

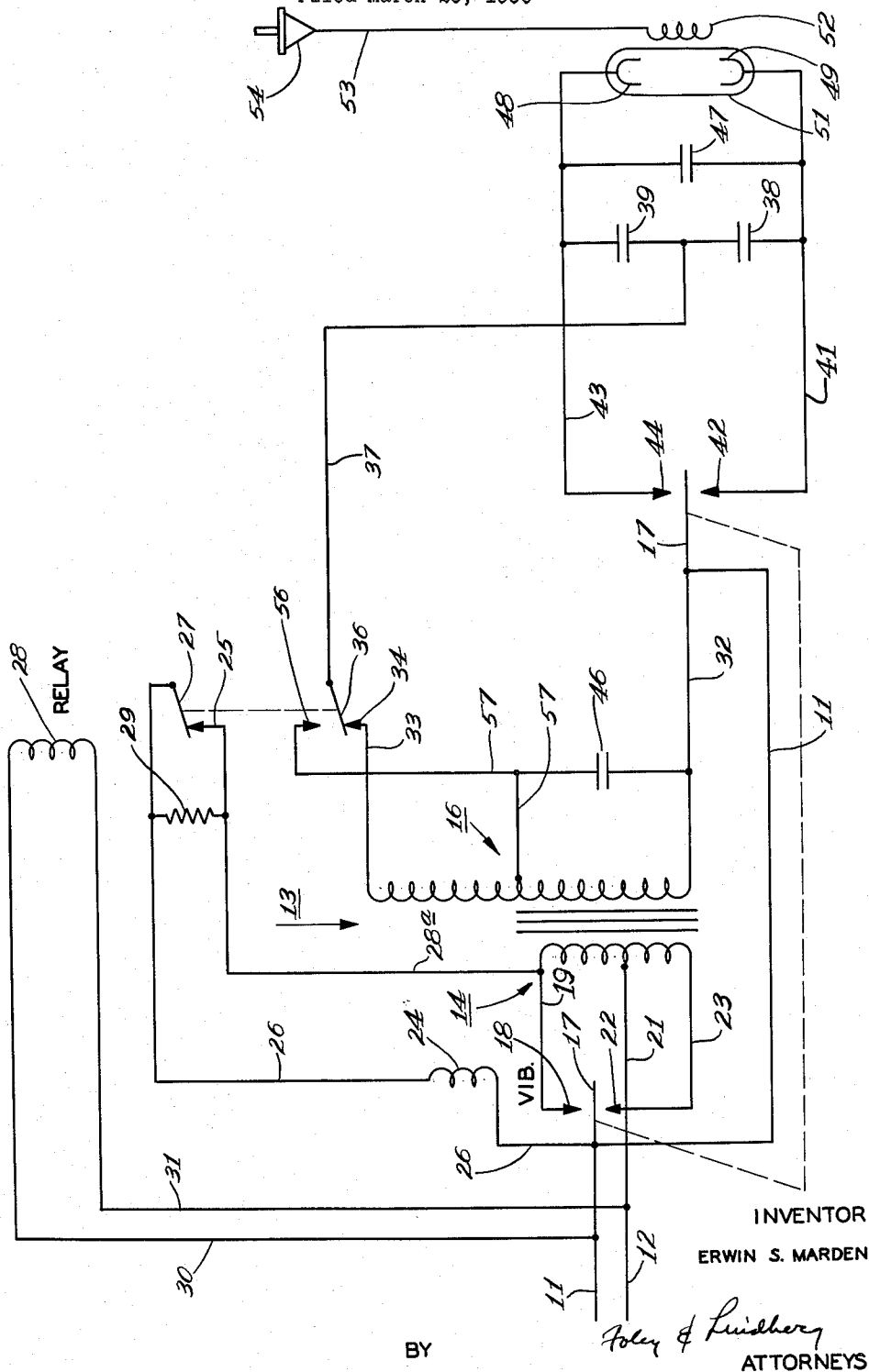
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TIMING LIGHT CIRCUIT

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TIMING LIGHT CIRCUIT

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This invention relates generally to devices for observing the timing of spark ignition engines, and particularly to an improved device operable from one of a plurality of voltage sources.

