Oct. 7, 1952 E. C. KIEKHAEFER 2,612,883

MOUNTING AND CONTROL MEANS MAGNETO FOR ENGINES

Filed Jan. 6, 1950 5 Sheets-Sheet 1

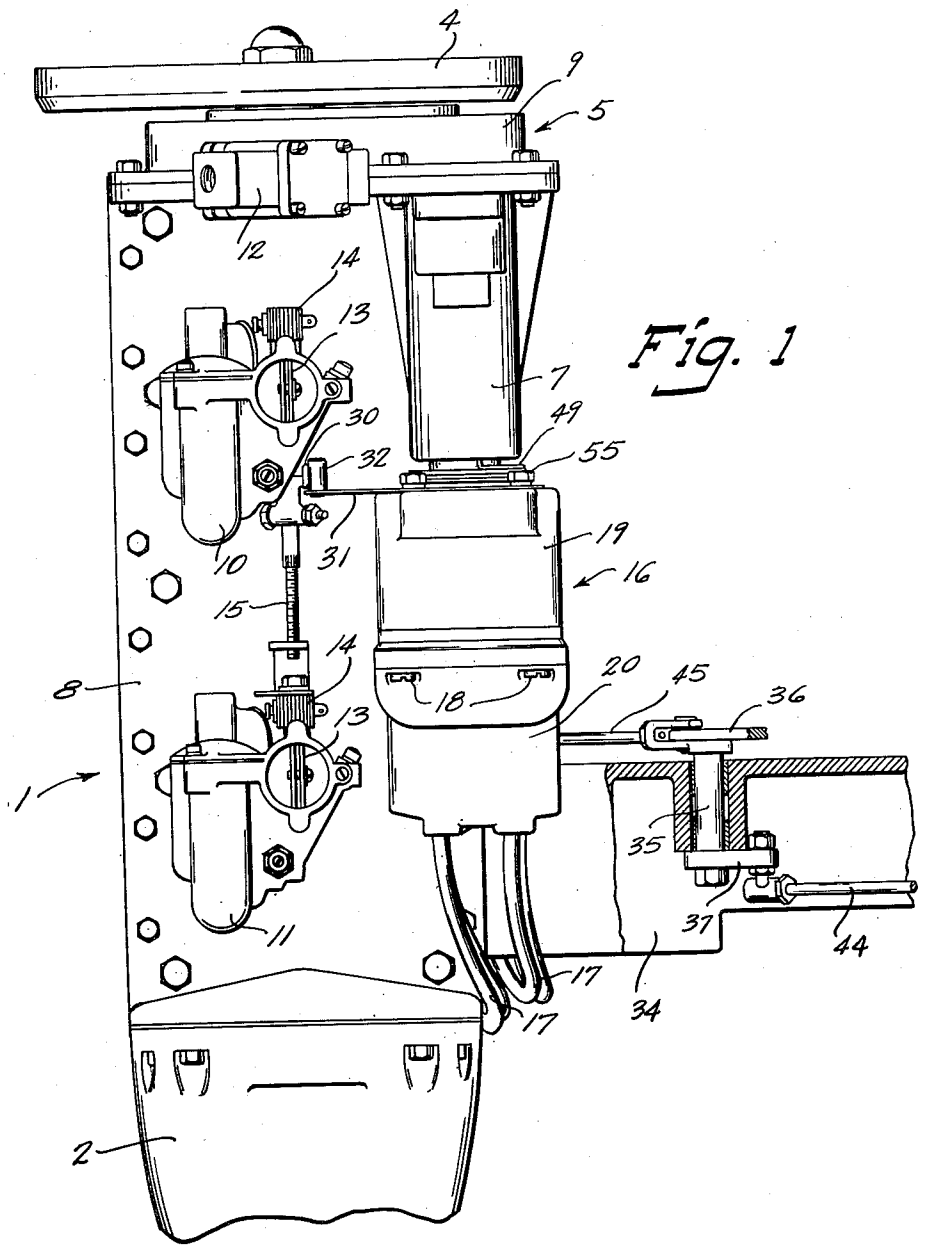


Fig. 1

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Fig. 2

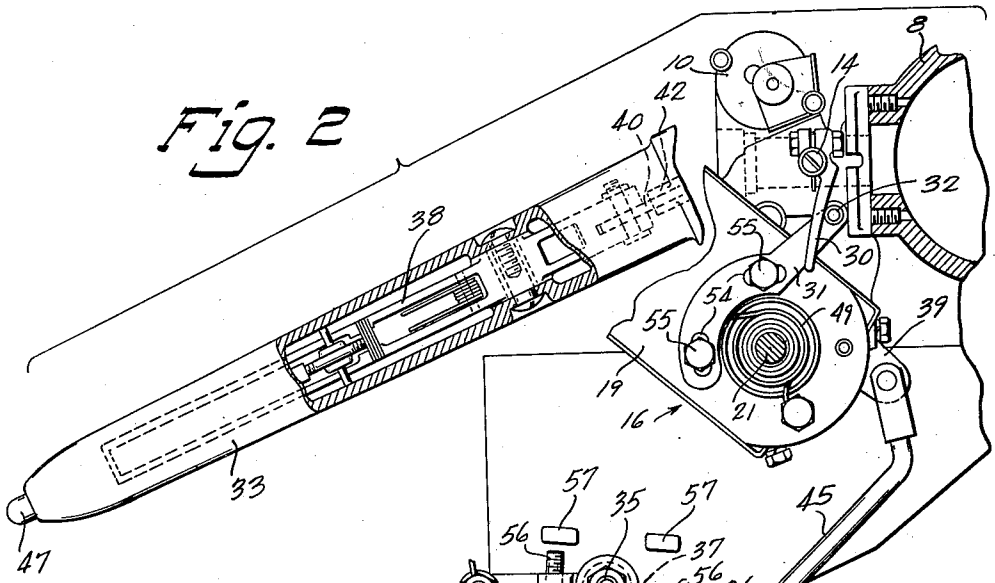
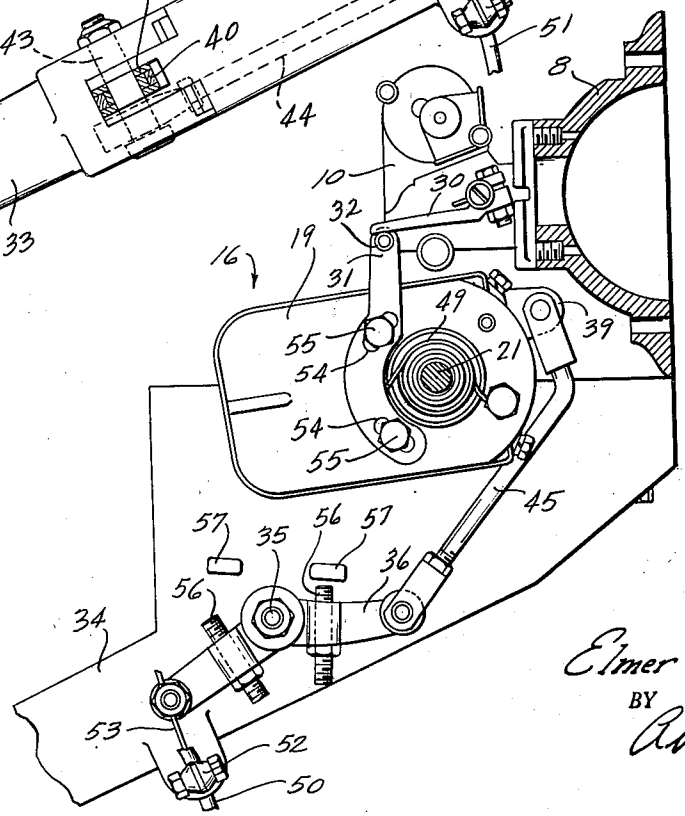


