Sept. 4, 1928. 1,683,239

W. A. CHRYST

IGNITION APPARATUS

Original Filed May 23, 1922 4 Sheets-Sheet 1

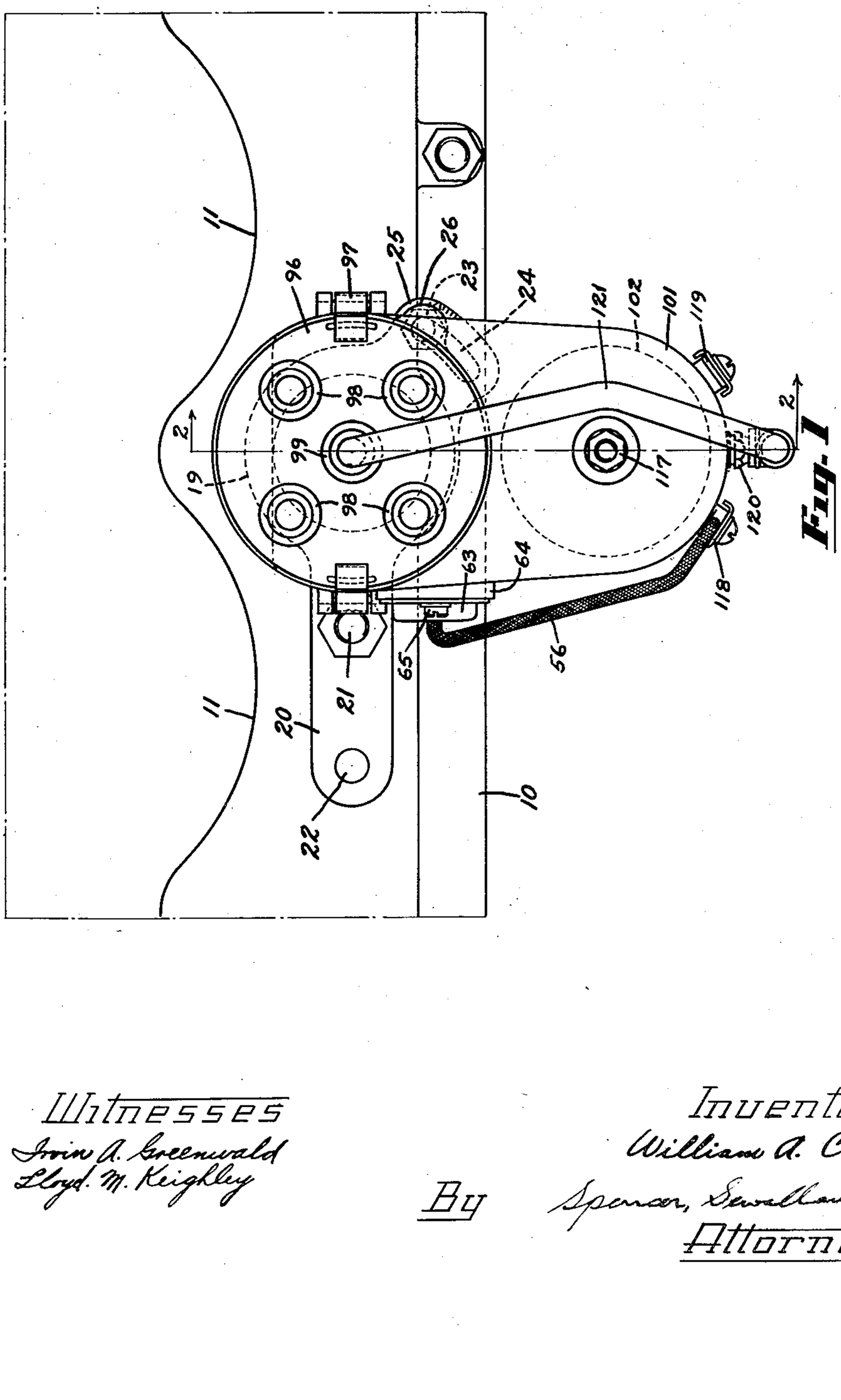

Fig. 1

Witnesses
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Original Filed May 23, 1922 4 Sheets-Sheet 2

