W. B. MOSES.

STARTING, GENERATING, AND IGNITION APPARATUS.

APPLICATION FILED JUNE 29, 1917.

1,333,331.

Patented Mar. 9, 1920.

4 SHEETS—SHEET 1.

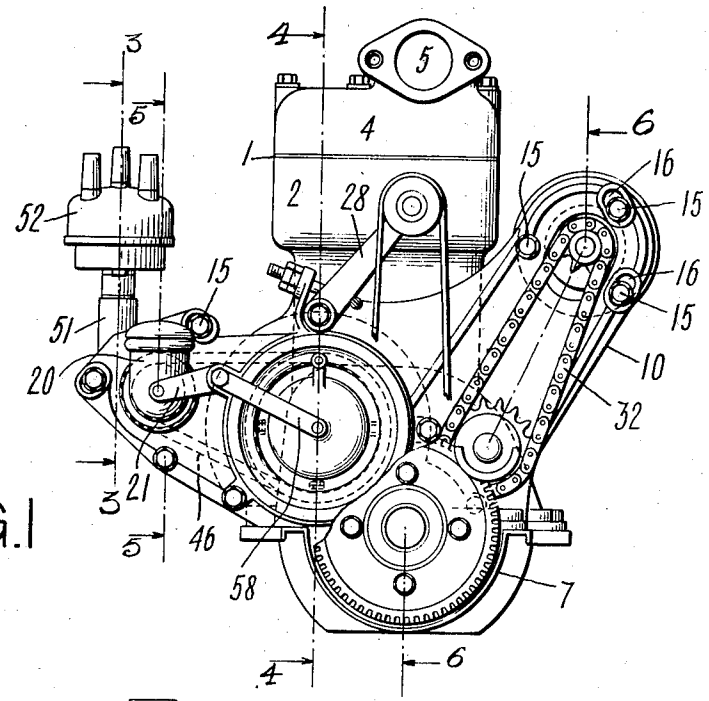


FIG. 1

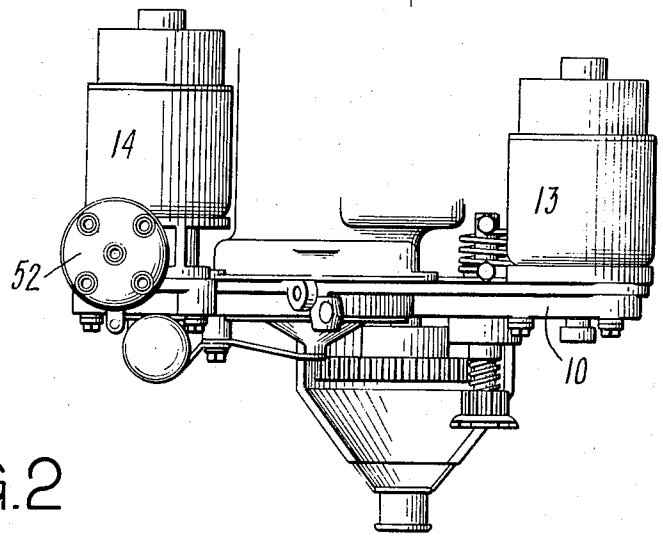


FIG. 2

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4 SHEETS—SHEET 2.