Fig. 3



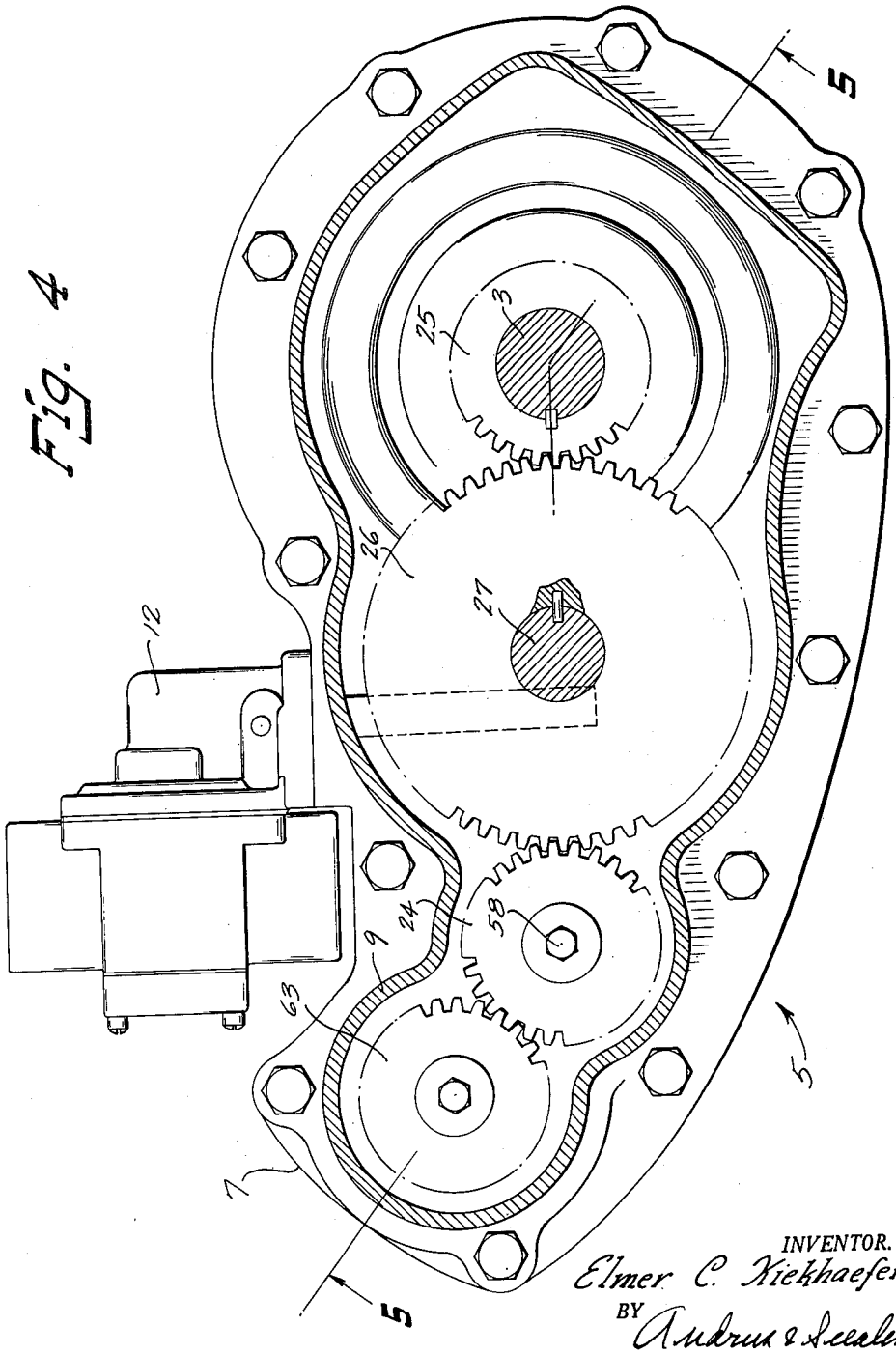
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MOUNTING AND CONTROL MEANS MAGNETO FOR ENGINES

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Fig. 4