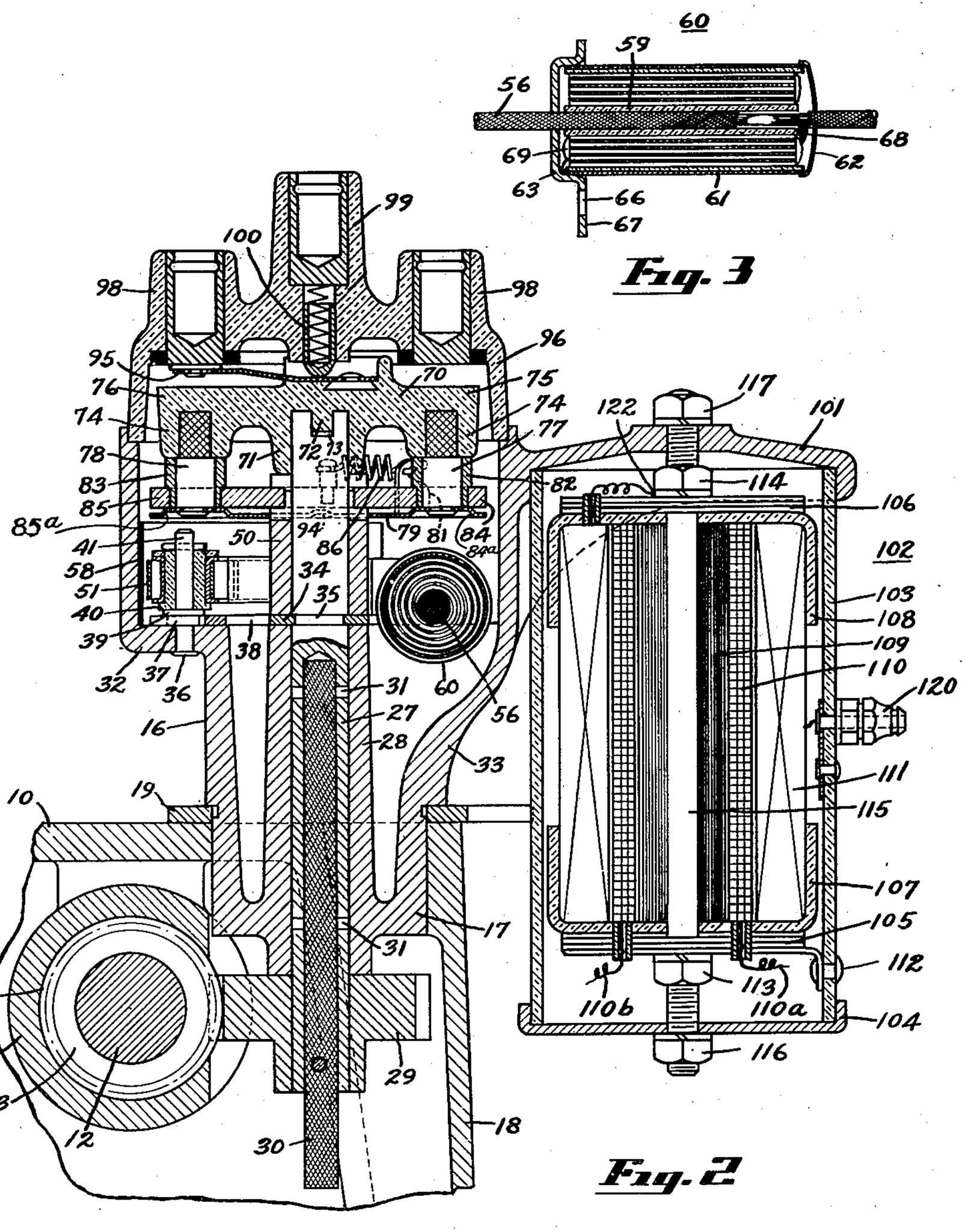

Fig. 3

Fig. 2