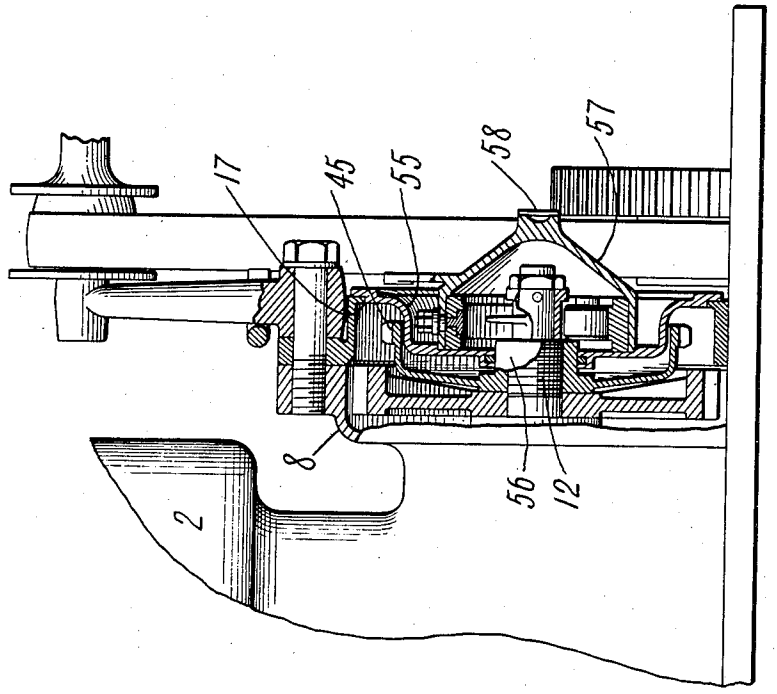


FIG.4

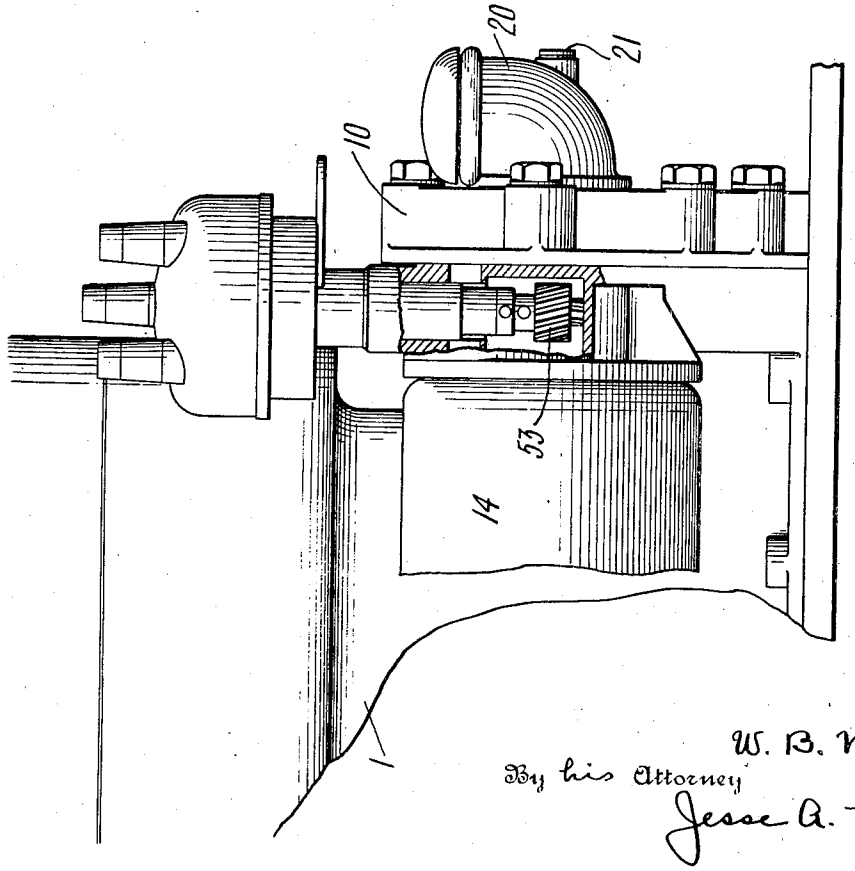


FIG.3

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STARTING, GENERATING, AND IGNITION APPARATUS.

