

1,296,006.

A. PRESS.
SPARK ENERGIZER.
APPLICATION FILED JUNE 11, 1917.

Patented Mar. 4, 1919.
2 SHEETS—SHEET 1.

Fig. 1.

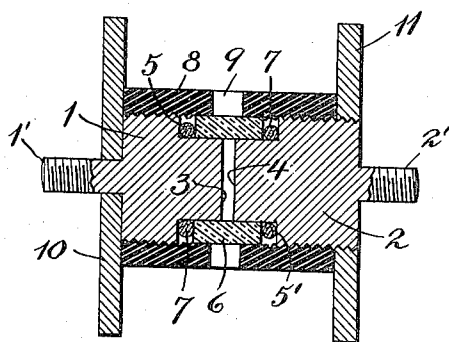
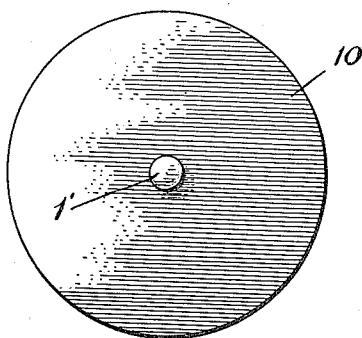


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

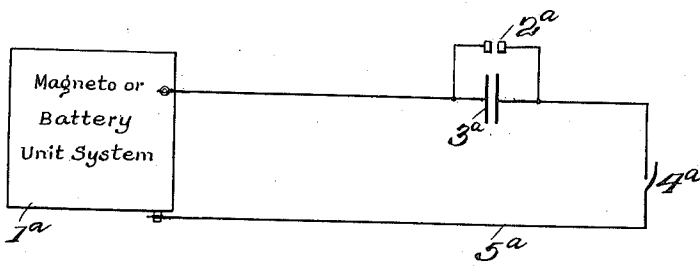


Fig. 4.

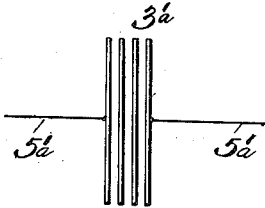
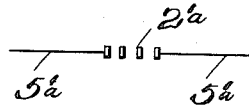


Fig. 5.



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UNITED STATES PATENT OFFICE.

ABRAHAM PRESS, OF WASHINGTON, DISTRICT OF COLUMBIA.

SPARK-ENERGIZER.

1,296,006.

Specification of Letters Patent.

Patented Mar. 4, 1919.

Application filed June 11, 1917. Serial No. 174,006.

To all whom it may concern:

Be it known that I, ABRAHAM PRESS, a citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Spark-Energizers, of which the following is a specification.

This invention relates to electric ignition systems or methods for gas engines or the like and more especially to such systems or methods where auxiliary devices are employed to increase the effectiveness of the ignition.

Heretofore series gaps have been proposed to produce ignition even where fouling occurs at the plug. Thus in U. S. patent issued to Lodge 869,208 Oct. 22, 1907, not only is a series gap disclosed but it also discloses such a gap accompanied by a condenser. (See Fig. 3 of the above patent.) A number of equivalent arrangements are also proposed but in no case has it been intimated or known that the auxiliary gap discharge wherever employed must have a quenching characteristic to produce the best results. In fact when testing magnetos or the like a spark at the points of the spark plug was never considered of proper quality except it showed considerable vaporization quality. This was usually tested by either of two methods known to the art, viz:—directing a current of air across the points to spread out and make visible the vaporization actually taking place or what is equally effective, to swing a mirror glass so that the spark is shown spread out as it were. The head of the spark is always whitish, indicating a disruptive discharge characteristic, whereas the trail or tail as it were indicated vaporization by its yellowish green color.

One of the things I have discovered is that in ignition the vaporization characteristic can do positive harm whenever it is required to fire a plug that is fouled to any degree. The object of auxiliary devices is to force a plug to fire that is fouled and therefore the present invention is an improvement over the Lodge disclosure above cited. This is because if a vaporization characteristic is present the range of possible sparking of a fouled plug is materially reduced whereas if the vaporization is quenched, that is suppressed substantially, the range of effectiveness of the plug

even with considerable fouling is materially increased. This quenching action can be made visible at the spark plug points by merely swinging a piece of mirror glass so that the spark appears drawn out to the naked eye.

The theory of energizer circuits has been little understood or developed, and in consequence many crudities have held sway. The following working theory of sparking is proposed which, after all, seems very reasonable when all the conditions are taken into account.

Two types of spark gap conduction are conceived to exist—the vaporizing type, and the dielectric conductive type. With the vaporizing type the flow of the electric current is through the vapor produced at the electrodes. This results in pitting and eating away of the electrodes with consequent consumption of energy, etc. It is the second type of spark gap conduction, in the controlling energizer that I have found to be desirable, for then the type of spark is whitish, or bluish white in character and the electrodes of the energizer gap are not eaten away because vaporization does not take place.

In the subjoined invention, therefore, massive electrodes are proposed so as to keep the surface electrodes cool and since vaporization is thereby reduced to a minimum, or to a practically negligible degree, not only will greater efficiency result by using such a spark gap in series, but because the extended and heat conducting surfaces are in a substantially air tight region, this type of energizer gap control will, in fact, result in the very kind of air gap discharge in the engine spark gap that is most conducive to exploding the mixtures usually obtaining in explosive engines.

