

C. L. SILVA.  
IGNITION SYSTEM FOR INTERNAL COMBUSTION ENGINES.  
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995,489.

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Fig. 1.

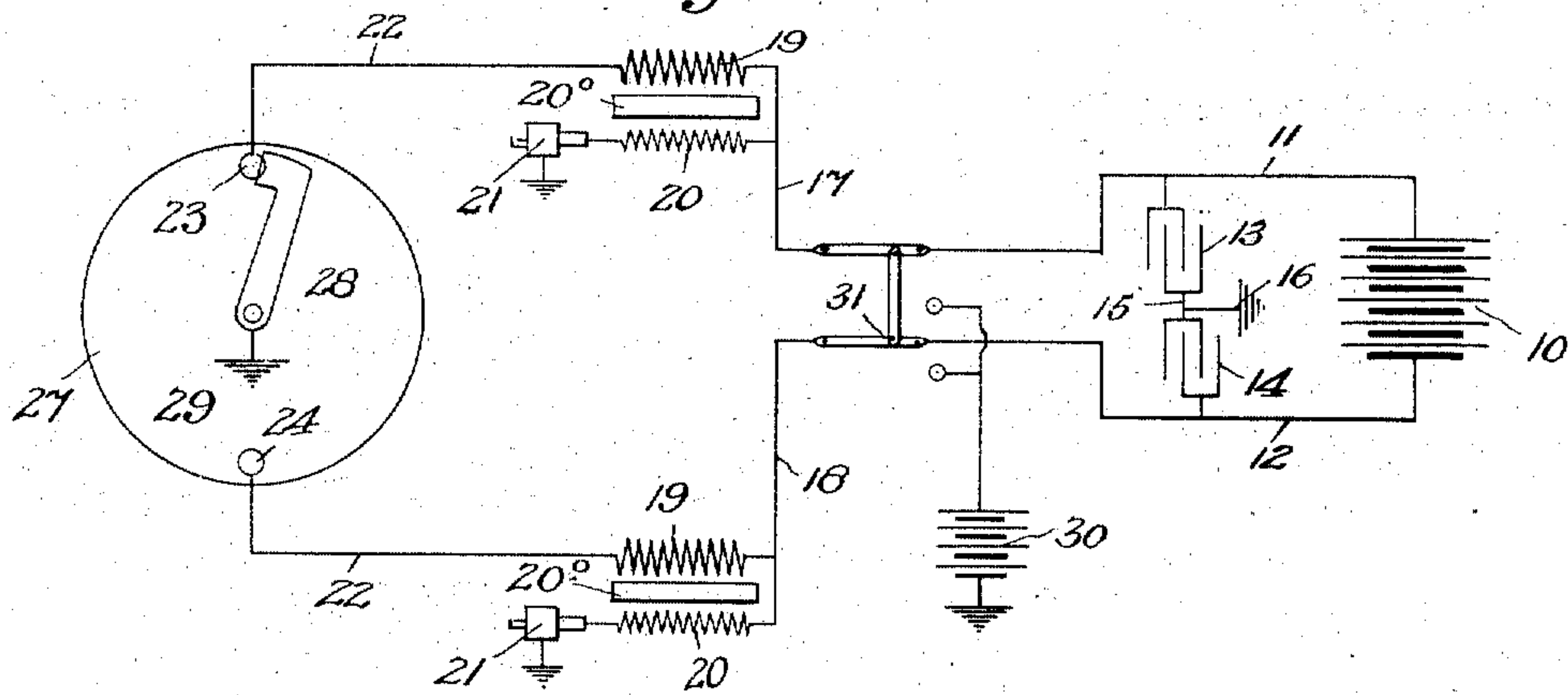
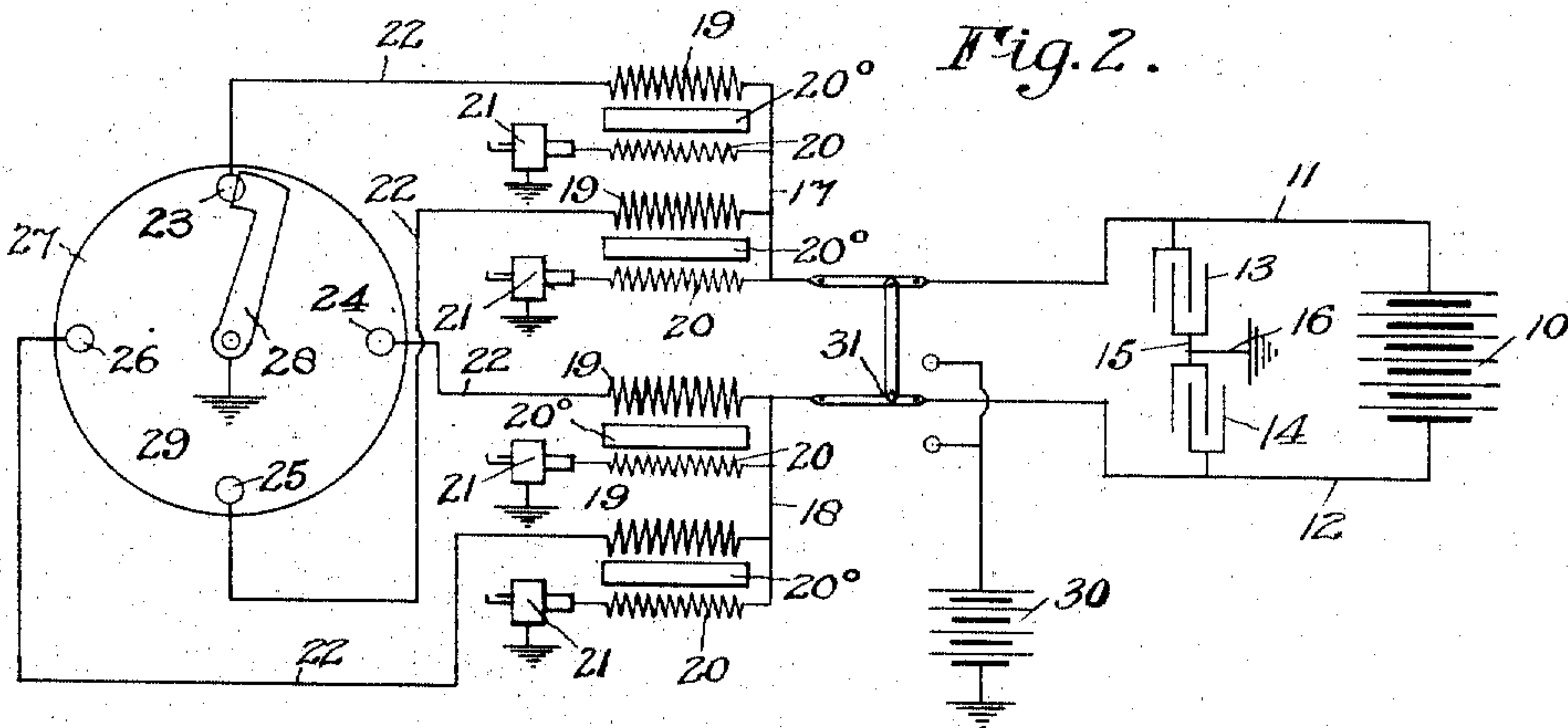