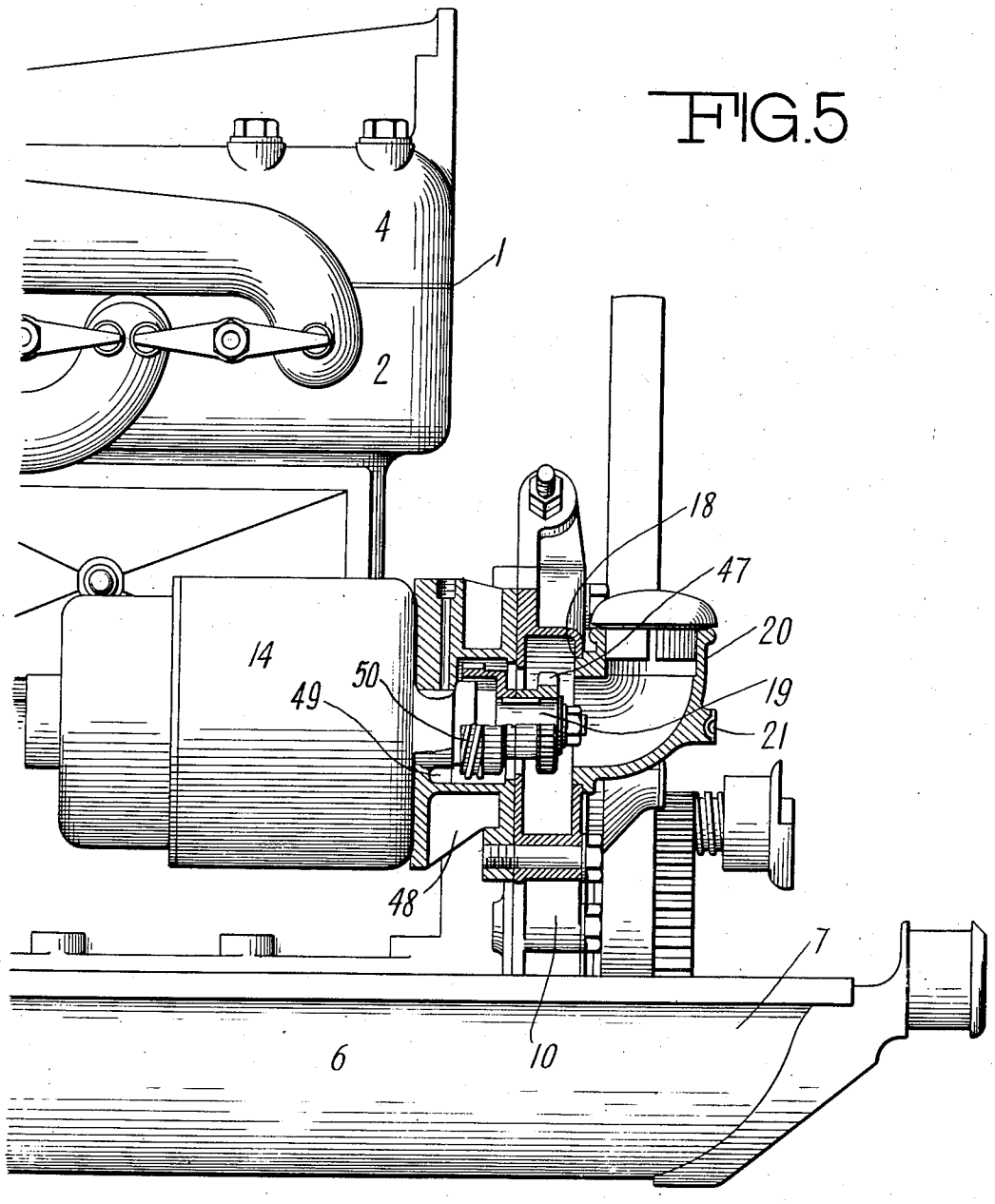
APPLICATION FILED JUNE 29, 1917.

1,333,331.

Patented Mar. 9, 1920.

4 SHEETS—SHEET 3.

FIG.5



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STARTING, GENERATING, AND IGNITION APPARATUS.

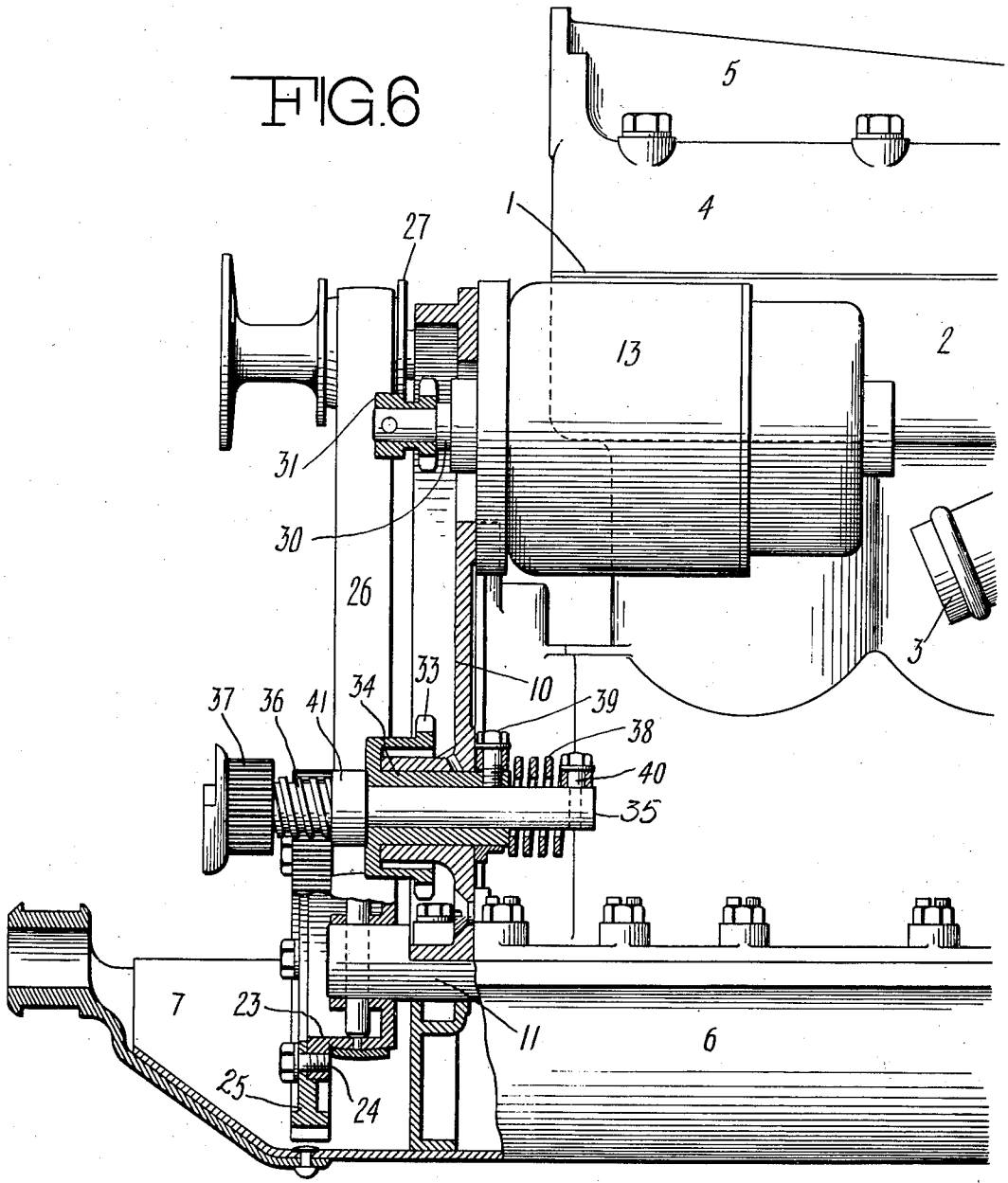
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1,333,331.