By the above means, therefore, it is possible to obtain an energizer that will not be eaten away, that will keep its adjustment at all times relative to the spark plug gap and at the same time employ the least amount of energy for its operation. This sort of result can also be approached by the so-called rotary gaps.

The invention will be better understood by the subjoined description when taken in conjunction with the accompanying drawings.

Figure 1 is a sectional view of one form

of the energizer and Fig. 2 is an end view of the same.

Fig. 3 of Sheet 2 represents a diagrammatic view of the several elements of a jump spark gap system with capacity effect however of the quenched gap shown parallel with the sparking electrodes of the auxiliary gap.

Fig. 4 is a conventional representation of a quenched gap as used in wireless telegraphy.

Fig. 5 indicates a form of quenched gap analogous to that shown in Fig. 4 with however less extended surfaces.

In Fig. 1 two metallic studs 1 and 2 are shown with flat and polished surfaces 3, 4 in juxtaposition. Recesses 5, 5' are provided for a glass ring or the like 6 which latter together with gaskets 7 form an airtight joint when assembled within a fiber sleeve or the like 8 having sight openings 9 arranged therein.

The interior of the sleeve 8 is screw threaded to mate with the threaded drums of the studs 1 and 2 forming the electrodes. Threaded shanks 1' and 2' are provided integral with said studs for the assembling of locking nuts 10 and 11, etc. In this way an integral substantially airtight structure is easily provided. Preferably the lock nuts 10 and 11 have diameters greater than that of the sleeve 8, for in this manner the lock nuts act as cooling flanges for the studs or electrodes.

In assembling, the stud 1 may be first screwed into the sleeve 8. Then the locking nut 10 can be employed to fasten the stud to one end of the sleeve. Naturally the sight openings should preferably be in line with the sparking space provided between the stud 1 and the cooperating stud 2 which is later to be introduced into the same sleeve 8. Upon the stud 1 is arranged a gasket 7, and then the glass ring 6 or the like slipped into place, thereafter a further gasket is provided for the stud 2 which latter is adjusted within the sleeve 8 and lock nutted by means of the nut 11.

Instead of glass transparent bakelite or the like can be employed, which latter material can also be used for the sleeve 8 though in either case some dielectric can be used which has a considerable brush leakage value for the sparking potential employed between the two studs 1 and 2 and yet be below the break down pressure of the gap between the said studs. It follows, therefore, that once the break down pressure is available a parallel path may be afforded to the flow of current by means of the solid dielectric.

It is obvious that the above type of energizer can be made available for immediate connection to any of the existing types of spark plugs and can in fact form immedi-

ate thermal-conductive relationship with said spark plugs.

In Fig. 3 is shown the conventional form of ignition circuit in which a quenched gap 2^a, 3^a, is inserted in series with a spark plug 70 diagrammatically represented by 4^a and connected to a high tension magneto or battery 1^a by means of leads broadly indicated by 5^a. In the above figure part of the capacity effect of the quenched gap is separately indicated by means of the condenser 3^a. With a practicable design of quenched gap all of the necessary capacity would be due to the surfaces of the electrodes constituting the gap 2^a.

In Fig. 4 the usual representation of a wireless telegraphic quenched gap 3^{a'} is given with the connecting leads 5^{a'}. However the matter of the requisite amount of extended surface is purely a question of design. Thus in Fig. 5 considerably less extended surface is indicated than would relatively be necessary when quenching large currents used in wireless telegraphy. The main thing is that to obtain the best results such a quenched gap is necessary as will give the non-vaporizing characteristic of the quenched gap as first used in wireless.

It is to be understood that within the scope of the above invention is the production of a quenched gap wherein by extending the size and number of the surfaces a non-vaporizing dielectric discharge characteristic will be attained.

What I claim is:

1. A system for increasing the ignition effectiveness of fouled plugs comprising a spark plug, an electrical circuit for said plug and means associated therewith to give to said plug circuit the non-vaporizing characteristic of a quenched gap.

2. Means to discharge explosive mixtures in engine cylinders comprising a spark plug, a quenched gap, electrical connections placing said gap in series with said spark plug, said quenched gap having extended surfaces with a sparking region spaced sufficiently far apart to give to said gap the non-vaporizing characteristic of a quenched gap.

3. A system for increasing the ignition effectiveness of fouled plugs comprising a spark plug, an electrical circuit for said plug, and a wireless telegraphic quenched gap in series with said spark plug to give to said plug circuit the non-vaporizing characteristic of a quenched gap.

4. In combination with an ignition circuit having a spark plug therein, a quenched gap in series with said ignition circuit comprising electrodes with extended surfaces having a surface area equal to at least four times the square of the separation distance.

5. In combination with a spark plug, a quenched gap device, electrical connections to place said device in series with said plug,

said quenched gap device having electrodes with extended surfaces and having a surface area equal at least to four times the square of the separation distance.

5 6. In combination with an ignition circuit having a spark plug therein, a quenched gap device in series with said ignition cir-

cuit comprising electrodes with extended surfaces having a surface area at least four times the square of the separation distance, 10 and cooling flanges for said electrodes.

In testimony whereof I affix my signature.

ABRAHAM PRESS.