

May 17, 1932.

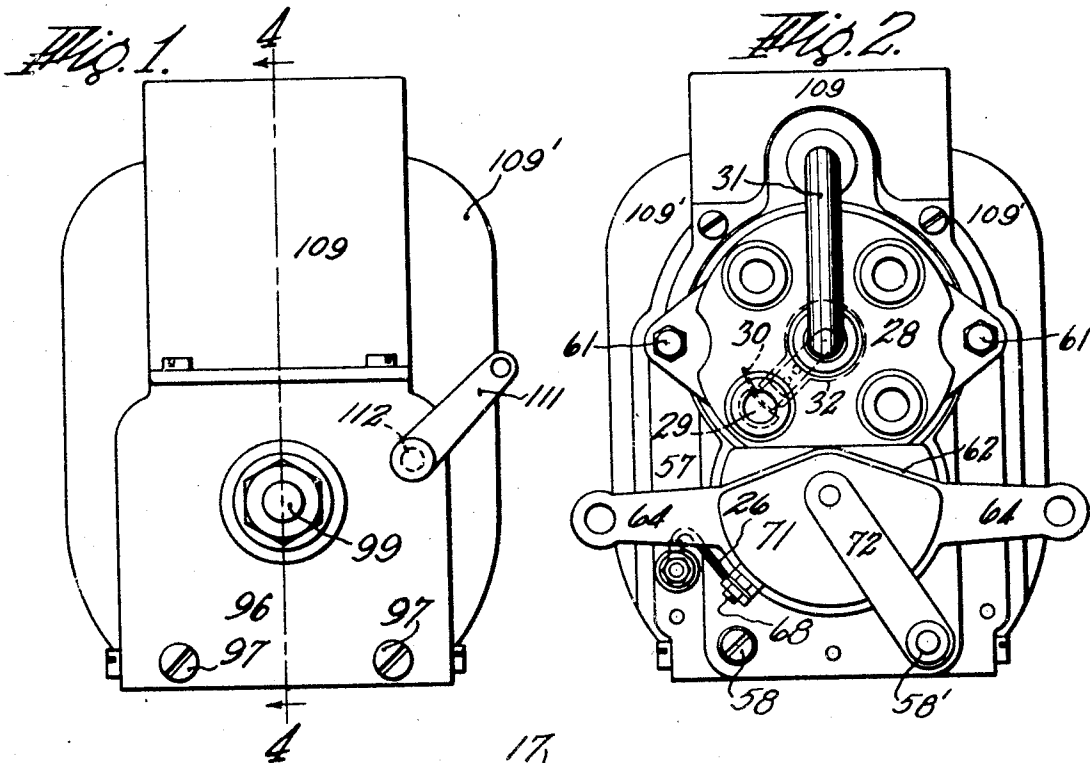
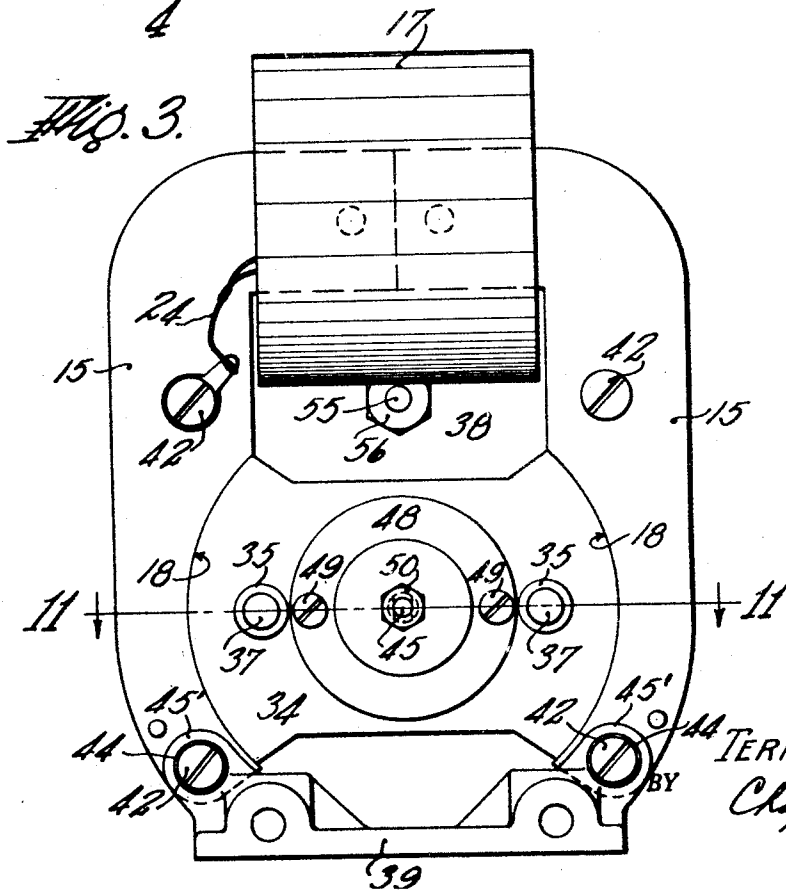
T. G. LOUIS