Patented Mar. 9, 1920.

4 SHEETS—SHEET 4.

FIG. 6



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UNITED STATES PATENT OFFICE.

WILLIAM B. MOSES, OF BROOKLINE, MASSACHUSETTS.

STARTING, GENERATING, AND IGNITION APPARATUS.

1,333,331. Specification of Letters Patent. Patented Mar. 9, 1920.

Application filed June 29, 1917. Serial No. 177,694.

To all whom it may concern:

Be it known that I, WILLIAM B. MOSES, a citizen of the United States, and resident of Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Starting, Generating, and Ignition Apparatus, of which the following is a specification.

This invention relates to starting, generating and ignition apparatus for engines, and with respect to certain more specific features thereof to such apparatus for automobile engines. It has special applicability to Ford automobiles.

One of the objects of the invention is to provide apparatus of the character above mentioned, which shall be simple in construction, easy to install and durable.

Another object is to provide improved means whereby an ignition unit may be associated with starting and generating units in a compact organization, which latter is adapted in turn to be attached to an automobile engine within the limited space available.

Still another object comprises the provision of reliable and inexpensive means for securing and maintaining certain parts of the apparatus assembled and in operative relations, while nevertheless permitting their detachment in a quick and convenient manner.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the various features of construction, combination of elements and arrangements of parts which will be exemplified by the construction hereinafter set forth and the scope of the application of which will be indicated in the following claims.

In the drawings wherein is shown one of various possible embodiments of the invention:

Figure 1 is a front end elevation of a Ford engine with the improved starting, generating and ignition apparatus attached.

Fig. 2 is a plan view of Fig. 1.

Fig. 3 is a fragmentary left side elevation of Fig. 1 with parts broken away to more clearly disclose the interior construction of the timer shaft.

Fig. 4 is a section taken on the line 4—4 of Fig. 1.

Fig. 5 is a left side elevational view with parts in section on a line 5—5 of Fig. 1; and

Fig. 6 is a right side elevational view with parts in section of the line 6—6 of Fig. 1.

Referring now more particularly to the drawings wherein similar reference characters refer to similar parts throughout the several views there is indicated generally at 1 a Ford engine comprising a water jacketed cylinder casting 2, with inlet pipe 3, a cylinder head casting 4, with outlet pipe 5, and a crank case 6 with extending nose or "snout" 7. The forward end of the cylinder block or casting 2 is formed to provide a flanged timing gear housing 8 and the present standard Ford engine has associated with this housing a cover plate, which for the purposes of this invention may be discarded.

In accordance with the rules reference is made to my co-pending application for United States Letters Patent for improvements in starting and generating apparatus, filed March 30, 1917, Serial No. 158,547.

Referring now to Figs. 1 and 2, it will be noted that a supporting plate or bracket 10 is secured forwardly of the engine and transversely of its crank shaft 11. The attachment is made at points around the peripheral flange of the timing gear housing by removing the before-mentioned timing gear cover plate and bolting the bracket 10 in place thereof. Other points of attachment are provided at the base of the bracket in the form of lugs having bolt holes positioned to register with standard points of attachment between a flange of the cylinder casting and a corresponding flange of the crank case.