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MOUNTING AND CONTROL MEANS MAGNETO FOR ENGINES

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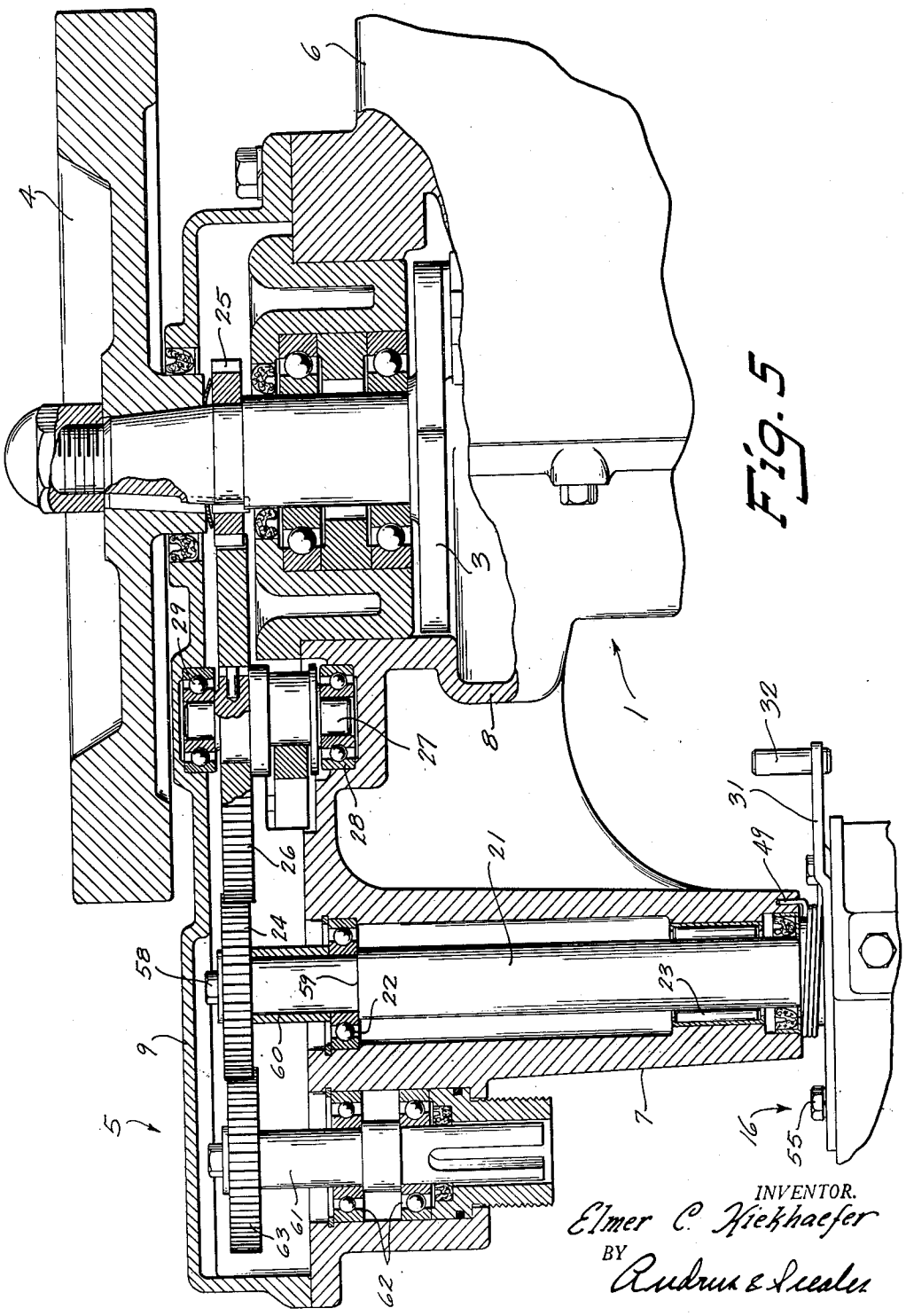