1,858,404

MAGNETO

Filed July 22, 1930

3 Sheets-Sheet 1



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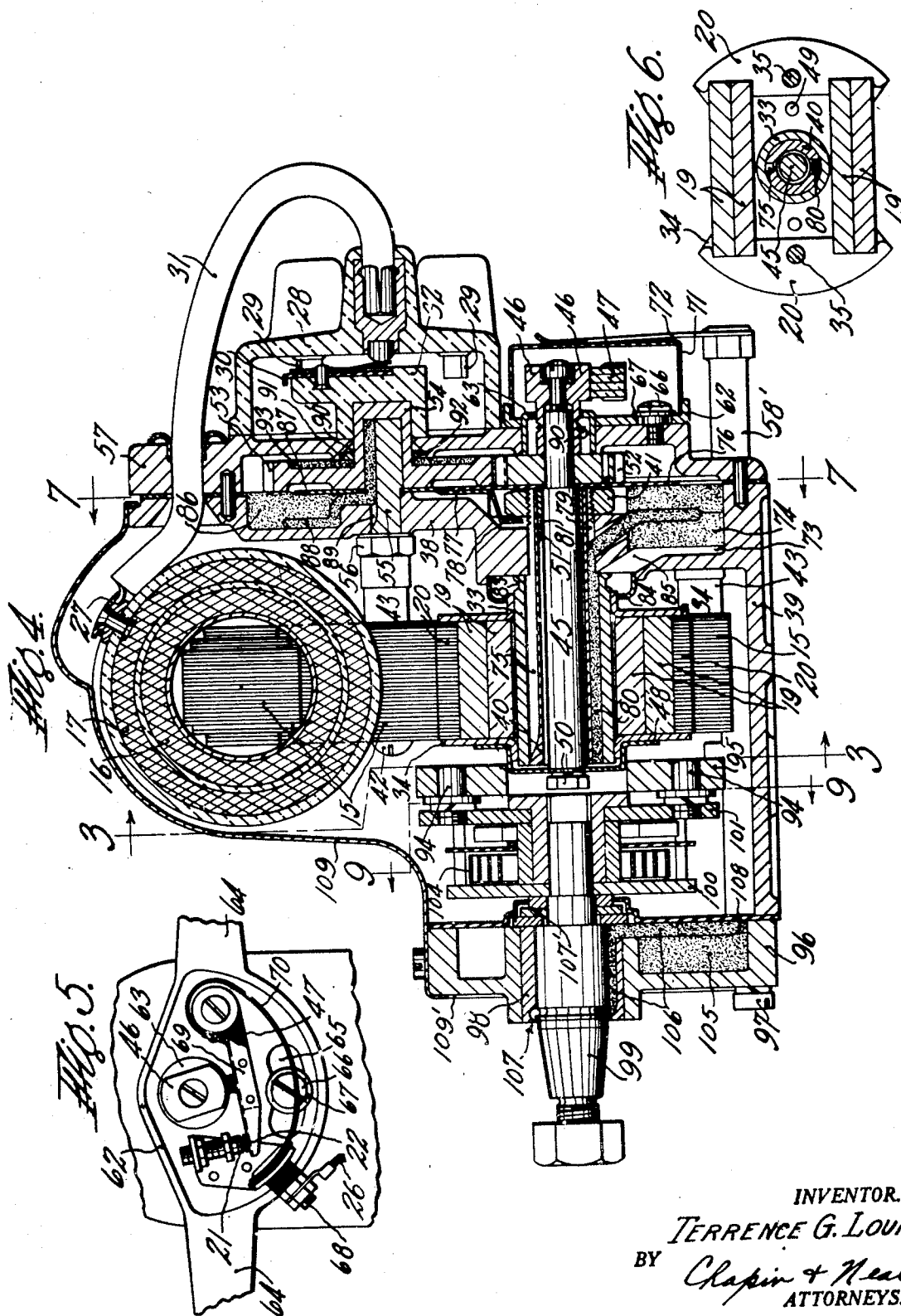
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Fig. 7.

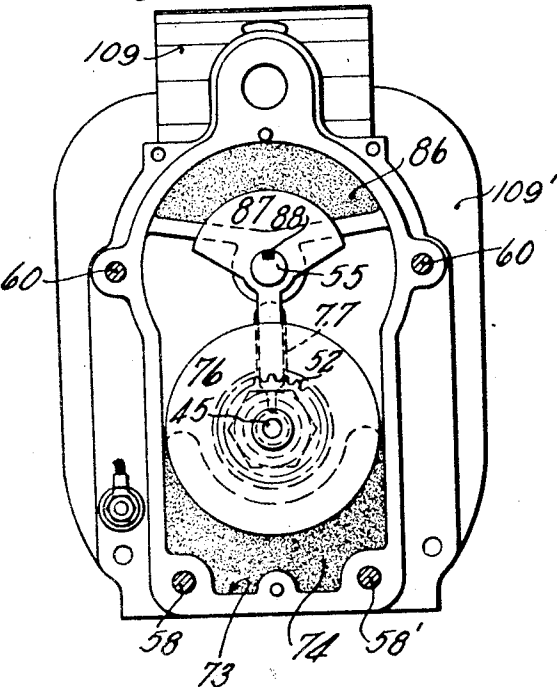


Fig. 8.

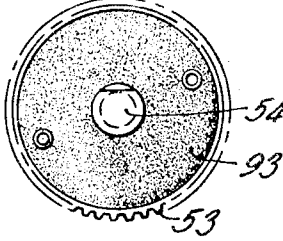


Fig. 9.

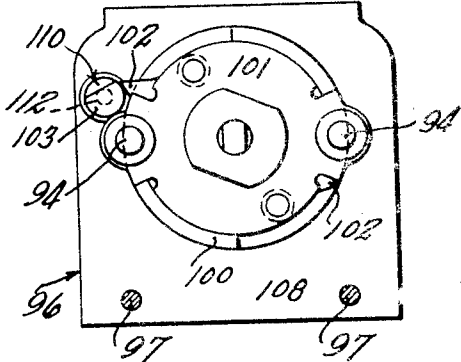


Fig. 10.