It is a principal object of the invention to provide an improved engine timing tester operable from one of a plurality of voltage sources.

A further object is to provide an improved timing light operable from one of a plurality of voltage sources and characterized by the use of extremely simple switching arrangements for providing a voltage suitable for operating a gas filled flash tube.

Other objects and important features of the invention will be apparent from a study of the specification following taken with the drawing, which together describe and illustrate a preferred embodiment of the invention and what is now considered to be the best mode of practicing the principles thereof. Other embodiments may be suggested to those having the benefit of the teachings herein, and such other embodiments are intended to be reserved especially as they fall within the scope and spirit of the subjoined claims.

The drawing shows a circuit for an improved timing light having the improvements according to the present invention embodied therein.

Referring now to the drawing, there is shown a pair of power leads 11 and 12 connected to one of two known D.C. voltage sources. For example, one such source may be of six volts, while the other may be of twelve volts, both such values being commonly used in passenger automobiles. Other different and known voltage sources are intended for use with the apparatus disclosed herein.

Means are provided for interrupting a circuit including the power leads 11 and 12, such a circuit including a transformer 13 having a center-tapped primary 14 and a secondary winding 16. The circuit interrupting means comprises a vibrating member 17 connected to the power lead 11 and cooperating with a fixed contact 18 connected by a lead 19 to one end of the center-tapped primary winding 14, the circuit being completed through one-half the primary winding 14 by a lead 21 connected to power lead 12.

The vibrating member 17 also cooperates with a fixed contact 22 connected by a lead 23 to the other end of the center tapped primary 14, the circuit being completed through one-half the primary winding 14 by the lead 21 to the power lead 12.

Power for driving the vibrating member 17 is derived from a driving coil 24 connected in a lead 26 branching from power lead 11, and connected in a circuit including an armature 27 of a relay 28, the circuit being completed past a contact 25 thereof and through a lead 28a, the winding 14 and the lead 21 to the other power lead 12. The relay winding 28 is connected in series with leads 30 and 31 branching respectively from the power leads 11 and 12.

In the position shown of the armature 27, the relay 28 is energized at the lower of the known D.C. voltages. However, when energized at the higher of said voltages, the armature 27 moves from its contact 25 to open the circuit thereat, but the driving coil 24 continues to be energized, a dropping resistor 29 connected in series therewith being provided to protect said driving coil.

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The circuit interrupting means is of the synchronous or rectifying type whereby the circuit interrupted through the primary winding 14 is concomitant with an interrupted circuit in the secondary winding 16 to produce a high voltage D.C. output.

The vibrating armature 17 is connected by a lead 32 to one end of the secondary winding 16. The vibrating member 17 is connected to interrupt a circuit through the secondary winding 16, and to this end the other end of the secondary winding 16 is connected in a circuit with a lead 33 and a contact 34 of an armature 36 of the relay 28, and a lead 37 connected between capacitors 38 and 39, capacitor 38 being connected by a lead 41 to a contact 42 at vibrating member 17, and capacitor 39 being connected by a lead 43 to a contact 44 at vibrating member 17. The balance of the interrupting circuit in the secondary winding 16 includes the vibrating member 17, contacts 18 or 22 and the primary winding 14, and thence to the other power lead 12.

A buffer capacitor 46 is connected across the secondary winding 16.

As has been explained, the relay armature 36 is in position corresponding to a lower known D.C. voltage being applied across power leads 11 and 12, and in the position shown gives a desired amplified voltage across the secondary winding 16 in accordance with the turns ratio between the primary and secondary windings of transformer 13.