Fig. 5

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MOUNTING AND CONTROL MEANS MAGNETO FOR ENGINES

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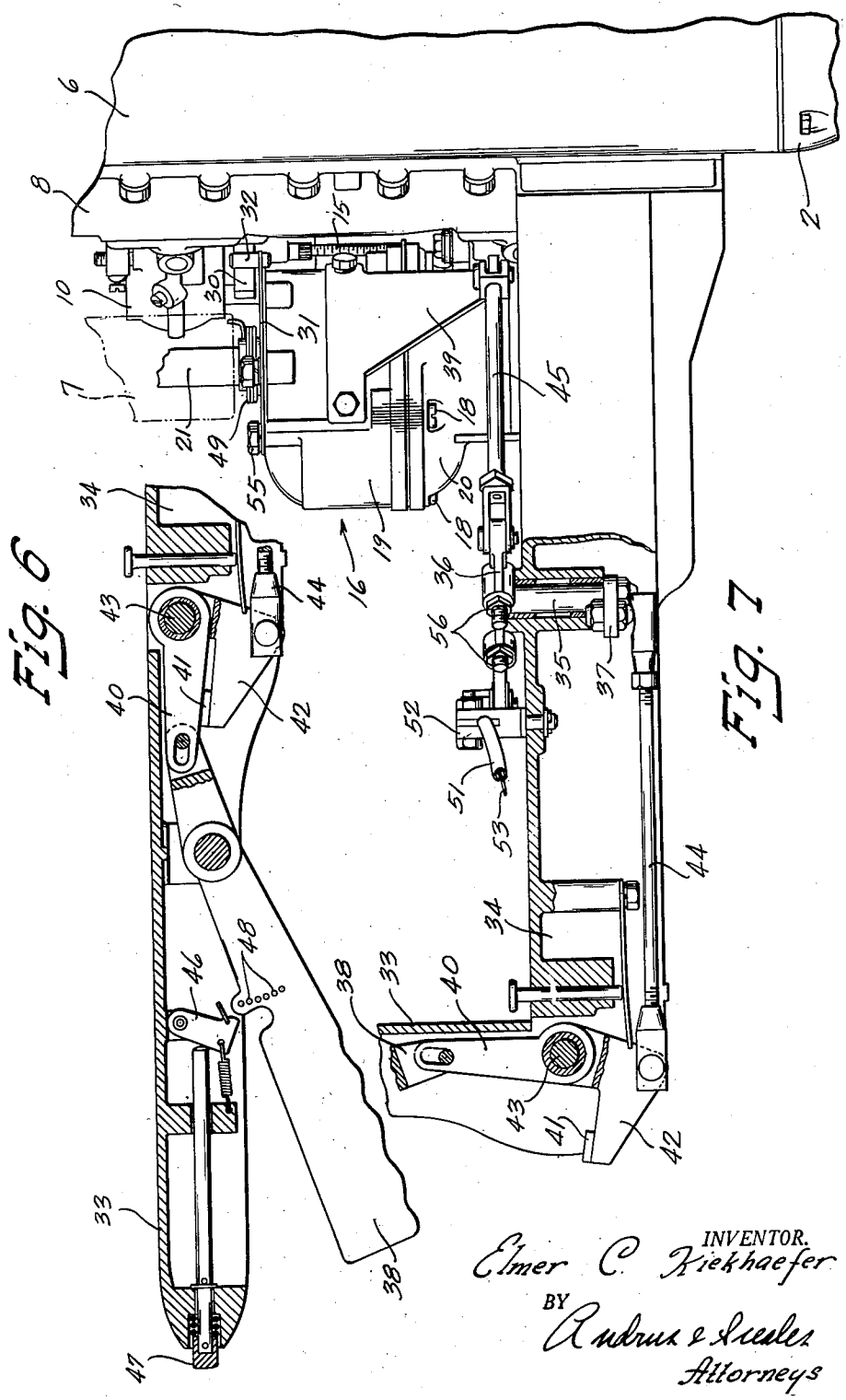