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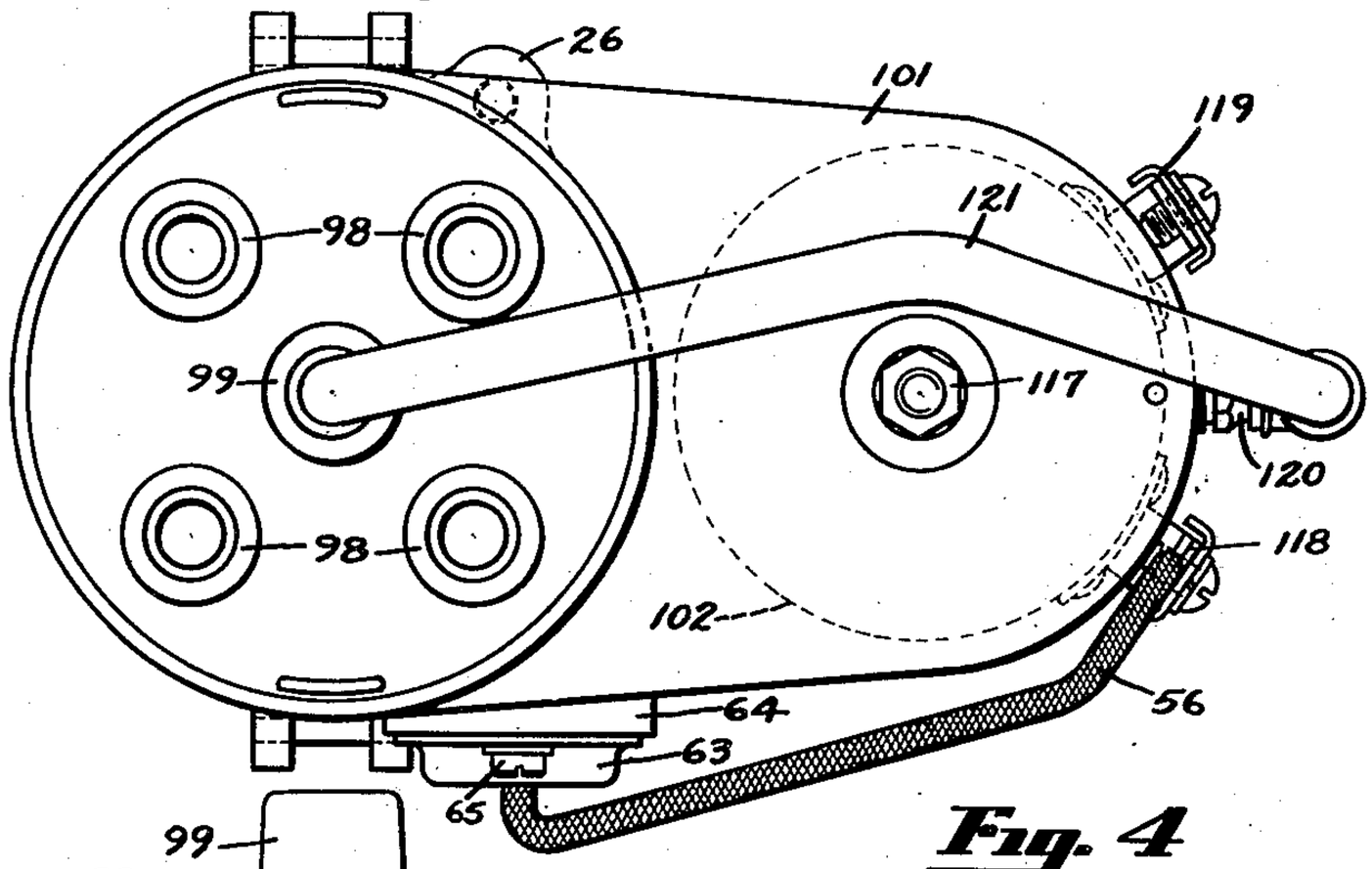

