto circuits of disturbing electrical influences.

One of the objects of my present invention is to provide a magneto which can be located in, and utilize to the best advantage, the flat annular space in the peripheral portion or rim of the fly wheel of the engine. Because of the shape of the limited space available within the rim of the engine fly wheel, it is not practically possible to employ a highly effective form of field magnet so as to obtain a highly efficient magnetic field, and one of the objects of my present invention is to improve the inductive effectiveness of the armature coils or windings so as to make up for or compensate for the the weaker magnetic field which is employed. More general objects of my invention are simplicity, inexpensiveness, durability and continued maintenance in operable condition. Other more particular objects and advantages of my invention will hereinafter appear.

My invention includes a magneto armature having a primary winding forming a primary coil, a secondary winding forming a high tension coil, and also a separate winding forming a supplemental reinforcing coil for the primary coil. My invention also includes features of construction and combinations of parts as will appear from the following description.

I shall now describe the magneto embodying my invention illustrated in the accompanying drawings and shall thereafter point out my invention in a claim.

Figure 1 is a vertical section on a plane indicated by the line 1—1 of Fig. 2 as viewed from below and illustrates the complete magneto in elevation as viewed from the inner open side of the fly wheel of the internal combustion engine, for effecting the ignition in which the magneto is employed.

Fig. 2 is a transverse horizontal section on a plane indicated by the line 2—2 of Fig. 1 as viewed from above.

Fig. 3 is a reduced side elevation of the armature core, and Fig. 4 is a similar edge view of the same.

Fig. 5 is a diagram illustrating the electrical connections for combining the reinforcing winding or supplemental coil with the primary and secondary coils or windings of the magneto armature.

In the embodiment of my invention illustrated in the accompanying drawings, the field is rotative and the armature is stationary. The field magnet of the magneto is shown as comprising two semi-circular permanent magnets 1 having their like poles in contact to form together a complete circular or ring-shaped magnet and provided at their joined ends with two inner reversely extending tapered polar extensions or pole shoes 2 of magnetic material. The circular or ring-shaped field magnet fits snugly within the peripheral flange or rim portion of the fly wheel shell 3 which is preferably of non-magnetic material, for example brass. The magnets 1 are firmly secured to the fly wheel shells by two pairs of screws 4 which also hold the pole pieces 2 in place upon the magnets 1, these pole pieces 2 also being shown as further supported from the side portion or web of the fly wheel shell 3 by means of distance blocks or spacers 5 and screws 6.

The engine fly wheel has a hub 7 which is removably held, as by means of a tap bolt

8, upon the tapered outer end of a shaft 9 which may be the crank shaft of the internal combustion engine. This outer end of the crank shaft 9 is shown as mounted by means of ball bearings in a bearing ring or collar 10 which is shown as screw-threaded over the adjacent outer end of a stationary sleeve 11. The collar 10 clamps in place and assists to hold a stationary plate-like part 12 forming a part of the frame of the vehicle, which may have a ground wheel or road wheel provided with a hub 13 journaled on the stationary crank shaft sleeve 11, as shown in Fig. 2.

The stationary magneto armature is fixed upon the stationary bearing ring or collar 10 of the stationary crank shaft sleeve 11. The armature has a supporting frame comprising a hub part 14 and a plate or collar part 15. The armature hub 14 is fixed on the bearing ring 10 and is provided with an outer shoulder and a reduced cylindrical extension over which fits the collar plate 15. A laminated armature core 16 which appears on a reduced scale in Figs. 3 and 4, is firmly clamped between the collar plate 15 and the shoulder of the armature hub 14 by means of screws 17. The laminated armature core 16, which is composed of magnetic material, projects similarly in opposite direction at both sides of the axis of the rotative shaft 9 and extends transversely within the ring formed by the rotative field magnet just within or just so as to clear the surfaces of the pole pieces or polar extensions 2 of the semi-circular magnets 1, as clearly appears in the drawings. It is to be noted that because of the limited size and annular shape of the space within the fly wheel, it is not possible to employ a field magnet of the usual highly effective horseshoe shape such as may be readily employed when plenty of free space is available.

One end of the laminated paramagnetic armature core 16 at one side of the axis of the crank shaft 9, which is the axis of rotation of the rotative field, is provided with an inner primary winding or coil 18 of few turns of comparatively large or coarse wire. A secondary high tension coil 19, composed of a large number of turns of fine wire, is wound outwardly from and upon the primary coil 18. The primary coil 18 and the secondary high tension coil 19 are insulated from each other and from the core 16 by means of insulative layers 20 as shown in the drawings. These primary and secondary coils 18 and 19 correspond respectively with the usual primary and secondary coils of magnetos as commonly heretofore constructed.

Upon the other end of the armature core 16, at the opposite side of the axis of rotation of the rotative field I provide a separate additional reinforcing winding or supplemental coil 21 which reinforces the inductive effect of the primary coil 18, producing an effect similar to that which would be produced by a stronger magnetic field and producing a correspondingly higher tension in the high tension secondary coil or spark coil 19. The necessary care of course is taken in making the electrical connection to assure that the current will flow through the reinforcing coil 21 in the correct direction so as to act in harmony with and reinforce the inductive effect of the primary coil 18. The supplemental coil or reinforcing winding 21 may be composed of the same comparatively large wire that is employed in the primary coil 18 and may have as many more turns than the primary coil 18 as conditions may require, and the reinforcing coil 21 is thus diagrammatically shown as having a somewhat larger number of turns than the primary coil 18. It is to be noted that it would require a secondary high tension winding of much larger proportionate size to produce the same inductive effect or pressure of high tension current in the secondary coil 19 that is produced by the combined inductive action of the primary coil 18 and the supplemental reinforcing coil 21. Also in this connection it is to be noted that it would not be feasible or practical to divide the secondary high tension winding 19 into two parts or coils of which each half would be wound upon the opposite ends of the armature core 16, because of the fact that two such small secondary coils would not be effective or efficient if connected with each other in multiple or in parallel, and it would be difficult to connect them in series by reason of the high tension current which would flow between these coils through the electrical connections. The reinforcing winding or supplemental coil 21 is shown as provided with an insulating covering 22 by which it is insulated from the core 16.

As indicated in Fig. 5, the primary coil 18 and the supplemental reinforcing coil 21 are both grounded to the machine and connected in parallel with each other to jointly deliver current through the circuit-breaker 23 shunted by the spark-absorbing condenser 25 in the usual manner and also by a current path leading through the high-tension coil 19 and the spark plug 24. The sign relations of the coils are such that when the circuit-breaker is opened the secondary E. M. F. of the coil 19 is co-directional with the joint E. M. F. of self-induction in the coils 18 and 21 so that these potentials are effectually added to produce the jump spark at the plug 24. The circuit breaker 23, so far as my present invention is concerned, may be of any suitable construction but the circuit breaker which I have employed and parts of which are illus-

trated in Fig. 1 of the drawings forms the subject of my application for patent for magneto Serial No. 68,444 filed on even date herewith and hereinbefore mentioned.

It is obvious that various modifications may be made in the construction illustrated in the drawings and above particularly described within the principle and scope of my invention.

I claim:

A magneto armature-core, primary and secondary coils disposed thereon in inductive relation to each other, a reinforcing coil on the core, a circuit-breaker, a common connection conductively uniting one terminal of the circuit-breaker and one terminal of each of said coils, ground leads for the opposite terminals of said coils and circuit-breaker, and a spark gap in said ground lead for the secondary coil.

In testimony whereof I have affixed my signature.

GEORGE W. WACKER.