Fig. 6

Fig. 7

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UNITED STATES PATENT OFFICE

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MOUNTING AND CONTROL MEANS MAGNETO FOR ENGINES

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Application January 6, 1950, Serial No. 137,236

15 Claims. (Cl. 123—98)

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This invention relates to internal-combustion engines and particularly to the magneto mounting and means for adjusting the timing of the magneto and the carburetor to control the operation of the engine.

The invention provides an engine magneto mounting which supports and drives a conventional magneto unit by its shaft adjacent the carburetor, and control means securing the unit against rotation with its own shaft selectively in various relative positions for purposes of timing adjustment together with predetermined adjustment of the carburetor.

A principal object of the invention is to provide for greater ease of adjustment of the magneto unit and carburetor control particularly as in outboard motor applications of the engine.

Another object is to dispose and support the magneto unit so as to be directly operable as by manual outboard motor control means.

Another object is to dispose the magneto adjacent the carburetor and simplify the mechanical connection by which the magneto and carburetor adjustments are co-ordinated.

Another object is to provide for the greater accessibility of the magneto and control therefor.

Another object is to improve and simplify the magneto mounting for purposes of assembly and replacement and elimination of vibration and wear.

Another object is to provide for the predetermined correlation of adjustments of the magneto unit and carburetor.

These and other objects and advantages will be more fully set forth in the following description of a preferred embodiment of the invention as illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a front elevation of part of an outboard motor including the engine with certain parts thereof broken away and sectioned;

Fig. 2 is a plan view of certain parts of the engine and complete control handle shown in Fig. 1;

Fig. 3 is a view similar to Fig. 2 showing the engine with the magneto and carburetors in another position of adjustment;

Fig. 4 is an enlarged plan view of the auxiliary drive gears with the engine flywheel removed and portions of the gear case broken away and sectioned;

Fig. 5 is an enlarged vertical sectional view taken on line 5—5 of Fig. 4;

Fig. 6 is a side elevation of the control handle with portions broken away and sectioned to show the operating parts thereof; and

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Fig. 7 is a side elevation of the motor showing part of the engine, the control arm and part of the control handle as secured to the arm and disposed vertically.

The engine 1 shown in the drawings is a four-cylinder, two-cycle engine of the type described and claimed in the copending application of the present inventor, Serial Number 94,107, filed May 19, 1949 for Internal Combustion Engine, now abandoned, and is mounted on the drive shaft housing 2 of an outboard motor with the engine crankshaft 3 disposed vertically for direct connection to a drive shaft, not shown, extending downwardly of the engine. The flywheel 4 is carried by the upper end of crankshaft 3 and above the gear case 5 provided at the upper end of engine 1 by the upper end of the engine cylinder block 6, the rigid projecting support 7 of the engine crankcase 8 and the cover plate 9 removably secured thereto.

The upper and lower carburetors 10 and 11 carried by crankcase 8 forwardly of the motor are supplied with fuel from a tank, not shown, by the fuel pump 12 carried by gear case cover 9 and operated by the engine, as will be described. Each carburetor 10 and 11 includes the butterfly valves 13 and the vertical control shafts 14 therefor disposed in substantial alignment and connected by the flexible shaft 15 to effect the uniform and simultaneous adjustment of both carburetors.

The conventional magneto unit 16 is connected by the ignition wires 17 to the respective individual spark plugs, not shown. The bolts 18 joining the stator housing 19, and the timing and distributor cover 20 of the magneto provides for removal of cover 20 from the magneto for adjustment of the parts thereof. The magneto unit 16 includes the rotor shaft 21 which as such is rotatably supported within housing 19 by suitable bearing means, not shown.