Fig. 4

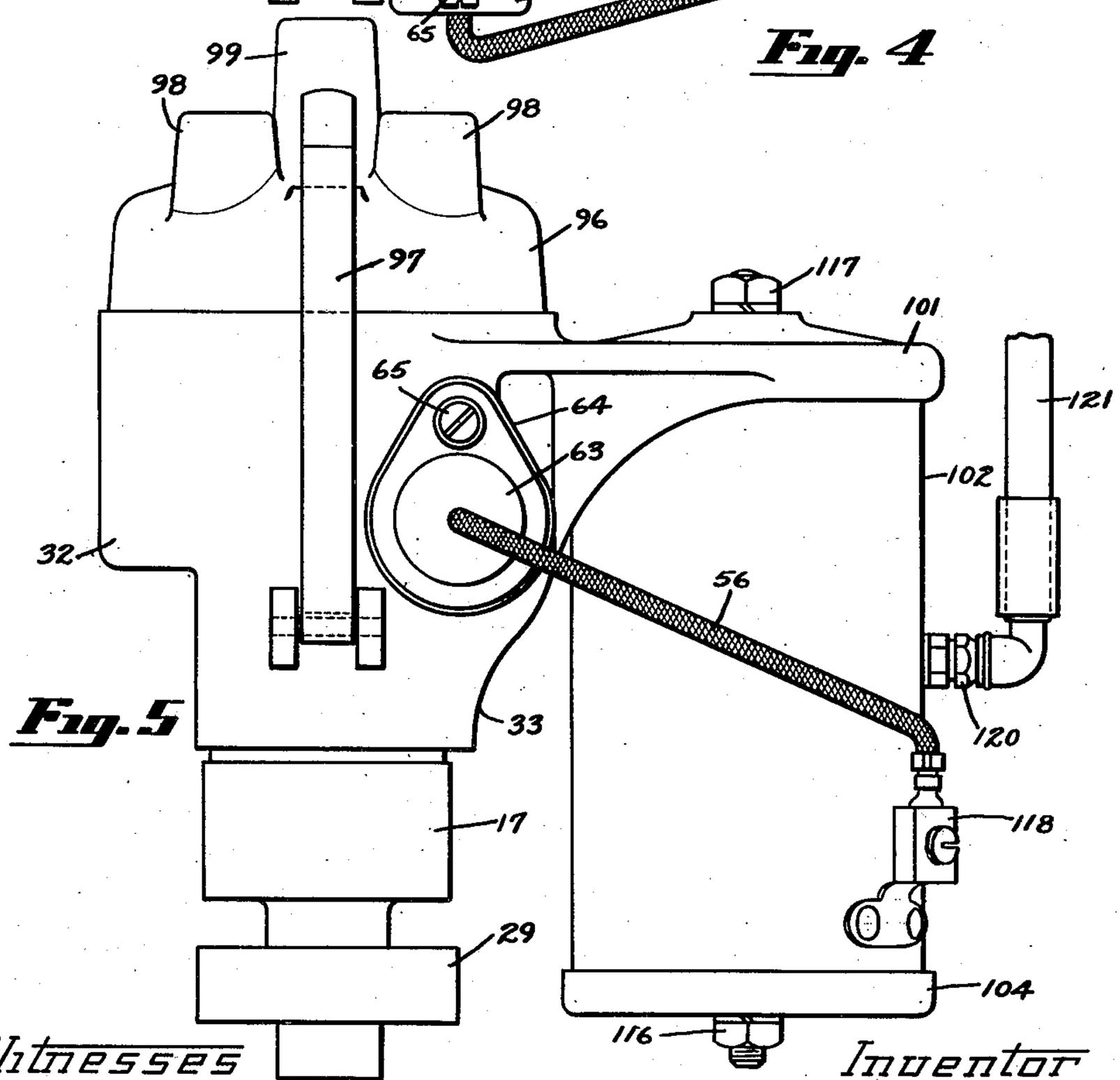

Fig. 5