A timing shaft 12 is driven in the usual way from a gear on the crank shaft to a gear twice size on the timing shaft. These gears are suitably incased to run in oil in the housing 8. The bracket 10 is provided on one side with means for adjustably securing a motor unit 13, and on the opposite side the bracket is provided with similar means for adjustably securing a generating unit 14, the means comprising in both instances, a set of bolts 15 two of which pass through slots 16 in the bracket 10 and tap into the end caps of the units 13 and 14. The other bolt of each set serves as a pivot around which the units may be swung for adjustment.

The bracket 10 is provided with a substantially large circular opening 17, which in assembly position, is concentric with the timing shaft 12. The bracket is also apertured at 18 concentrically with the armature shaft 19 of the generator unit, and a filler spout 20 is provided, suitably shouldered to engage the bracket 10 at the opening 19 and normally close the same. This filler spout is held in place by a spring finger 21 pivotally mounted on the bracket 10 so that it may be swung into and out of engagement with the spout, as desired.

Referring now more particularly to Figs. 1, 2 and 6, the crank shaft 11 has secured thereto a pulley 23 which is formed with a wide laterally extending flange 24. To this flange are bolted web portions of a spur gear 25, this gear being preferably of as large a diameter as is possible to fit into the nose or snout 7. The pulley 23 is connected by means of a belt 26 with a fan pulley 27, whereby the engine fan is driven directly from the engine crank shaft. Means are provided in the form of an adjustable stop and a lever arm 28, which serves as a support and bearing for the fan shaft, for increasing or decreasing the tension on the belt 26.

The power transmission from the motor unit to the crank shaft is as follows: (Figs. 1, 2 and 6:) On the end of the armature shaft 30 of the motor there is fixed a sprocket 31 which is connected by means of a chain 32 with a sprocket 33 formed on a sleeve 34, which sleeve is journaled in the bracket 10. Within the sleeve 34, there is mounted a counter shaft 35 having a threaded portion 36 upon which is mounted for relative longitudinal movement an unbalanced pinion 37. The shaft 35 and sleeve 34 are yieldably connected together by means of a torsion spring 38, one end of which is connected to the sleeve 34 by a bolt 39, the other end of which is connected to the shaft 35 by a bolt 40. The transmission parts are so arranged that when the motor is energized, the sprocket 33 will be driven from the sprocket 31 rotating the sleeve 34 and through the yielding connection just described turning the counter-shaft 35 at a rate of speed suitable to cause the pinion 37 to move longitudinally along the threads 36 until the teeth of this pinion completely engage with the teeth of the gear 25 and until the pinion is obstructed in its longitudinal movement by a stop 41 whereupon it will turn with the counter shaft 35, rotating the gear 25 and give the engine crank shaft the initial movement required.

Movement of the crank shaft under the engine fuel will automatically return the pinion 37 to normal position of disengagement with the gear 25 and the motor being deënergized will remain at rest. Through the timing gears, however, as is well known, the timing shaft is rotated at one-half crank shaft speed. By the substitution on the timing shaft 12 of a sprocket 45 for the standard lock nut therein employed means are provided for driving through a sprocket chain 46 a smaller sprocket 47 keyed to the armature shaft 19 of the generator unit, whereby the generator armature may be rotated continuously from the engine at comparatively high proportionate speeds. The generator unit 14 is formed with a substantially wide end cap member 48 recessed at 49 to receive a spirally toothed ignition shaft driving gear 50, this gear being keyed to the generator armature shaft 19 adjacent the sprocket 47. The end cap 48 provides a journal 51 for the main vertical shaft on an ignition device 52. As seen in Fig. 3, this shaft is provided with a spirally toothed gear 53 which meshes with the gear 50, providing the driving connection, whereby the main shaft of the ignition device is driven in direct proportion to the armature shaft, and likewise, therefore, to the engine shaft. It will be noted that the removable filler spout 20 is adapted for attachment opposite the end of the armature shaft, which provides for lubrication of the ignition and generating power transmitting devices by the oil introduced for cylinder lubricating purposes. Furthermore, the spout being removable permits access to the end of the generator armature shaft for purposes of assembly or removal of the parts. The inner faces of the bracket 10 serve as conduits for the lubricant introduced through the filler spout and complete the oil passage between the filler spout and the engine casing, a suitable outlet being provided at the rear of the bracket where the same attaches to the timing gear housing of the cylinder casting.