According to the present invention, magneto 16 is supported and carried entirely on its rotor shaft 21, eliminating and freeing the housing of all other, cumbersome supporting means whereby the usual timing adjustment of the magneto by rotation on the axis of its operating shaft may be readily accomplished manually, or by remote control means, as will be described, or by automatic means responsive to the operation of the engine. According further to the invention, magneto 16 is disposed immediate and adjacent to carburetors 10 and 11 and operatively connected so that the adjustment of the carburetors and magneto is co-ordinated and effected simultaneously. The invention is intended for use in two-

cycle engines and the like in which the co-ordinated adjustment of both the ignition timing and the carburetion must be provided for controlling the speed of the motor, and particlularly as in outboard motors where ease of control and adjustment is given particular consideration.

Shaft 21 is preferably integrally formed to project beyond housing 19 a considerable distance and is rotatably vertically suspended and carried by the upper bearing 22 and the lower bearing 23 well spaced from bearing 22 and through which shaft 21 extends. Bearings 22 and 23 are carried in support 7 of the engine crankcase to dispose magneto 16 adjacent carburetor 10 forwardly of the engine and with the upper end of shaft 21 adapted to receive the gear 24.

The gear 25 carried by crankshaft 3 within gear case 5 is drivingly engaged by the intermediate gear 26. Gear 26 meshes with gear 24 and is mounted in the gear case on the shaft 27 supported in lower and upper bearings 28 and 29 carried by crankcase 8 and cover 9, respectively. Gears 24 and 25 should, of course, be of the same size so that the rotation of shaft 21 corresponds exactly with the rotation of the engine crankshaft.

Gear 26 may be eliminated if desired by providing for the direct intermeshing of gears, not shown, carried by crankshaft 3 and rotor shaft 21.

In engine 1 the larger diameter of gear 26 reduces the required size of gears 24 and 25 and additionally provides a convenient auxiliary drive of reduced speed for fuel pump 12.

The co-ordinated adjustment of magneto 16 and carburetors 10 and 11 is provided by the lever-cam 30 carried by the shaft 14 of the upper carburetor and the arm 31. Arm 31 is bolted to the upper face of magneto housing 16 and carries the roller pin 32 which engages and rides the lever-cam 30. As magneto 16 is advanced by turning housing 19 oppositely of rotation of shaft 21, roller 32 pushes lever 30 turning adjustment shafts 14 of carburetors 10 and 11 as predetermined by the contour of lever 30 and according to the advanced position of the magneto.

Spring means, not shown, normally biasing lever 30 and shafts 14 of both carburetors in a closed or low-speed position, as shown in Fig. 2, serves to return the carburetors to low-speed adjustment as the magneto is retarded by turning housing 19 in the direction of rotation of shaft 21.

The outboard motor shown in part in the drawings also includes the steering handle 33 projecting forwardly of the motor and by which the same is turned as a unit on bearing supporting means, not shown, for steering of the boat.

Handle 33 is supported by the arm 34 bolted to the lower side of engine 1 beneath magneto 16. The short rock shaft 35 disposed vertically in suitable bearing means in arm 34 carries the control adjustment crank 36 at its upper end above arm 34 and the crank 37 at its lower end.

The "squeezed grip" lever 38 pivotally carried within handle 33 is connected to the depending control arm 39 carried by magneto housing 19 to advance the latter and control the same and carburetors 10 and 11, as described.

Lever 38 is connected oppositely to the lever 40 which engages the abutment 41 of crank 42. Cranks 40 and 42 are carried on the transverse pin 43 which secures handle 33 and arm 34 and by which arrangement handle 33 may be set vertically, as shown in Fig. 7, on pin 43 when in the way or not in use.

The rod 44 connecting cranks 42 and 37, and rod 45 connecting crank 36 and the arm 39 of magneto 16 complete the mechanical connection of lever 38 and the magneto so that movement of lever 38 as by squeezing handle 33 rotates housing 19 to advance the same and adjust carburetors 10 and 13, as described.

The selective locking mechanism 46 controlled by the push button 47 at the forward end of handle 33 is disposed to engage one of a series of detents 48 in lever 38 securing the latter in the selected position of adjustment. Release of lever 38 by mechanism 46 is effected by spring means upon advancing magneto control lever 38 allowing the free control of the magneto, as described.

The return of magneto housing 16 and the entire manual control mechanism, described above, to a retard position is effected principally by the spring 49 secured at one end to housing 19 of the magneto and projecting for suitable engagement in a hole in the lower end of the magneto support 7.

It should be noted in connection with the manual effort required to move housing 19 for the necessary magneto adjustment that the sole resistance to such adjustment is the operating torque of the magneto unit including whatever frictional losses are involved therewith, and that in conventional or better magnetos such torque will be of such low values that the additional spring means 49 is necessary to ensure the return of the control to the retard position at all times and also when the engine is not in operation.

If desired, the flexible control cable 50 may be employed whereby engine control may be accomplished remotely by a suitable control lever, not shown. The cable housing 51 is secured by the mounting 52 on arm 34 and the control wire 53 is connected to crank 36 to effect adjustment of magneto 16 and carburetors 10 and 11.