Fig. 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

CLAUDE L. SILVA, OF SAN DIEGO, CALIFORNIA, ASSIGNOR OF TWENTY-FIVE AND ONE-HALF ONE-HUNDREDTHS TO PERCY J. BENBOUGH AND FORTY-NINE ONE-HUNDREDTHS TO H. COON, JOHN A. GILLONS, CLAIR A. NELSON, N. H. HARGRAVE, W. V. O'FARRELL, D. A. GARRA, LYMAN P. OWEN, A. O. WALKER, N. D. KUHLMAN, F. M. MADISON, V. E. HAWKINS, I. T. BROCKETT, AND P. J. BENBOUGH, ALL OF SAN DIEGO, CALIFORNIA.

## IGNITION SYSTEM FOR INTERNAL-COMBUSTION ENGINES.

995,489.

Specification of Letters Patent. Patented June 20, 1911.

Application filed February 23, 1910. Serial No. 545,266.

*To all whom it may concern:*

Be it known that I, CLAUDE L. SILVA, a citizen of the United States, residing at San Diego, in the county of San Diego and State of California, have invented certain new and useful Improvements in Ignition Systems for Internal-Combustion Engines, of which the following is a specification.

My present invention relates generally to ignition systems for internal combustion engines and more particularly to an improvement upon the system shown and described in my pending application filed May 21, 1909, and serially numbered 498088 which embodies a single condenser which alternately charges and discharges upon successive contacts made at the timer, and in which it is necessary to provide the timer with two segments for the spark plug of each engine cylinder.

The object of my present invention is, therefore to provide an improvement with respect to the adaptation of my improved system to the use of timers which are employed on present systems and thus obviate the use of additional segments as above mentioned. I accomplish this primarily by the use of two condensers which are connected in series and charged from a suitable source of constant current of uniform potential, and by arranging the circuits whereby at the make of each thereof, one of these condensers is discharged and the other is charged, this operation alternating throughout the cycle of operations.

In the accompanying drawing, Figure 1 is a diagram of my improved apparatus as applied to a two-cylinder engine, and, Fig. 2 is the same as applied to a four-cylinder engine.