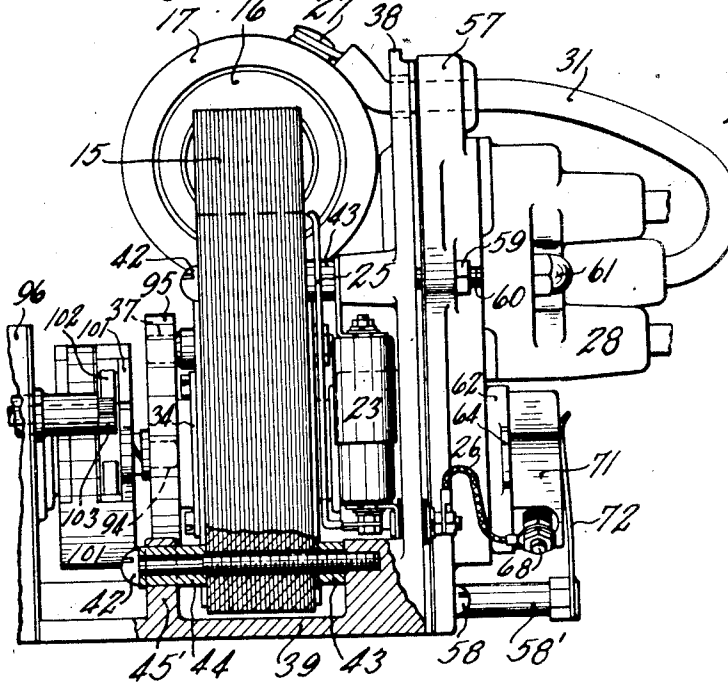
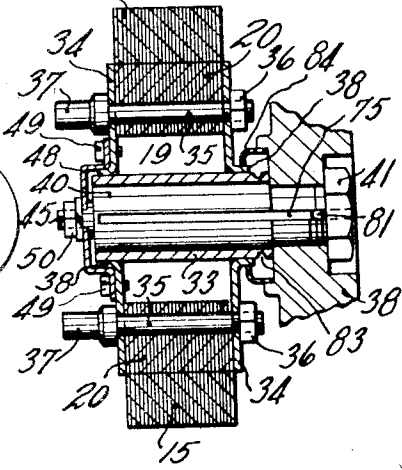


Fig. 11.



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UNITED STATES PATENT OFFICE

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MAGNETO

Application filed July 22, 1930. Serial No. 469,789.

This invention relates to improvements in magnetos. These improvements are especially designed for a rotary type magneto although some of them may be useful in magnetos, wherein the rotor is given an oscillatory rather than a complete rotational movement.

The improvements of this invention relate primarily to mechanical features of the magneto. The magneto, in so far as its electrical and magnetic functioning is concerned, is of a general type already known in the art.

The general object of the invention is to provide a compact, highly efficient machine of rugged construction, susceptible to manufacture in quantity at low unit cost and calculated to give a long life of useful service with a minimum of attention and care. Particular care has been taken to provide a substantially fool proof construction,—one in which the working parts are all enclosed and protected against injury and against ingress of dirt and in which the lubrication problems are automatically taken care of so that the common troubles due to faulty lubrication or the lack of it are unlikely to arise. The effort likewise has been to provide a complete magneto unit, in which all working parts are assembled and adjusted at the factory, leaving nothing whatever for the engine manufacturer to do other than to bolt the magneto in place and couple it up to an engine shaft.

A particular object of the invention is to provide an improved mounting for the stationary and movable elements of the magnetic circuit of the magneto. Both are wholly supported by a single frame. The rotor is journaled on a stud rigidly fixed to and projecting from the frame while the stationary elements are clamped to the same frame. By this arrangement, these relatively movable elements can be accurately located with respect to each other with a precision of adjustment which cannot be disturbed by the lack of alignment, looseness, wear or failure of any other part of the magneto. Thus, the construction makes it practical and safe to employ an exceedingly close running fit between these elements, thereby increasing the efficiency of the magneto over what would be obtained from using the same materials with

a greater air gap between the relatively movable elements of the magnetic circuit.

Another object of the invention is to provide a magneto which is composed of a plurality of independent units, so arranged as to afford a construction possessing a wide range of flexibility. Starting with a fundamental magneto unit, complete in itself, the magneto manufacturer can, by adding other units, adapt the fundamental unit to suit various types of engines. For example, with the one fundamental unit, adapted for direct drive from an engine, a unit can be added to secure spring impulse drive. So also, the magneto construction is such that it can be adapted to single cylinder or multi-cylinder engines, as desired.

A most important feature, in the case of the spring impulse driving means, or any other for that matter, is that the driving means is journaled entirely independent of the magneto rotor and flexibly coupled therewith so that the rotor, once it has been mounted and adjusted to run in true concentricity and close proximity to the pole shoes of the stationary magnetic elements of the magneto, cannot be disturbed by any unevenness in the running of the driving means or by any misalignment of the same.

Another object of the invention is to provide for the lubrication of the moving parts of the magneto in such a way that the lubricant is prevented from causing trouble in the operation of the magneto and at the same time the lubricant is protected against loss of effectiveness. A substantially sealed up, circulatory lubricating system is provided, and one which is proof against ingress of dust and dirt and protected against the deleterious effects of ozone generated in the magneto. Lubrication being automatically attended to, the common troubles, arising either from excessive or insufficient lubrication where reliance is placed on an operator for this purpose, are entirely avoided.

Other objects will appear as the detailed description proceeds and will be pointed out in the appended claims.

The invention will be disclosed with refer-

ence to the accompanying drawings, in which:—

Figs. 1 and 2 are elevational views showing opposite ends of the magneto;

Fig. 3 is a cross sectional view taken on the line 3—3 of Fig. 4;

Fig. 4 is a sectional elevational view taken on the line 4—4 of Fig. 1;

Fig. 5 is a fragmentary end elevational view showing the timer;

Fig. 6 is a cross sectional view of the rotor;

Fig. 7 is a cross sectional view taken on the line 7—7 of Fig. 4, illustrative of the gear case and provisions for lubrication;

Fig. 8 is a view of the distributor gear;

Fig. 9 is a cross sectional view taken on the line 9—9 of Fig. 4;

Fig. 10 is a side elevational view, partly in section, of the magneto, with its enclosing casing removed; and

Fig. 11 is a sectional plan view taken on the line 11—11 of Fig. 3.