In remote control operation handle 33 may be raised whereby lever 38 is operatively disconnected as lever 40 moves out of range of abutment 41.

In any type of control where positive manual adjustment of the magneto in both directions is preferred and provided for, spring 49 may be eliminated entirely.

Adjustment of arm 31 is readily provided by moving the same in the arcuate slots 54 before tightening bolts 55 securing arm 31 to housing 19. The retard and advance limits of magneto unit 16 is provided by the adjustable lock screws 56 carried by crank 36 on opposite sides of shaft 35 to engage the abutments 57 carried by arm 34.

Various provisions for the assembly and removal of magneto unit 16 may be provided for. In engine 1 driven gear 24 is secured to shaft 21 by the bolt 58 which further secures the inner race of bearing 22 on shaft 21 between the shoulder 59 formed in the shaft and the removable collar 60 between bearing 22 and gear 24. Removal of bolt 58 allows magneto 16 with shaft 21, arm 39 and spring 49 to be removed as a unit from the engine for repair or replacement. The additional auxiliary drive or power take-off shaft 61 is fitted to receive the flexible shaft, not shown, of a tachometer and the like and is car-

ried conveniently forwardly of the engine within gear case 5 by the bearings 62 and driven by gear 63 meshing with gear 24.

The invention allows the magneto unit to be most conveniently disposed with respect to the engine application and desired control means. The driven shaft and timing gear are carried together directly by a rigid support instead of by the movable magneto housing thus eliminating possible chances of gear misalignment, wear and excessive gear noise.

The nominal effort required to turn the magneto housing makes various types of manual and automatic control means, not shown, feasible and practicable in outboard motors and the like.

Various embodiments of the invention may be employed within the scope of the following claims.

I claim:

1. In an internal-combustion engine, a magneto unit for said engine having a housing and a rotor shaft nominally rotatably supported within the housing, means rotatably carried and driven by said engine having connection at one end with a corresponding end of said rotor shaft and supporting by said connection the entire weight of said unit, and selectively adjustable means securing the housing of said unit against rotation with the rotor shaft thereof.

2. In an engine of the class described, an integral magneto and timer unit for the ignition of said engine including a stator housing and a rotor shaft rotatably carried by the housing, a shaft rotatably carried and driven by said engine in predetermined timed relation to the operation of the engine, means connecting corresponding ends of said shafts in alignment, the housing of said unit being rotatably supported on the rotor shaft thereof by said engine shaft, and abutment means adjustably securing said housing against rotation on and with the rotor shaft supporting the same and in a predetermined position and corresponding timed relation to the ignition requirements of the engine.

3. In an engine of the class described including a shaft adapted to be rotated by and in timed relation with the operation of the engine, an integral magneto and timer unit therefor having a housing and a rotor shaft, the latter supported by said engine shaft and rotatably supporting the housing and control means connected to said housing to move the same on said rotor shaft for the selective adjustment of the relative positions of said housing and engine.

4. An engine including in combination, an electrical ignition system, an operating shaft rotated by and in timed relation with the operation of the engine, and a timed electrical impulse generator connected to said system operatively mounted and supported on said shaft and adjustably disposed with respect to said shaft whereby the timing thereof may be advanced or retarded.

5. In an engine for outboard motors and the like, an integral magneto and timing unit including a housing and a rotor shaft, means carried by said engine rotatably supporting said shaft, gear means drivingly connecting said engine and said shaft in timed relation, and a manually operable lever carried by said engine connected to said housing and disposed to turn selectively the latter upon said shaft irrespective of the rotation thereof whereby the timed relation of said engine and unit is manually adjustable.

6. In an engine for outboard motors and the like, an integral magneto and timing unit including a housing and a rotor shaft, means carried by said engine rotatably supporting said shaft, gear means drivingly connecting said engine and said shaft in timed relation, a manually operable lever carried by said engine connected to said housing and disposed to turn selectively the latter upon said shaft irrespective of the rotation thereof whereby the timed relation of said engine and unit is manually adjustable, and spring means disposed to turn said housing in the opposite direction.

7. In an outboard motor, an integral magneto and timing unit including a housing and a rotor shaft, bearings carried by the motor rotatably supporting said shaft, gear means drivingly connecting the motor and said shaft in timed relation, a steering handle for said motor including a manually operable lever carried by the motor connected to said housing and disposed to turn selectively the latter in one direction upon said shaft irrespective of the rotation thereof whereby the speed of the motor is manually adjustable, and spring means disposed to turn said housing and move said lever in the opposite direction.