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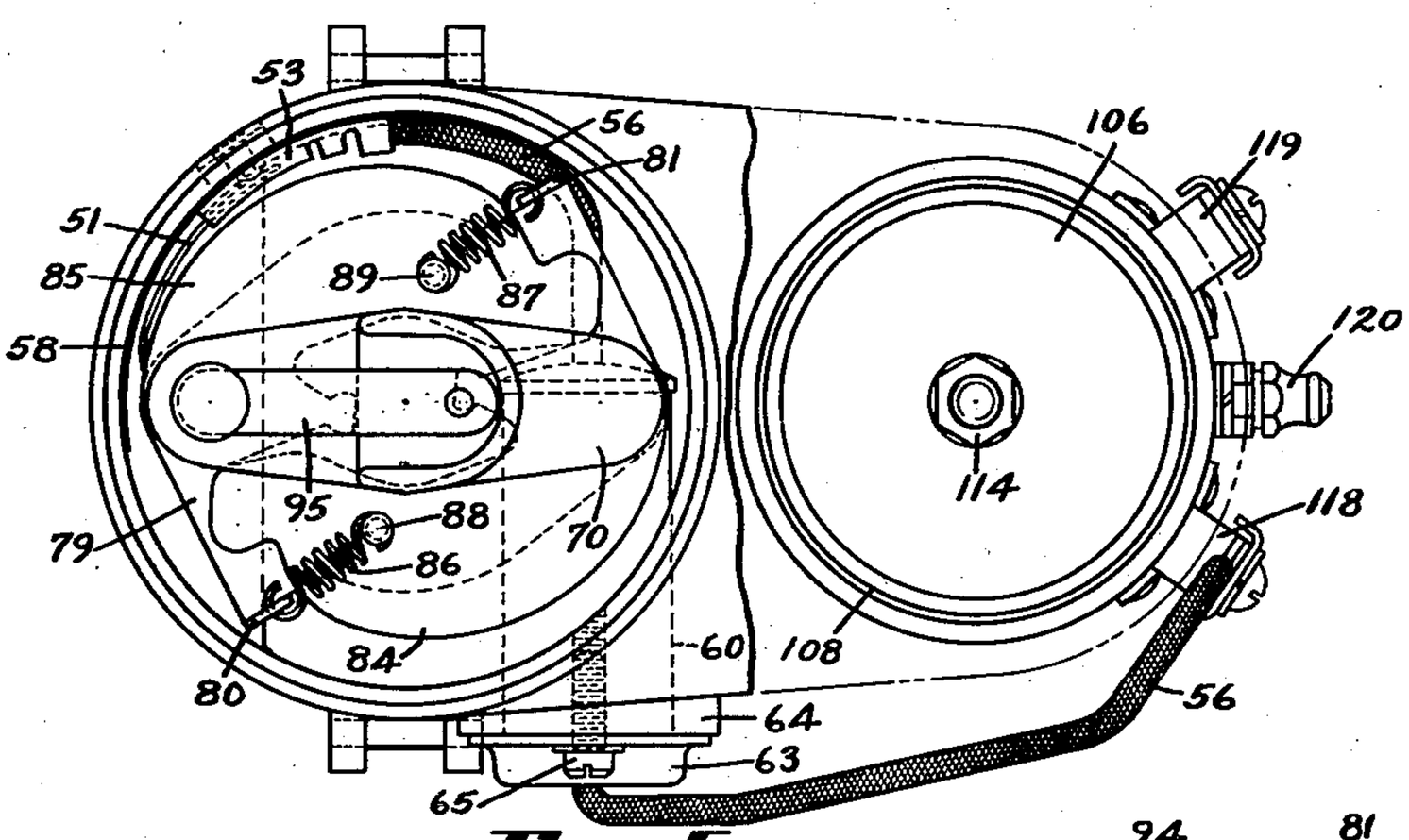