Referring now to these figures, 10 represents a battery supplying a constant current through conductors 11 and 12 which are bridged adjacent said battery by the condensers 13 and 14, connected in series by a wire 15 from which leads ground wire 16. Thus, initially, the potential in each of the condensers is equal to one-half that of the current supply means or battery 10, which latter may, of course be a generator to be

driven without definite relation to the engine.

The conductors 11 and 12 lead current through the split and separated portions 17 and 18 of the bus-bar and through the primaries 19 of the spark coils which induce into their respective secondaries 20 and raise the potential sufficient to cause a spark to jump the gap in their respective spark plugs 21. From the primaries 19, the current leads through conductors 22 to the respective segments 23, 24, 25 and 26, of the timer 27, the rotating brush 28 of which is grounded at 29.

The operation is as follows: Condenser 13 is at zero potential when the timer brush 28 is contacting with segment 23 and condenser 14 has the potential of the battery 10 due to the current flowing from battery 10, over conductor 11, through switch 31, into conductor 17, through induction coil 19, over conductor 22, to timer contact 23, into timer brush 28, thence through ground wire 29, thence to ground wire 16, through common conductor 15, into and through condenser 14, over conductor 12, into battery 10, thus completing the circuit with battery 10. This causes condenser 14 to rise in potential to that of the battery 10. As the timer brush 28 revolves and makes contact with segment 24 of the timer, and at the instant of contact, current flows from condenser 14, over line conductor 12, switch 31, and conductor 18, into induction coil 19, through timer contact 24 into timer brush 28, into ground wire 29, and through ground wire 16, into common conductor 15, completing the circuit of condenser 14, causing this condenser to rapidly fall to zero potential. As the potential of condenser 14 falls, lines of force thread through secondary coil 20 inducing current, by induction therein, of sufficient voltage to jump the spark plug 21, causing a spark thereby. At such a time thereafter current flows from battery 10 into switch 31, through conductor 18, primary winding 19, into conductor 22, through contact 24 of timer, into brush 28, to ground wire 29, into and through condenser 13, over conductor 11, charging condenser 13 to potential of the battery 10. As



the timer continues to revolve, it makes contact with segment 23, causing condenser 13 to discharge, creating a spark thereby. This completes a full cycle. Obviously then, the  
 5 second or condenser-charging current flowing in opposite relation to the first or discharging current, and both thereof being through the primary of the respective coil, has a further beneficial effect in that it effi-  
 10 ciently demagnetizes the core 20° of said coil.

The operation having been made clear, it is thought best to call attention to the fact that each charge and discharge of energy is  
 15 upon the make, doing away with all arcing attending those systems which spark upon the break, and that the discharge is instantaneous and develops a very hot spark of unvarying intensity which will ignite a weak  
 20 or poor mixture and will jump through oil or a dirty-plug. This is due in part to the absence of mechanical devices such as cams, relays, vibrators and contacts which depend  
 25 upon their proper adjustment for successful operation.

In installing my improved system where a present system is in operation, the only change to be made in the latter is to split its bus-bar to receive the current conductors,  
 30 and this, together with the absence of all expensive parts such as magnetos insures a low first cost, while the fact that there is nothing to be adjusted, no lagging to be compensated, or remedied, and that the cur-  
 35 rent consumption is strictly in accordance with the number of ignitions made, insures an economical maintenance.

A dual or alternative system may be created by supplying a battery 30 to be cut in  
 40 by means of a double pole, double throw switch 31 in the conductors 11 and 12, and with this arrangement the system operates through the ordinary vibrators. With the condensers cut in, however, the discharge is

so rapid that the vibrator has not time to oscillate, and this fact eliminates the time constant that every vibrator has and permits synchronous sparking with relation to the position of the pistons of multi-cylinder engines. 50

I claim:

1. In an ignition system, a current source, two condensers in series having their neutral point grounded and their free terminals connected to the current source, an induc- 55  
 tion coil having its primary and secondary winding connected to a pole of the current source, an ignition device in the secondary circuit, and a timer in the primary circuit.

2. In an ignition system, a source of cur- 60  
 rent, two condensers in series having their middle point grounded and their free terminals connected to the current source, induction coils the primaries of which are connected to the current source, ignition devices 65  
 connected to the secondaries of the induction coils, and means for producing a discharge of one condenser through the primary winding of a coil and at the same time causing the other condenser to receive the full poten- 70  
 tial of the current source.

3. In an electric ignition system, a current source, a pair of condensers in series having their middle point grounded and their free terminals connected to the current source, a 75  
 timer having a ground connection, contacts controlled by said timer, induction coils having their primaries connected to the current source and to the aforesaid contacts, and ignition devices connected to the second- 80  
 aries of the induction coils.

In testimony whereof I affix my signature in presence of two witnesses.

CLAUDE L. SILVA.

Witnesses:

F. A. BARRON,  
 E. F. CAMP.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."