8. In an outboard motor, an integral magneto and timing unit including a housing and a rotor shaft, bearings carried by the motor rotatably supporting said shaft, gear means drivingly connecting the motor and said shaft in timed relation, a steering handle for said motor including a manually operable lever carried by the motor connected to said housing and disposed to turn selectively the latter in one direction upon said shaft irrespective of the rotation thereof whereby the speed of the motor is manually adjustable, spring means disposed to turn said housing and move said lever in the opposite direction, and selectively operable means carried by said handle disposed to secure said lever and housing in at least one selected position of adjustment.

9. In an outboard motor, an integral magneto and timing unit including a housing and a rotor shaft, bearings carried by the motor rotatably supporting said shaft, gear means drivingly connecting the motor and said shaft in timed relation, a steering handle for said motor including a manually operable lever carried by the motor connected to said housing and disposed to turn selectively the latter in one direction upon said shaft irrespective of the rotation thereof whereby the speed of the motor is manually adjustable, spring means disposed to turn said housing and move said lever in the opposite direction, and selectively operable means carried by said handle disposed to secure said lever and said housing against rotation in said last named direction and adapted to automatically release the same upon movement in said first named direction.

10. In an internal-combustion engine including a carburetor, a magneto unit for said engine having a housing and a rotor shaft nominally rotatably supported within the housing, means rotatably driven by said engine carrying a corresponding end of said rotor shaft and supporting the entire weight of said unit, selectively adjustable means securing the housing of said unit against rotation with the rotor shaft thereof, and cam means connecting said housing and said carburetor and providing for the coordinated adjustment of the latter with respect to said magneto unit.

11. In an engine of the class described including at least one carburetor, a conventional in-

tegral magneto and timer unit for the ignition of said engine including a stator housing and a rotor shaft rotatably carried by the housing, a shaft rotatably carried and driven by said engine in predetermined timed relation to the operation of the engine, means connecting corresponding ends of said shafts in alignment, the housing of said unit being rotatably supported on the rotor shaft thereof by said engine shaft, abutment means adjustably securing said housing against rotation on and with the rotor shaft supporting the same and in a predetermined position and corresponding timed relation to the ignition requirements of the engine, and cam means connecting said housing and said carburetor and providing for the coordinated adjustment of the latter with respect to said magneto unit to control the speed of said engine.

12. In an engine of the class described including a vertically disposed shaft adapted to be rotated by and in timed relation with the operation of the engine, an integral magneto and ignition timer unit therefor having a housing and a rotor mounted on said shaft, the latter being supported vertically by said engine and rotatably supporting the housing, and a control rod connected to said housing to move and secure the same on said rotor shaft for the selective adjustment of the ignition timing.

13. In an engine for outboard motors and the like, an integral magneto and timing unit including a housing and a rotor shaft, means carried by said engine rotatably supporting said shaft independently of said housing, gear means drivingly connecting said engine and said shaft in timed relation, a steering handle, and a manually operable lever carried by said handle connected to said housing and disposed to turn selectively the latter upon said shaft irrespective of the rotation thereof whereby the speed of the motor is manually adjustable.

14. In an outboard motor unit supported pivotally on a vertical axis and including a tiller extending forwardly thereof for effecting steering movement of the unit, an internal combustion engine having a housing and including a shaft supported by said housing for rotation in fixed timed relation with the operation of the engine, a magneto unit for said engine including a rotor shaft driven by said engine shaft, said unit being supported for relative rotation independently of the rotation of said rotor shaft to allow the selective adjustment of the operation of said magneto unit, spring means biasing said magneto unit rotationally in one direction on the axis of the rotor shaft thereof, a handle at the forward end of said tiller for grasping and including a lever associated therewith, and a control linkage connecting said lever and said magneto unit for effecting the rotation of said magneto unit in the other direction and a corresponding adjustment thereof by grasping of said handle by an operator.

15. In an outboard motor unit supported for pivotal movement on a vertical axis and including a tiller for effecting the steering movement of the unit on said axis, said tiller including a handle at the end thereof and a lever associated with said handle so as to be actuated by grasping of said handle by an operator, an internal combustion engine having a housing and including a shaft supported by said housing for rotation in fixed timed relation with the operation of the engine, a magneto unit for said engine having a rotor shaft driven by said engine shaft in a given direction and including bearing means supporting the magneto unit for rotation on the axis of said rotor shaft and independently of the rotation thereof for the advance and retard adjustment of the unit, spring means biasing said magneto unit rotationally in said given direction to a position of full retard, a control linkage connecting said lever and said magneto unit for advancing the adjustment of the latter by rotation thereof oppositely of said given direction and against said spring means by actuation of said lever, and releasable catch means disposed to be moved into selective engagement with said lever to secure the latter and said magneto unit in the selected position of adjustment and to release said lever to allow rotation of said magneto unit by said spring means in said given direction and the return thereof to said position of full retard.

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