Fig. 6

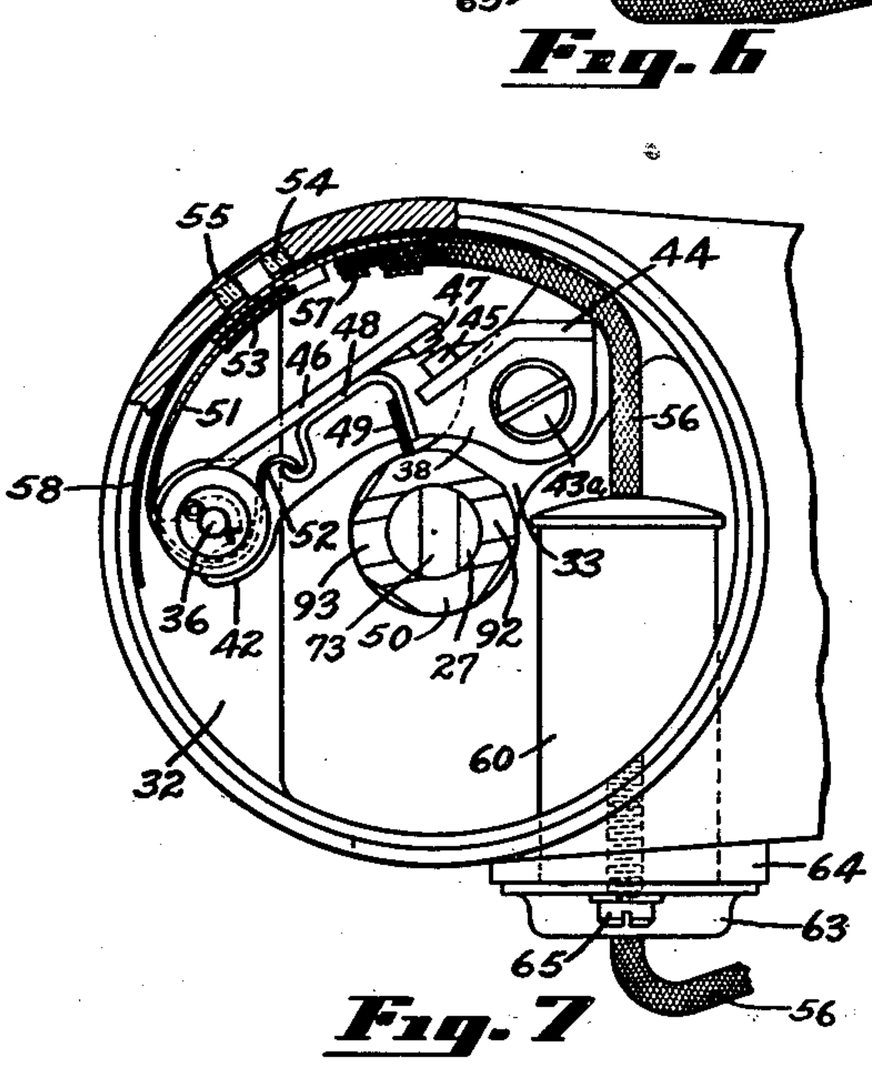

Fig. 7

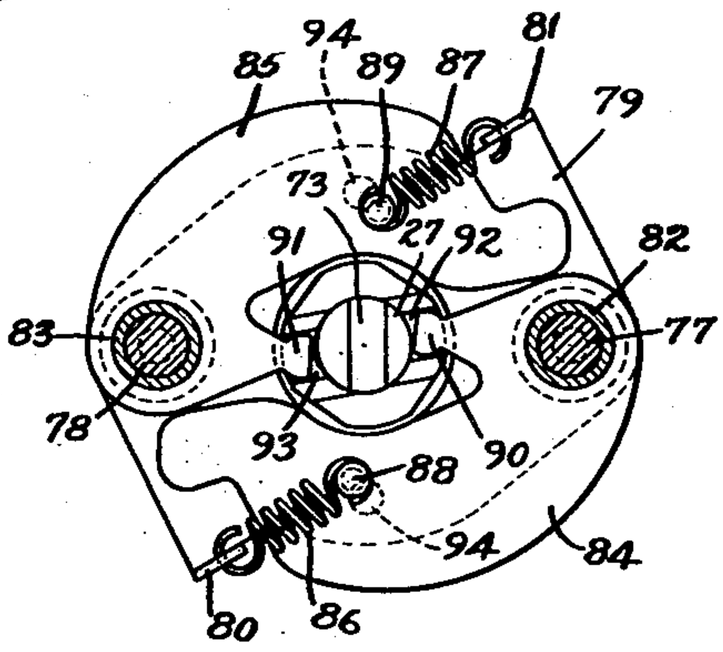

Fig. 8

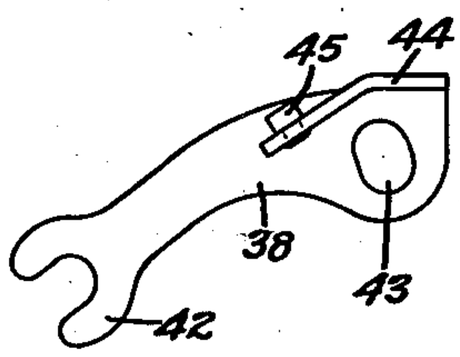

Fig. 9

Witnesses
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UNITED STATES PATENT OFFICE.

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IGNITION APPARATUS.

Original application filed May 23, 1922, Serial No. 563,145. Divided and this application filed May 26, 1925, Serial No. 33,072. Renewed April 11, 1927.

This invention relates to apparatus employed for producing sparking impulse for engine ignition, and its principal objects are to provide a compact apparatus whose parts are accessible and to provide a construction and arrangement of the parts which promotes manufacture at low cost. This application is a division of Serial No. 563,145, filed May 23, 1922.

In the accompanying drawings:

Fig. 1 is a plan view of an apparatus embodying the present invention mounted on an engine of which a part only is shown;

Fig. 2 is a sectional view thereof taken on line 2—2 of Fig. 1;

Fig. 3 is a longitudinal sectional view of a cylindrical condenser;

Fig. 4 is a plan view of a part of the apparatus detached from the engine;

Fig. 5 is a side view thereof;

Fig. 6 is a plan view similar to Fig. 4 with the distributor head removed;

Fig. 7 is a plan view of the breaker mechanism and condenser;

Fig. 8 is a plan view of the instrumentalities for controlling the spark timing mechanism;

Fig. 9 is a plan view of the fixed contact support.

In these drawings 10 is an engine having cylinders shown diagrammatically at 11, 12, a cam shaft having a journal 13 supported in a bearing 14, and 15 is a spiral gear formed in the cylindrical face of the journal. 16 is a vertical metal distributor cup having a cylindrical lower end 17 projecting into the engine crank case 18. The distributor cup seats on a metal plate 19 resting on the crank case 18 and having a lateral projection 20 fastened to the crank case by a bolt 21 and a downwardly projecting boss 22 seating in a hole (not shown) in the upper surface of the crank case. Bolt 23 passing through an arcuate slot 24 in a lateral projection 25 in the plate 19 and through an ear 26 on the distributor cup, secures the cup in adjusted position on the plate.