In assembling the apparatus, the standard Ford crank shaft pulley may be removed and the combined pulley and gear 23 and 25, respectively, substituted. The original commutator, roller arm, timing gear, lock nut and timing gear housing cover may be removed and the bracket 10 secured in position, after which the large sprocket 45 is screwed on to the threaded end of the timing shaft 12 in place of the standard lock nut. A cover plate 55 suitably shouldered is then fitted into the aperture 17 in the front of the bracket and this plate is provided with packing adapted to fit tightly around a hub 56 on the large sprocket 45. The original Ford commutator parts are then restored to position with respect to the timing shaft 12 and the commutator cap 57 is secured in position by means of a spring finger 58 having a common pivot point on the bracket 10 with the spring finger 21. The commutator cap 57 bears against the outer face of the

cover plate 55 and in turn seals the same in quick detachable relation with the bracket 10.

The easy accessibility of the working transmission parts is one of the features of the present invention. By swinging the fingers 58 and 21 out of engaging positions with their respective parts, the filler spout 20, commutator cap 57, Ford roller carrying arm and cover plate 55 may be quickly removed from the assembly giving free access to the chain and sprocket connections of the generator drive. If it is desired to remove the generator unit for any reason it is only necessary to remove the filler spout and the sprocket 47 may be withdrawn from the generator armature shaft from the front of the bracket through the opening normally closed by this spout. The generator and ignition units may then be removed by freeing the bolts 15 from the end cap 48. By this means it is not necessary to open the sprocket chain 46 or remove same from either one of its sprockets.

It should be noted that the various parts described have multiple functions whereby the exceptional compactness is obtained and the application of power confined to points of exceptional reinforcement against lateral stress. The bracket 10 not only performs a supporting function but is hollow and shaped to serve in the oil conduit from the filler spout to the lower crank casing. And so, as well, does the bracket serve as a housing for the transmission parts, enabling them to partake of the cylinder lubricant passed through from time to time and preventing the ingress of dirt. Further, the bracket serves to incase the timing gears, and disregarding the motor side for the moment becomes, in short, a "cover plate" for the timing gear housing of the engine casting, with but a short lateral extension to receive the generator. This extension comprises a hollow chamber with an opening at the rear to communicate with the coupling or end-cap member and an opening at the forward side to which is fitted the filler spout. Obviously as far as the oil filling features are concerned, the dynamo might be attached directly to the rear wall of the bracket without including the coupling or ignition member.

It will be found that the member 48 performs several services. It carries the igniter shaft properly journaled, provides for attachment to the rear wall of the bracket and to a forward part of the dynamo frame. It provides a housing for the driving connection between the armature shaft and the igniter which housing is in communication with the oil conduit formed by the bracket permitting the passage of oil to said housing for lubrication of the driving connection. The mounting of the igniter, as shown herein, at a point in close proximity to the point of attachment of the generator unit to the bracket, has an important effect in minimizing vibration.

As many changes could be made in the above construction and as many apparently widely different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter set forth in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What I claim is:

1. In apparatus of the character described, in combination, an element, in the nature of an end-cap member, adapted to be positioned between a supporting arm laterally extending from an engine, and the main body of a dynamo, said element serving to receive an ignition unit with shaft, and a driving connection between the armature shaft of said dynamo and the shaft of said ignition unit, which connection is housed by said element.

2. In apparatus of the character described, in combination, a hollow supporting arm extending laterally of the engine, a dynamo having an armature shaft adapted to extend into said bracket, a coupling member in the nature of an end-cap for said dynamo adapted to join the bracket and dynamo so that the latter may be supported from the former, and an ignition unit on said coupling member.

3. In apparatus of the character described, in combination, a bracket adapted to extend crosswise of the crank shaft of an engine, means for securing said bracket in fixed relation with the engine, means for securing a motor unit to one side of said bracket and for securing a generator unit to the other side of said bracket so that both units are adapted to lie in positions on respectively opposite sides of the engine, and an ignition unit with driving connections from the generator armature shaft arranged forwardly of the generator and rearwardly of said bracket.

4. In apparatus of the character described, in combination, an arm extending from an engine, a dynamo to be supported thereby, an intermediate or coupling member having provision for attachment at one side to the arm and at the other side to the dynamo body, power transmission devices extending through the arm and the coupling member whereby the dynamo armature and an ignition device may be operated, and an ignition device journaled in said coupling member.

5. In apparatus of the character described, in combination, a coupling element having provision at one side for attachment thereof to a support and having provision at the other side for attachment thereof to

a dynamo, and an igniter mounted in said element and adapted to have a driving connection with the shaft of the dynamo.

6. The combination with a bracket, a generator attached thereto, and a filler spout adapted to be removably attached to said bracket, of means whereby the bracket may be mounted relatively to an engine so that an oil passage is established between said spout and engine.

7. The combination with a bracket, a generator attached thereto having an armature shaft extending thereinto, a filler spout, and means for securing said filler spout to said bracket at a point opposite the end of said shaft, of means for attaching the bracket to an engine, inner faces of the bracket cooperating to provide a conduit connecting the filler spout with the engine.