The magneto includes a stationary element and a movable and preferably rotatable element, forming together a magnetic circuit which includes a source of magnetic flux. By relative movement of these elements, flux changes are periodically effected in a generating winding, which encircles part of said circuit, to induce the generation of intermittent electromotive forces. The stationary element, as herein shown, is made up of two parts 15, best seen in Fig. 3. Each part 15 is made up of substantially angle-shaped laminations of soft iron. The short and horizontal legs of these members 15 abut one another to form a core, on which are mounted primary and secondary coils 16 and 17, respectively, (see also Fig. 4). The stationary element, as a whole, is of the shape of an inverted U, as will be clear from Fig. 3, and the parallel and vertical portions thereof form extensions of the coil-carrying core and are recessed, as at 18, to receive between them, and closely fit, the movable element. The latter preferably takes the form of a magnetic rotor and comprises a plurality of permanent short bar magnets 19 (Fig. 6), interconnecting a pair of laminated soft iron pole shoes 20, which are convexly curved to closely fit the concave recesses 18 in the stationary element.

A suitable timer or interrupter (Fig. 5) is provided having relatively movable breaker points 21 and 22. A suitable condenser 23 (Fig. 10) is also provided. One terminal of the primary coil 16 and one terminal of the secondary coil 17 are connected together and to the frame of the machine by a wire 24 (Fig. 3). The other terminal of the primary coil is connected by a wire 25 (Fig. 10) to one terminal of condenser 23 and such terminal is connected by a wire 26 to the movable breaker point 22 of the interrupter mechanism. The fixed breaker point 21 and the other terminal of the condenser are in metallic connection

with the frame of the machine, as will be clear from Figs. 5 and 10, respectively. The other terminal of the secondary coil 17 is shown at 27. For multi-cylinder ignition, a distributor may be provided as shown in Figs. 2 and 4. The distributor, of conventional type, includes a case 28 of insulating material, carrying a plurality (four as shown) of contacts 29, and a rotatable brush 30, which is connected to high tension terminal 27 by a wire 31 and is operable to distribute the high tension current successively to the contacts 29. The brush 30 is mounted on a member 32 of insulating material and thereby insulated from the member which rotates it.

The elements thus far described cooperate in the usual manner. The magnetic rotor varies the flux through the elements 15. The flux passes through these elements in one direction, is then decreased and subsequently passed through the elements in an opposite direction, followed by another decrease of flux. An electromotive force is thus induced in the primary coil 16. This coil is normally in a closed electric circuit controlled by the breaker points 21 and 22, which open at the proper times (twice each revolution as shown) and induce a high tension current in the secondary coil 17. The high tension current is distributed by the element 30 to the high tension terminals 29 or in any other usual and suitable way.

Referring more particularly to the rotor construction, the magnets 19 (Fig. 6) are segregated into two groups which are spaced apart sufficiently to enable a supporting shaft 33, in the form of a hollow tube or sleeve, to pass between them. The magnets 19 and pole shoes 20, suitably interconnected to form a hollow box-like structure; are clamped between a pair of non-magnetic end plates 34 by a pair of bolts 35 and nuts 36 (Fig. 11). The heads of these bolts are specially formed to provide cylindrical driving pins 37, hereinafter referred to. These end plates 34 are centrally pressed out to form hollow hubs 38 into which the sleeve 33 is tightly pressed or otherwise fixed thereto.

An important feature of this invention relates to the mounting of the stationary and movable elements of the magnetic circuit, of the magneto. Both are supported from a common frame,—an upright, more or less plate-like member 38 (best seen in Figs. 4 and 10), which may have and preferably has an angular extension 39, integrally or otherwise fixed thereto, by means of which the magneto may be conveniently secured to an engine. Conveniently, the parts 38 and 39 are integral parts of an iron casting and the extension 39 forms a base for the magneto. Fixed at one end to and projecting from one side face of frame 38 is a stud 40 (Figs. 4 and 11) preferably hollow for reasons hereinafter to appear but not necessarily so for

all purposes. Stud 40 is turned down at one end (where it passes through frame 38) to form a shoulder, which squarely seats against one side face of frame 38 and is rigidly clamped thereto by a nut 41, threaded on one end of the stud and seating against the opposite side of the frame. This stud supports the rotor, the sleeve 33 of which is rotatably mounted on the outer peripheral surface of the stud. The members 15 are rigidly clamped to frame 38 by long cap screws 42, which pass through the members and through spacing sleeves 43 and thread into the frame.

In the case of the lower screws 42, these preferably pass through outer spacing sleeves 44 (Fig. 10) as well as the inner sleeves 43 and the sleeves 44 are received in and closely fit one in each of a pair of lugs 45' upstanding from base 39. The sleeves 44 are rigidly clamped to the members 15 by the screws 42 and form cylindrical projections which fit in the lugs and prevent the members 15 from being sprung inwardly near their lower ends by the strong magnetic pull of the rotor.

Preferably, the screws 42 are somewhat smaller in diameter than the holes in member 15, sleeves 43 and 44, through which they pass. This enables lateral adjustment of the members 15 to bring their upper inturned ends into close abutment and to bring their lower curved faces 18 into proper relation with the rotor. For example, with the screws 42 in place and lightly holding the members 15 to frame 38, a dummy rotor, having a diameter slightly greater than that of the actual rotor, is inserted between the curved faces 18. The members 15 are then forced laterally toward one another to bring their upper inturned ends into abutment and their curved faces 18 against the dummy rotor. The screws 42 are then completely tightened to clamp the members 15 in place, the dummy rotor is withdrawn and the actual rotor inserted in place. The surfaces 18 will then lie in true concentric relation with the periphery of pole shoes 20 and slightly spaced therefrom by an air gap which may be, and desirably is, very small. Another, and sometimes preferable, way is to use a dummy rotor of less diameter than the actual rotor. After the members 15 have been clamped as described and the small dummy rotor removed, the surfaces 18 may be machined, as for example by grinding. In this operation, the stud 40 will be removed and its receiving hole in frame 38 will serve as a guide to receive the pilot of the grinding wheel. In this way, the desired true concentricity of the rotor and surfaces 18 and an exceedingly close running fit therebetween may be secured with precision. The supporting of both the movable and stationary elements of the magnetic circuit wholly from one and the same side face of the frame 38, leaves these elements wholly exposed on one side and ac-

cessible for machining in the manner last described.