27 is a vertical driving shaft rotatably mounted in a bearing 28 in the cup and carrying on its lower end a worm gear 29 meshing with the worm 15 cut on the cam shaft journal. Wick 30 located in an axial hole in the shaft 27 conducts lubricant from the crank case to lateral holes 31 extending to the surface of the shaft. The upper surfaces of a shoulder 32, the central bearing 28, and a radial lug 33 formed integral with the bearing and wall of the cup are machined to the same horizontal plane. A washer 34 seating on the top of the bearing 28 and pressed into a circumferential groove 35 formed in the shaft supports the latter in operative position with the gears in mesh and the upper portion of the shaft projecting above the bearing 28.

Vertical pin 36 secured to the shoulder 32 and projecting into the distributor housing is formed with a collar 37 forming an axis for a fixed contact arm 38, a flange 39 supporting a hollow spooled insulating bushing 40 and a reduced upper portion 41 forming an axis for the bushing.

Contact arm 38 rests on shoulder 32 and radial lug 33, and is formed with a notched outer end 42 embracing the collar 37, an elongated aperture 43 adjacent the opposite end of the arm and an upturned projection 44 supporting fixed contact 45. Screw 43ª passes through the aperture 43 into lug 33 and secures the fixed contact arm in adjusted position. A movable contact arm 46 of channel-shape cross section supports a contact 47 and one end thereof is formed around the bushing 40. A plate 48 is secured to the inner surface of the movable contact arm, and supports a cam follower 49 adapted to engage cam 50 journalled upon the projecting end of the shaft 27, and the washer 34.

The movable contact arm is yieldingly urged toward the fixed contact arm 45 by a leaf spring 51 bent around and seating in the channel end of the contact arm 46 and having its end 52 bent to engage the hook shaped end of plate 48. The other end of the spring rests in a metal plate 53 of channel-shape cross section. This plate is held in position by the spring 51 and by an insulating plug 54 attached to the plate and projecting into a hole 55 in the wall of the distributor housing. Spring 51 and plate 53 electrically connect the breaker arm 46 with a wire 56 which is fastened to a clip 57 provided by the plate. 58 is an insulating plate resting on the shoulder 32 and held in position by the insulating plug 54 which passes through a hole in the plate.

Cable 56 passes through an insulating tube 59 mounted axially in a cylindrical condenser 60. (Figs. 2, 3 and 7). This condenser is formed with a cylindrical casing 61, a relatively small inner end plate 62 adapted to pass through an opening in the side wall of the distributor cup, and a larger outer end plate 63 seating against a boss 64 on the outer surface of the distributor cup and fastened to the latter by a screw 65 passing through an opening 66 in an ear 67 formed on the cover, and threaded into the cup. Adjacent the inner end of the condenser is a lead 68 connecting one of the condenser coils with the cable 56 which is bared at the point of connection as shown in Fig. 3. The other coil is connected by a wire 69 to ground at the opposite end of the condenser, thus placing the condenser in parallel with the contact points 45 and 47 which are grounded on the lug 33. Cable 56 projects through the condenser to the outside of the distributor cup and the condenser and cable may be completely detached from the cup by removing the screw 65, moving the spring 51 toward the center of the cup, sliding the plug 54 inwardly from the opening 55, and moving the condenser and cable outwardly through the opening in the boss 64.

70 is a distributor rotor mounted upon the top shaft 27 and detachably secured in a predetermined angular position thereon by a hollow boss 71 on the lower side of the rotor 70 and a key 72 integral with the rotor and received by a transverse slot 73 in the shaft end. Pressed into lugs 74 at the ends of the rotor arms 75 and 76 are downwardly projecting pins 77 and 78 supporting a plate 79 centrally apertured to receive the upper end of cam 50 and formed with opposite disposed upturned lugs 80 and 81. Pins 77 and 78 carry, respectively, bushings 82 and 83 and transversely disposed weights 84 and 85 rotatably mounted on the pins and normally held in proximity to the cam by springs 86 and 87. Spring 86 is connected at its ends to lug 80 on plate 79 and a pin 88 projecting from the upper surface of weight 84. Spring 87 is connected in like manner to lug 81 on plate 79 and a pin 89 on weight 85. The weights 84 and 85 are connected to cam 50 by radial arms 90 and 91, respectively, projecting into diametrically disposed slots 92 and 93 in the sides of the cam. The shaft rotates the distributor rotor which in turn rotates the plate 79 and weights 84 and 85 which swing outwardly by centrifugal force about the axes 77 and 78, respectively. The weights are supported by shoulders 84[a] and 85[a] formed on the plate 79 adjacent the pins 77 and 78. The weights also slidably rest on raised portions or lugs 94 formed on the upper surface of the plate 79 (Fig. 2), by denting the same or any other suitable manner.