8. The combination, with a bracket, a generator attached thereto having an armature shaft extending thereinto, a filler spout, and means for removably securing said filler spout to said bracket at a point opposite the end of said shaft, of means for attaching the bracket to an engine, inner faces of the bracket coöperating to provide a conduit connecting the filler spout with the engine.

9. The combination with a bracket, a generator attached thereto having an armature shaft extending thereinto, a filler spout, and spring means for securing said filler spout to said bracket at a point opposite the end of said shaft, of means for attaching the bracket to an engine, inner faces of the bracket coöperating to provide a conduit connecting the filler spout with the engine.

10. The combination, with a bracket, a generator attached thereto, having an armature shaft extending thereinto, and quick, detachable means for securing said filler spout to said bracket at a point opposite the end of said shaft, of means for attaching the bracket to an engine, inner faces of the bracket coöperating to provide a conduit connecting the filler spout with the engine.

11. In apparatus of the character described, in combination, an engine, having a casing with an open front end and a crank shaft within said casing; a member closing said open front end and extending laterally beyond said casing; a member adjoining the rear of the first-said member, a generator body rearwardly of the second said member, and power transmission devices extending from the crank shaft to the generator body; the first said member and said casing serving to house a portion of said transmission devices, and the first and second said members being correlated to serve as a housing for another portion of said transmission.

12. In apparatus of the character described, for use with an internal combustion engine having a crank shaft, a timing shaft and transmission means between said shafts; the combination, with a member extending laterally of said engine, of a generator attached to said first member through the intermediary of an end coupling member adjoining the first said member, an ignition device mounted on the coupling member, and driving connections for the generator and ignition device housed by the correlated members.

13. In apparatus of the character described, in combination, a bracket projecting from an engine forwardly of said engine and substantially at right angles to the crank shaft thereof, a member secured to adjoin a rear face of said bracket, a generator supported from said bracket having a body portion rearwardly of said member and an armature shaft a portion of which extends within said member, said bracket and member being shaped where they adjoin to provide a pocket, and driving connections for said generator housed in said pocket.

14. In apparatus of the character described, in combination, a bracket projecting from an engine forwardly of said engine and substantially at right angles to the crank shaft thereof, a member secured to adjoin a rear face of said bracket, a generator supported from said bracket having a body portion rearwardly of said member and an armature shaft a portion of which extends within said member, said bracket and member being shaped where they adjoin to provide a pocket, driving connections for said generator housed in said pocket, a timer-distributer having a shaft rotatively supported in said member and driving connections therefor housed in said pocket.

15. In apparatus of the character described, in combination, a cover plate for a timing-gear housing of an engine characterized by an extension adapted to mount a generator, said extension having a rear attaching wall; a member clamped to said wall and interiorly apertured to form, with said extension, a pocket; a generator attached so that the body thereof is rearwardly of said member but having an armature shaft projecting into said pocket, and a transmission element on the armature shaft projection.

16. In apparatus of the character described, in combination, a cover plate for a timing-gear housing of an engine characterized by an extension adapted to mount a generator, said extension having a rear attaching wall; a member clamped to said wall and interiorly apertured to form, with said extension, a pocket; a generator attached so that the body thereof is rearwardly of said member but having an armature shaft projecting into said pocket, a transmission element on the armature shaft projection, an ignition device having an operating shaft

extending transversely of said armature shaft and projecting into said pocket and means in said pocket drivingly connecting said operating and armature shafts.

17. In apparatus of the character described, for use with an engine having a crank shaft a second shaft connected by gearing with the crank shaft and a casing for said shafts having an opening at its front end adjacent said gearing; the combination with a member which is characterized by the fact that attached to said casing, it serves to close the opening at the front of the casing and projects beyond the casing in a plane transverse to the crank shaft to provide a bracket, of a member secured to adjoin a rear face of the first said member and shaped interiorly to coöperate with the first said member to provide a housing for transmission devices connected to said gearing, a generator having a body portion supported abutting the rear of the second said member and having an armature shaft a portion of which projects into said housing, and transmission devices comprising gearing on the projecting portion of said armature shaft adapted to coöperate with the first said gearing whereby the generator is driven from the engine crank shaft.

18. In apparatus of the character described, for use with an engine having a crank shaft a second shaft connected by gearing with the crank shaft and a casing for said shafts having an opening at its front end adjacent said gearing; the combination with a member which is characterized by the fact that attached to said casing; it serves to close the opening at the front of the casing and projects beyond the casing in a plane transverse to the crank shaft to provide a bracket, of a member secured to adjoin a rear face of the first said member and shaped interiorly to coöperate with the first said member to provide a housing for transmission devices connected to said gearing, a generator having a body portion supported abutting the rear of the second said member and having an armature shaft a portion of which projects into said housing, transmission devices comprising gearing on the projecting portion of said armature shaft adapted to coöperate with the first said gearing whereby the generator is driven from the engine crank shaft, an ignition device having an operating shaft projecting into said housing, and a driving connection between the operating shaft and the said gearing on the armature shaft.