In the position shown of the relay armature 36, the interrupted voltage across the secondary winding 16 causes each capacitor 38 and 39 to be charged at the voltage developed across the secondary winding 16. The two capacitors 38 and 39 are connected in parallel with a capacitor 47, which has a voltage thereacross which is a sum of the voltages across capacitors 38 and 39.

The energy stored in capacitor 47 is available for rapid discharge between electrodes 48 and 49 of a gaseous discharge tube 51. However, tube 51 will not discharge without the triggering impulse from a suitably disposed element 52 connected by a lead 53 to a spark plug 54.

Under conditions when the power leads 11 and 12 are connected to the higher of the two known voltage sources, the armature 36 will be moved from the contact 34 to a position against a contact 56 connected in a lead 57 connected at point intermediate the ends of the secondary winding 16, so as to utilize but a portion of the secondary winding 16, and to develop a secondary voltage corresponding to that developed when the lower of the two voltages is employed.

In cases where the higher voltage is twice the lower, one-half of the secondary winding is connected when the relay moves armature 36 from position at contact 34 to position at contact 56.

It will be observed that the circuit according to the present invention employs a simple transformer having a single primary which is connected across the two known voltage sources, and a single secondary which is tapped at an appropriate point so that the voltage developed in the secondary circuit is the same, if desired, as under the condition when the entire circuit is connected across the lower known D.C. voltage.

The same relay controlling the tapping of the secondary also causes suitable resistance to be inserted in series with the driving coil for the interrupting means for the primary circuit when the higher voltage is employed, so as to protect the driving coil.

While the invention has been described in terms of a preferred embodiment thereof, its scope is intended to be limited only by the claims here appended.

I claim as my invention:

1. A timing light circuit for producing a timed visible

3. A timing light circuit for producing a timed visible impulse operable from one of two known voltage sources comprising a transformer having a single center tapped primary winding and a single center tapped secondary winding, means for forming a circuit including the primary winding of said transformer and either of said voltage sources, means for interrupting said circuit including a vibrating member and contacts interrupted thereby connected in said circuit, an operating coil for said interrupter means for actuating said vibrating member, means connected to said voltage source and having circuit controlling means operable to one position when said voltage source is of one value and operable to a second position when said voltage source is at a second value, a circuit including said operating coil when said

6. A timing light circuit for producing a timed visible impulse operable from one of two known voltage sources comprising a transformer having a single center tapped primary winding and a single center tapped secondary winding, means for forming a circuit including the primary winding of said transformer and either of said voltage sources, means for interrupting said circuit including a vibrating member and contacts interrupted thereby connected in said circuit, an operating coil for said interrupter means for actuating said vibrating member, a circuit including circuit controlling means including said operating coil when said voltage source is at the said one value, said circuit including a resistance in series with said operating coil when said voltage is at said second value, means for rectifying the voltage across said secondary winding, said circuit controlling means being operable in one position

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to connect said secondary winding in circuit with said rectifying means and being operable in the second position thereof to connect a portion only of said secondary winding in circuit with said rectifying means.

7. A timing light circuit for producing a timed visible impulse operable from one of two known voltage sources comprising a transformer having a single center tapped primary winding and a single center tapped secondary winding, means for forming a circuit including the primary winding of said transformer and either of said voltage sources, means for interrupting said circuit including a vibrating member and contacts interrupted thereby connected in said circuit, an operating coil for said interrupter means for actuating said vibrating member, means connected to said voltage source and having circuit controlling means operable to one position when said voltage source is of one value and operable to a second

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position when said voltage source is at the said second value, said circuit including a resistance in series with said operating coil when said voltage is at said second value, means for rectifying the voltage across said secondary winding, said circuit controlling means being operable in one position to connect the whole of said secondary winding in circuit with said rectifying means, and being operable in the second half position thereof to connect a portion of said secondary winding in circuit with said rectifying means.

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