As a means for driving the timer, and also the distributor where one is desired, a shaft 45 (Fig. 4) is provided. This shaft is connected to the rotor at one end, extends through the hollow stud 40 and at its other end, which lies on the opposite side of frame 38 to that on which the magnetic elements are mounted, carries a cam 46 to operate a breaker lever 47 carrying the movable breaker point 22. Conveniently, the connection between shaft 45 and the rotor may be effected by means of a flanged, cup-like cover 48 which completely closes and conceals the otherwise open outer end of both stud 40 and sleeve 33. The flanged part of cover 48 is secured by screws 49 to the outer end plate 34 of the rotor and the connection between these elements is made oil tight in any suitable way. The shaft 45 passes through the cover and is preferably flattened, as indicated in Fig. 3, to resist relative rotation between these elements. The outer end of shaft 45 is threaded to receive a nut 50 by which the cover 48 is clamped to the shaft. This shaft is likewise journaled within the hollow stud 40. As shown, a single bearing 51, arranged near the inner end of the stud, suffices for the purpose since the load on the shaft is small,—being simply that necessary to turn the movable elements of the timer and distributor.

When the distributor is used, gearing is necessary to drive it from shaft 45. As shown in Fig. 4, a small gear 52, suitably fixed to the shaft 45, drives a larger gear 53 (as shown, one having twice the pitch diameter of gear 52). Gear 53 has a hollow hub 54, mounted to turn on a stud 55, fixed to frame 38 by a nut 56. The outer end of hub 54 is closed to prevent escape of oil into the distributor and the supporting member 32 of the distributor brush is suitably secured to and driven by such hub. The gears are entirely enclosed within a case formed between the frame 38 and a casting 57 suitably secured thereto. As shown, the casting 57 is secured by cap screws 58 and 58' (Fig. 2) and also by nuts 59 (Fig. 10) threaded on studs 60, which in turn are threaded into frame 38. The outer ends of studs 60 pass through the distributor case 28 and the latter is held against the outer face of member 57 by nuts 61 threaded on said studs. The members 38 and 57 afforded a complete enclosure for the gears and one which is oil tight except for the necessary openings into the distributor, timer and rotor support and, as to these, means are provided to substantially prevent escape of oil into the timer and distributor and to confine the oil supplied to the rotor support against escape from its intended channels.

The timer elements are mounted on a

frame 62 which lies against the outer face of member 57 (Fig. 4). A cup-shaped bushing 63, serving as an oil collector as will later appear, is pressed into member 57 and projects beyond said face and into an opening in the timer frame, serving as a pivot about which the frame may be turned to effect variations in timing. One or more arms 64 (Figs. 2 and 5) are provided on frame 62 by means of which the frame may be turned for the stated purpose. The frame has an arcuate slot 65 (Fig. 5), concentric with bushing 63, and a stud 66 threaded into member 57 extends through said slot and limits the extent of angular movement of the timer frame. The stud 66 and a washer 67 thereon also serve to hold the timer frame against endwise movement. The fixed breaker point 21 is adjustably fixed to frame 62 as indicated, and is in electrical connection therewith. Frame 62 has an insulated terminal 68 to which wire 26 is connected. The breaker lever 47 is of insulating material except for a metal conducting part 69 to which breaker point 22 is fixed. This part, however, does not engage the cam 46 or touch any uninsulated portions of the machine. A spring 70, which serves to force lever 47 toward cam 46, electrically connects the part 69 to insulated terminal 68. A cover 71 fits into a recess in frame 62 and cooperates therewith to completely house in the breaker point mechanism. The cover is held in place by any suitable means, as by a flat spring 72 which at one end is mounted on stud 58' so as to be free to turn about the axis thereof but held against axially endwise movement. The free end of spring 72 bears against cover 71 to yieldingly hold it in place.

It is obviously important to provide for the lubrication of the various moving parts described. It is not so obvious, however, as to how to provide for the lubrication of such parts without having the lubricant escape to unintended and undesired places and without having the efficacy of the lubricant impaired or even destroyed by the deleterious effects of ozone generated in the magneto. My invention makes special and important provisions for lubrication, for the protection of the lubricant against injury by ozone or other means and for the confinement of the lubricant in intended channels and the prevention of its escape into the timer and distributor and other parts of the machine.

Referring to Figs. 4 and 7, the lower part of the frame 38 is recessed to form a reservoir 73 for oil. This reservoir may, and preferably does, contain felt 74 or some other suitable absorbent. A longitudinally-directed oil groove 75 (Figs. 4, 6 and 11) is formed in the upper and outer periphery of stud 40. Means are provided for elevating oil from the reservoir and delivering it to groove 75 from whence it passes between the sleeve 33 and stud 40 to lubricate the same. A convenient oil elevator consists of a thin circular disc 76 (Figs. 4 and 7) mounted on shaft 45 and disposed between gear 52 and nut 41. This disc bears against the oil saturated felt 74 in the reservoir, receiving oil therefrom. A fixed wiper 77 bears against the back of the disc 76, near the upper peripheral portion thereof, and removes some of the oil carried thereby. An extension 78 (Fig. 4) of the wiper conducts the oil, flowing downwardly thereon, to the rearward end of groove 75. In the lower portion of the outer peripheral portion of stud 40 is a longitudinally-directed groove 79 containing a wick 80, one end of which extends downwardly into the reservoir 73 and between or at least in contact with the felts 74. This wick normally functions to absorb excess oil, supplied between sleeve 33 and stud 40, and to conduct the same back to the reservoir. Thus, there is a circulatory lubricating system for the rotor.