95 is a radially disposed resilient conductor mounted upon the rotor arm 76. Distributor head 96 is mounted upon the distributor cup by spring clips 97 and carries an annular row of sockets 98 adapted to be connected by cables to the spark plugs of an engine and a central socket 99 electrically connected to spring 95 by a spring pressed plunger 100. The conductor 95 carries a button 95[a] for engaging the under surfaces of the sockets 98.

A laterally extending bracket 101 formed integrally with the distributor cup forms the upper end wall of an ignition coil 102, having a cylindrical casing 103, and a lower end wall 104. The coil includes a magnetizable end plate 105 and 106 clamped against insulating cups 107 and 108 enclosing the ends of a magnetizable core 109, a primary winding 110 and a secondary winding 111. One of the end plates 105 is secured to casing 103 by rivet 112. Nuts 113 and 114 threaded on a rod 115 extending through the core, secure the end plates in position. Nut 116 secures the lower end wall 104 to the casing 103 and nut 117 secures the ignition coil to the bracket 101. A binding post 118 is mounted on the casing 103 and is connected to the outer end of cable 56 and to one end 110[a] of the primary winding. A binding post 119 is connected to the other end 110[b] of the primary winding and is adapted to be connected to a battery or other source of current. A terminal 120 connected to one end of the secondary winding 111 is connected by cable 121 to the socket 99 on the distributor head. The other end of the secondary winding 111 is grounded at 122.

The present invention provides unitary coil and ignition timer structure from which the coil is readily removable without disturbing the remaining parts of the apparatus. The coil may be rotated, after loosening nut 117 so that the terminals on the coil may be brought into the most convenient location. One end cover of the coil is provided by the ignition timer cup thus eliminating a separate part.

The present construction eliminates the terminal screws and other wire devices usually formed in ignition timers. Only one wire is used to connect the ignition coil to the insulated contact of the timer and the condenser to this contact. The mounting of the condenser upon the timer cup grounds the condenser and also secures the wire which connects the timer and coil. The terminal clip attached to this wire is held in position within the timer cup and in electrical connection with the breaker lever by the leaf spring which urges the breaker lever toward the cam. These are some of the features by which the simplification of construction and reduction of the cost of manufacture of ignition apparatus is accomplished.

While the form of embodiment of the pres-

ent invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. The combination with an ignition distributor of a laterally extending bracket integral therewith; a vertical ingition coil mounted on the underside of the bracket, the bracket forming an end enclosure for the coil; and an axial bolt in the coil and secured to the bracket, the coil being separated from the bracket by detaching the bolt from the latter.

2. An ignition apparatus for internal combustion engines, comprising in combination, a distributor housing adapted to be mounted on the engine; and an ignition coil detachably secured to the side of said housing remote from the engine.

3. An ignition apparatus for internal combustion engines comprising in combination, a distributor housing adapted to be mounted on the engine; a bracket extending from the side of said housing; and an ignition coil secured to said bracket so as to have the bracket form an end enclosure for the coil.

4. An ignition apparatus for internal combustion engines comprising in combination, a distributor housing adapted to be mounted on the engine, and including an integral bracket extending from the side thereof; and ignition coil provided with a terminal; and means for adjustably securing the ignition coil on said bracket.

5. An ignition coil comprising a tubular case and end members attached to the case; a core and windings within the case; a coil mounting bracket comprising a pedestal portion and one of said end members which projects from one side of the pedestal portion and is integral therewith; and means for detachably securing the case to the end member forming a part of the bracket.

6. An ignition coil according to claim 5 in which both end members are removable and in which means are provided for clamping the case between the end members.

7. An ignition coil according to claim 5 in which a rod extends through the core and windings and has threaded ends which extend through the end members, and in which nuts cooperate with the threaded ends of the rod to secure the end members to the tubular case.

In testimony whereof I hereto affix my signature.

WILLIAM A. CHRYST.