19. In apparatus of the character described, in combination, a member having provision for covering the forward portion of an engine casing and extending beyond said casing transversely to serve as a bracket or attaching means for a generator, a second member detachably secured to said bracket adjacent the rear thereof and being interiorly cut away to form by its union therewith a housing for a shaft projection and transmission devices, a generator secured to the rear of said second member and having an armature shaft projection within said housing, and transmission connections within said housing.

20. In apparatus of the character described, in combination, a member having provision for covering the forward portion of an engine casing and extending beyond said casing transversely to serve as a bracket or attaching means for a generator, a second member detachably secured to said bracket adjacent the rear thereof and being interiorly cut away to form by its union therewith a housing for a shaft projection and transmission devices, a generator secured to the rear of said second member and having an armature shaft projection within said housing, transmission connections within said housing, an ignition device having an operating shaft rotatably mounted in one of said members, and devices for connecting the armature shaft with said operating shaft and with armature driving means, said devices being rotatable with the armature shaft within said housing.

21. In apparatus of the character described, in combination, a member having provision for covering the forward portion of an engine casing and extending beyond said casing transversely to serve as a bracket or attaching means for a generator, a second member detachably secured to said bracket adjacent the rear thereof and being interiorly cut away to form by its union therewith a housing for a shaft projection and transmission devices, a generator secured to the rear of said second member and having an armature shaft projection with said housing, transmission connections within said housing, an ignition device having an operating shaft rotatably mounted in said second member, and devices for connecting the armature shaft with said operating shaft and with armature driving means, said devices being rotatable with the armature shaft within said housing.

22. In apparatus of the character described, in combination, a cover plate adapted to be secured to the timing gear housing of an engine casing having an open front end opposite its timing gears, said cover plate having an extension projecting beyond the engine providing a rear attaching wall, a generator, an end coupling member, the generator abutting the coupling member and the latter abutting the cover plate extension, and means for securing the coupling member and generator in said abutting positions whereby the generator derives its principal support from the cover

plate, said means comprising bolts passing from the cover plate into said coupling member.

23. In apparatus of the character described, in combination, an engine having a crank shaft, a part time shaft geared from the crank shaft, a commutator at the forward end of the part time shaft, a casing partially housing said gearing but frontally open opposite said gearing, a member having provision for attachment to said casing to further house said gearing, said member being adapted to receive an extension of the part time shaft and said commutator, and said member having a projection beyond the engine with an attaching surface extending in a substantially vertical plane transversely of the crank shaft, an end coupling member secured adjacent said attaching surface; a generator unit secured in position adjacent the rear of said coupling member having an armature shaft extending forwardly, and gearing between the part time shaft and the armature shaft housed by the association of the first said member and the coupling member.

24. In apparatus of the character described, in combination, an engine having a crank shaft, a part time shaft geared from the crank shaft, a commutator at the forward end of the part time shaft, a casing partially housing said gearing but frontally open opposite said gearing, a member having provision for attachment to said casing to further house said gearing, said member being adapted to receive an extension of the part time shaft and said commutator, and said member having a projection beyond the engine with an attaching surface extending in a substantially vertical plane transversely of the crank shaft, an end coupling member secured adjacent said attaching surface, a generator unit secured in position adjacent the rear of said coupling member having an armature shaft extending forwardly, gearing between the part time shaft and the armature shaft housed by the association of the first said member and the coupling member, a timer-distributer mounted on the coupling member, and having a driving connection with the armature shaft.

25. In apparatus of the character described in combination, a substantially flat attaching member having provision for attachment to the front end of an engine casting and being apertured to permit penetration by the part time shaft of the engine, said member also having an extension beyond the engine to the rear of which an intermediate member and a generator body may be attached, an intermediate member secured to a rear wall of said extension and a generator body secured to a rear wall of said intermediate member.

26. In apparatus of the character described in combination, a substantially flat attaching member having provision for attachment to the front end of an engine casting and being apertured to permit penetration by the part time shaft of the engine, said member also having an extension beyond the engine to the rear of which an intermediate member and a generator body may be attached, an intermediate member secured to a rear wall of said extension and a generator body secured to a rear wall of said intermediate member, said intermediate member being apertured to receive an operating shaft of an ignition device.

Signed at Cambridge, in the county of Middlesex and State of Massachusetts, this 31st day of May, A. D. 1917.

WILLIAM B. MOSES.