It is to be noted, however, that the wick 80 can likewise function to convey oil from the reservoir to the rotor and, on failure of the described oil elevating means, lubrication would be effected by the wick, thus affording a safeguard against failure of lubrication at the most vital point in the magneto.

The bearing 51 for shaft 45 likewise receives oil from groove 75 by way of a hole 81 drilled through the stud 40 and bearing. Surplus oil not used for lubricating this bearing can drain directly back into reservoir 73.

It will be clear that the cover 48 effectively prevents escape of oil onto the outer end face of the rotor and adjacent parts. The only other possible place where oil might escape from between the sleeve 33 and stud 40 is at the inner end of the former. Here, oil might work out between said inner end and frame 38 onto the outer periphery of the sleeve. This sleeve, however, has an "oil slinger" 83 tending to throw any such oil off into a surrounding oil collector 84 fixed to frame 38. A passage 85 in the latter serves to drain oil from the collector back into reservoir 73.

In the upper part of frame 38 and in back of the gear 53, a recess is formed to receive a mass of felt 86 (Figs. 4 and 7) or other suitable absorbent. This felt is retained in place by a member 87 of thin sheet metal, mounted on stud 55 in back of gear 53 and held in place between the latter and frame 38. Member 87 may be an integral extension of the wiper 77 and used to support the latter as shown. A wick 88 leads downwardly from the felt 86 and its lower end lies in a longitudinal groove 89 formed in stud 55 so as to lubricate the gear hub 54 which turns thereon. The felt 86 will be originally soaked with oil but, on the other hand, its supply of oil is continuous.

ally replenished from the reservoir 73. The gear 53 will carry up oil from disc 76 and some oil will be thrown upwardly directly by the disc. By each of these means oil is thrown into the upper part of the gear case and some of such oil is received and absorbed by felt 86. The latter may even wipe off some oil from the adjacent face of gear 53. The teeth of the gears will also be lubricated by oil received directly or indirectly from disc 76. There is thus a circulating oiling system to and from the reservoir 73 for each of the magneto parts which requires lubrication.

To substantially prevent escape of oil from the gear case into the timer, the hub of the timer cam is grooved as at 90 (Fig. 4) to throw off any oil, which may creep outwardly along it, and the collector 63 is provided to receive such oil as is thrown off. Oil from the collector 63 will drain back to the reservoir 73 between the inner end of the collector and the outer face of gear 52, there being sufficient clearance between these elements to permit this action.

Escape into the distributor of oil used to lubricate the bearing of gear 53 is prevented by the closed outer end of the hub 54. The opening 90' (Fig. 4) in member 57, through which the hub 54 passes, is made conical and of outwardly converging form. Pressed into the inner end of this opening is a washer 91 which cooperates with the conical openings to form a pocket, in which is collected any oil that may creep along the outside of hub 54. The lower end of the washer is cut away to form a drain opening 92. A large felt washer 93 is secured, as indicated in Fig. 8, to the outer face of gear 53 and this washer presses against the washer 91 to seal the opening between the gear case and distributor case, tending to prevent escape of oil from the gear case and escape of ozone from the distributor case into the gear case. Ozone eventually renders oil unfit for lubricating purposes.

Referring now to the driving means for the magneto, the driving pins 37 on the outer and exposed end face of the rotor afford a convenient means for connection to any driving means desired. The shaft of such driving means may carry similar pins, such as 94 (Fig. 4) and the two sets of pins may be connected by a flexible coupling, such as the leather disc 95 (Fig. 4). In this way, the shaft of the driving means, although journaled independently of the magneto, may be connected to drive the latter without the necessity for exact alignment with the axis of the rotor.

In many cases, an impulse drive of the magneto may be desired and, where this is the case, I provide as one complete and independent unit, an impulse coupling which may be interposed between the rotor of the magneto and the engine shaft from which it

is to be driven. This impulse coupling is entirely supported from a frame 96 (Fig. 9) and is adapted to be attached, as by cap screws 97, to one end of the magneto frame, as shown in Figs. 1 and 4. Frame 96 has a bearing 98 (Fig. 4) to support a shaft 99, which is adapted for connection to an engine shaft or other suitable driving means. Shaft 99 is fixed to the driver element of the impulse coupling,—such element being indicated conventionally at 100 and the driven element at 101. The latter carries the pins 94 for connection with the flexible coupling disc 95. The disc 95 is also resilient and serves to absorb the shocks incident to the intermittent operation of the rotor by the spring impulse mechanism. The latches for the impulse driving device are indicated at 102 (Fig. 9) and frame 96 has mounted therein an abutment 103 with which the latches may successively engage to arrest the element 101 while the impulse spring 104 (Fig. 4) is being wound up. After such spring has been duly stressed, the latch, which has theretofore held element 101 against rotation, is released and a quick sharp turn is imparted to said element and the magneto rotor.

Frame 96 also carries a reservoir for oil, such reservoir being filled with felt 105 (Fig. 4). In contact with the latter is a wick 106 leading upwardly to bearing 98 and received in a longitudinal groove therein for lubricating shaft 99. Oil escape means, indicated at 107 and 107', are provided at the ends of bearing 98. The reservoir is formed in a recess in the inner face of frame 96 and this recess is closed, oil tight, by a thin metal plate 108.

The entire mechanism described is preferably housed in except for the timer and distributor, which have independent housings readily removable for convenient access thereto, and except for the protruding end of shaft 99. Such housing in is conveniently accomplished by casing sections 109 and 109' of thin non-magnetic metal, appropriately pressed out or otherwise formed to fit about and enclose the parts between the frames 38 and 96.

The abutment 103 of the impulse coupling is mounted to be turned in frame 96 from the position illustrated in Fig. 9 to a position in which the cut away portion 110 of the abutment lies adjacent the periphery of member 100. The latches 102 cannot then strike on the abutment 103 to arrest member 101 and accordingly the impulse mechanism is cut out of action, resulting in direct drive of the rotor from shaft 99. A lever 111 secured to a shaft 112, mounted in frame 96 and carrying abutment 103, is provided as a convenient means for moving the abutment from spring drive position to direct drive position or vice versa.

The operation, in so far as the magnetic and electrical features are concerned, is or

may be the same as in other magnetos of similar type and has been sufficiently considered in the foregoing description.

It is to be noted that the magneto construction possesses a wide range of flexibility, in the sense that it may readily be adapted to suit various types of engines because of its unit construction. The unit idea is carried out even in the construction of the main fundamental magneto unit. That is, the stationary element of the magnetic circuit is made up in two similar units 15, the coils 16 and 17 constitute another unit, the rotor a third unit, and the frame 38 a fourth unit. While the unit construction, thus far described, is important, I carry the unit idea beyond this point and add to the fundamental magneto unit, which comprises the several units just described, other units enabling the fundamental one to be adapted for various types of engines. For example, the impulse coupling unit, complete in itself with all parts carried by the one frame 96, may be readily added to the standard fundamental magneto unit to adapt the magneto for satisfactory operation with engines of relatively slow speed. For relatively high speed engines, the impulse unit may be omitted. So also, the gear case, with the distributor thereon, may readily be added to frame 38 to adapt the magneto for multi-cylinder work. For single cylinder work, these parts would be omitted and a member carrying the interrupter would be fastened to frame 38 in place of the gear case member 57. I have shown the complete combination of all the units but it will be readily appreciated that the impulse driving unit may sometimes be omitted and that the distributor, gear case and gearing may also in certain cases be omitted.

The lubrication provisions are considered important. Many of the common troubles in magnetos can be traced to excess, faulty or insufficient lubrication and the improvements of this invention prevent such troubles. Something more than an ordinary lubrication problem is involved. It is necessary, and much more so than ordinarily, to closely confine the lubricant to the desired channels. There are electrical parts, which would not continue to function properly if subjected to lubricating oil. There are wires and terminals and insulation which would be damaged by oil. The means described effectually confines the oil to the normal channels of the circulatory lubricating system and prevents its escape to the timer, distributor, coils, wiring and terminals. Then, also, there is the desire to provide for automatic lubrication and avoid placing reliance on manual lubrication which may be carelessly performed, if not neglected. To accomplish this object, lubricant is supplied once for all time to the reservoirs and this supply must not only be

preserved against loss by leakage but it must be maintained in effective condition. The lubrication system must be protected against contamination due to ingress of dust, dirt or other foreign matter but, more important still, it must be protected against the rapid deterioration which ensues when ozone, such for example as is generated in the distributor case, finds its way into some channel of the lubricating system. The lubricating means, above described, effectively accomplish all these objects.

The mounting of the rotor is most important. To a certain extent it contributes to the solution of a vexing part of the lubrication problem, as will be appreciated. Its major importance, however, is in making commercially feasible the use of an exceedingly close running fit between the rotor and members 15 and thereby enabling greater efficiency to be secured from given materials than would be possible with the usual and larger clearances between these relatively movable parts. First, the rotor is so mounted as to be entirely independent of the engine shaft which drives it and is so connected to such shaft that its perfect adjustment cannot be disturbed by any lack of alignment or uneven running of the engine shaft. Second, a single bearing is used, eliminating the difficulty in aligning two bearings, such as are usually used, within sufficiently close limits to permit the use of the close fit between the rotor and members 15. Third, this one bearing, stud 40, is rigidly fixed to the same member 38 to which the members 15 are fixed.

From a manufacturing standpoint, the latter arrangement is of great importance. The hole for the stud 40 and the holes for cap screws 42 can be bored at the same time so as to assure correct spacing and true alignment. Then also, the arrangement enables the surfaces 18 of members 15 to be finished, after the members have been clamped to frame 38, with precision and in true concentricity with the rotor bearing by using the receiving hole for stud 40 as a guide for the pilot of the grinding wheel or other finishing tool. The finishing of the stud 40 and the rotor involve simple machining operations, easily accomplished. It will be noted that the machine operations necessary to secure the result are few and simple and capable of being accomplished expeditiously and at low cost. There is, as an incident to the arrangement, a resulting advantage of manufacturing economy. In addition, there is the more important advantage that the arrangement enables the attainment of the desired result of closeness and precision of fit between the rotor element and the fixed element of the magnetic circuit. This is of vital importance. These relatively movable elements must be accurately located with respect to each other and the described arrangement enables the

result to be obtained effectively and without undue manufacturing expense.

It is to be noted that these relatively movable elements, once mounted, need not ordinarily be disturbed. The other magneto accessories are added on and built around the fundamental parts described, and supported independently thereof. Particularly, all connections of moving parts to the rotor are such as not to interfere with its perfection of adjustment between the rotor and the fixed magnetic element. The distributor, timer, gear case, timer driving shaft, lubricating system and impulse drive may be removed without at all disturbing the mounting of the rotor. It will be apparent that this feature is of great importance in servicing the magneto. The replacement of any of the parts removed for servicing, even though done carelessly or with lack of skill, cannot disturb the carefully adjusted, close fitting relationship between the relatively movable parts of the magnetic circuit.

What I claim is:

1. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a stud fixed to and projecting from said frame, said movable element being journaled on the exterior of said stud, an independently journaled driving member axially spaced from the stud and having an end face movable adjacent an end face of the movable element, and interengaging means between said end faces for driving the movable element from said member.

2. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a stud fixed to and projecting from said frame, said movable element being journaled on the exterior of said stud, an independently journaled driving member axially spaced from the stud and having an end face movable adjacent an end face of the movable element, and flexible coupling means between said member and movable element.

3. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a stud fixed to and projecting from said frame, said movable element being journaled on said stud, driving means including spring impulse mechanism mounted in axially spaced relation with said movable element and stud, and coupling means between said mechanism and movable element including a resilient shock absorbing element.

4. In a magneto, stationary and movable

elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a stud fixed to and projecting from said frame, said movable element being journaled on said stud, a member attached to said frame, a spring impulse driving mechanism supported from said member and affording with the latter a complete and independent unit, and a flexible and resilient coupling interconnecting said mechanism and movable element.

5. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a hollow stud fixed to and projecting from one side of said frame, said movable element being journaled on said stud, interrupter mechanism disposed on the other side of said frame, and a shaft secured to said movable element and extending through said hollow stud to operate said mechanism.

6. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a hollow stud fixed to and projecting from one side of said frame, said movable element being journaled on said stud, interrupter mechanism disposed on the other side of said frame, and a shaft secured to said movable element and extending through said hollow stud to operate said mechanism, said shaft being journaled in said stud.

7. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a hollow stud fixed to and projecting from one side of said frame, said movable element being journaled on said stud, means cooperating with the other side of said frame to afford a completely enclosed gear case, a timing and a distributing device mounted on said means outside said case, a drive shaft connected to said movable element and extending through said hollow stud and case to operate one of said devices, and gearing in said case for operating the other of said devices from said shaft.

8. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a stud fixed to and projecting from said frame, and a sleeve fixed to said movable element, journaled on the exterior of said stud and having its outer end closed.

9. In a magneto, stationary and movable elements effective on relative movement to

- produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a hollow stud fixed to and projecting from one side of said frame, a sleeve fixed to said movable element and journaled on said hollow stud, one end face of said sleeve engageable with said side of said frame to restrain axial movement of the sleeve in one direction, a cap fixed to the outer face of the movable element and closing the other and outer end of said sleeve and the corresponding end of said hollow stud, and a member extending through said hollow stud for connecting said cap to the other side of said frame to restrain axial movement of the sleeve in the other direction, said member interengaged with both cap and frame and relatively rotatable with respect to one thereof.
10. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a stud fixed to and projecting from one face of said frame, a hollow shaft fixed to said movable element and mounted to turn on said stud with one end face running in close proximity to said face of said frame, means for carrying lubricant along the stud from its fixed end toward the free end thereof, means closing the other end face of said hollow shaft to prevent escape of lubricant at the free end of said stud, and means near the fixed end of said stud to prevent escape of lubricant between said faces of the frame and hollow shaft.
11. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a stud fixed to and projecting from one face of said frame, a hollow shaft fixed to said movable element and mounted to turn on said stud with one end face running in close proximity to said face of said frame, a reservoir for lubricant, means for carrying lubricant from said reservoir to and along the outer periphery of said stud from the fixed end toward the free end thereof, means closing the other end face of said hollow shaft to prevent escape of lubricant at the free end of said stud, and means near the fixed end of the stud for collecting lubricant and returning it to said reservoir.
12. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a stud fixed to and projecting from one face of said frame, a hollow shaft fixed to said movable element and mounted to turn on said stud with one end face running in close proximity to said face of said frame, means for circulating lubricant along the outer periphery of said stud from the fixed end toward the free end thereof and back again, means closing the other end face of the hollow shaft to prevent escape of lubricant, and means near the fixed end of said stud to prevent escape of lubricant between said faces of the frame and hollow shaft.
13. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a stud fixed to and projecting from one face of said frame, a hollow shaft fixed to said movable element and mounted to turn on said stud, said stud having a groove in the upper part of its outer periphery and another groove at a lower part of its outer periphery, a lubricant reservoir, means to elevate lubricant from the reservoir and feed it into said first named groove, and a wick disposed in part in the second named groove and extending to and into said reservoir.
14. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame on one face of which said elements are supported, a member secured to said frame and cooperating with an opposite face thereof to form a completely enclosed gear case, a timing and a distributing device supported by said member outside said case, a shaft connected to said movable element and extending through said case to operate one of said devices, and gearing in said case for operating the other of said devices from said shaft.
15. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame on one face of which said elements are supported, a member secured to said frame and cooperating with an opposite face thereof to form a completely enclosed gear case, a timing and a distributing device supported by said member outside said case, a shaft connected to said movable element and extending through said case to operate said timer, gears in said case one of which is fixed to said shaft, a stud fixed to said frame and projecting into said case to support the other gear, the latter having a hollow hub projecting through the gear case into the distributor case and closed at its outer end, and means for sealing the opening through which said hub passes against passage of ozone from the distributor to the gear case and against passage of oil from the gear case to the distributor.
16. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame

on one side face of which said elements are supported, a member secured to said frame and cooperating therewith to form a completely enclosed gear case, a timing and a distributing device supported by said member outside said case, a shaft connected to said movable element and extending through said case to operate one of said devices, intermeshing upper and lower gears in said case for operating the other of said devices from said shaft, said frame having in its second named face and within the gear case upper and lower recesses forming lubrication reservoirs one adjacent each gear, oil absorbing material in each reservoir, an oil elevating device disc carried by and movable with said shaft and located between the lower gear and the reservoir, said device contacting with the absorbent material in the lower reservoir and with one face of the upper gear, a support for the upper gear, and a wick extending from the upper reservoir into said support to lubricate the same.

17. In a magneto, stationary and movable elements effective on relative movement to produce a change of flux and cause the generation of an electromotive force, a frame supporting the stationary element, a hollow stud fixed to and projecting from one face of said frame and supporting said movable element, a groove in the upper and outer peripheral portion of said stud extending through said frame from its fixed end to the free end thereof, a shaft connected to the movable element and extending through said stud and beyond the opposite side of said frame, a member secured to the last named side of said frame and cooperating therewith to form a closed lubrication chamber, the lower portion whereof contains lubricant, a disc on said shaft receiving lubricant from the lower part of the chamber and elevating it, and a device supported in said chamber in contact with the upper part of said disc to remove lubricant therefrom and direct it into the groove in said stud adjacent the fixed end thereof.

In testimony whereof I have affixed my signature.

TERRENCE G. LOUIS.