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INTERVAL TIMER

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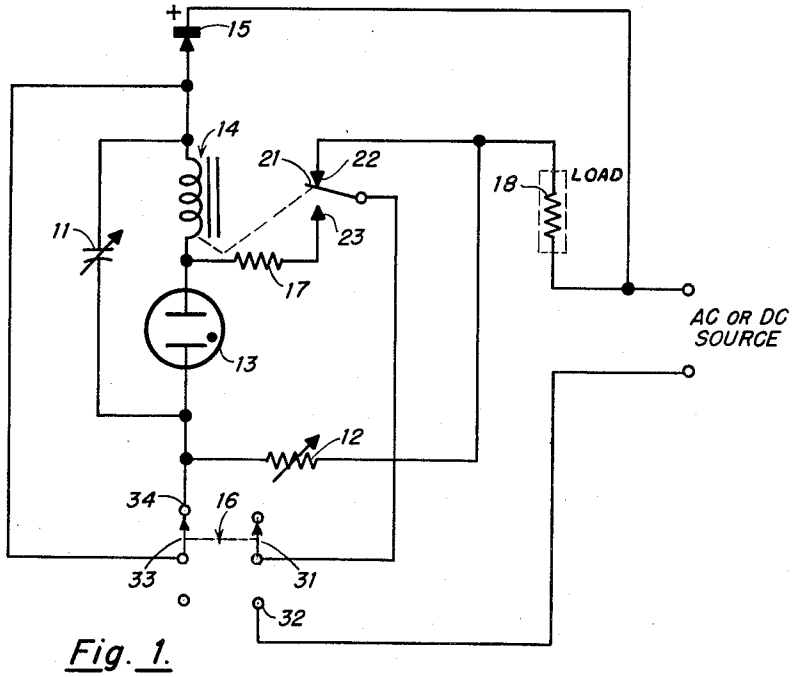


Fig. 1.

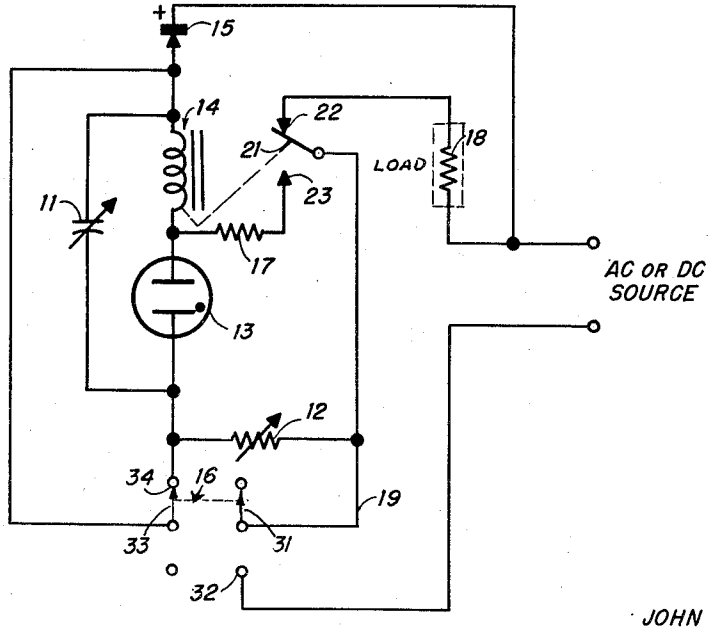


Fig. 2.

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INTERVAL TIMER

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The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates generally to timing devices, and more specifically to an interval timer well suited to photographic, welding, and other similar arts, though not limited to such, it being applicable in almost any art wherein timed intervals are of importance.

It is an object of this invention to provide a reliable timing device in which a translating means is operated after a predetermined interval.

It is a further object of the invention to provide a timing device which is readily operable on either A.-C. or D.-C. voltage.

Still a further object is the provision of a variable interval timer simple and accurate in its adjustment.

It is still a further object of the invention to provide an interval timer having an almost instantaneous reset time.

It is a further object of this invention to provide an inexpensive timing device utilizing current flow as a metering means and having simple circuitry.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a schematic illustration of an electrical circuit in accordance with the present invention; and

Fig. 2 is a schematic illustration of a modification embodying the invention.

Referring to the figures of the drawings, a preferred physical embodiment of the invention is shown in Fig. 1, wherein the elements are shown in their normal unenergized state.

In this embodiment an impedance **11**, having a capacitive reactance, is employed in conjunction with a variable resistance **12** and a gaseous electron discharge device, such as a neon diode tube **13**, to control for a variable predetermined time interval the operation of a current translating device, relay **14**, which includes transfer contact means comprising relay arm **21** and contacts **22** and **23** which in turn may control various other devices or operations, such as the energization of a load **18**, etc.

The capacitive impedance **11** is arranged in parallel with gaseous diode **13** and the coil of relay **14**. This forms a discharge loop for the capacitive impedance **11** upon its being charged to a critical value.

This discharge loop circuit is connected in series with a rectifier **15**. This entire series-parallel circuit is connectible to a suitable source of potential, A.-C. or D.-C. through a manually operable double pole, double throw switch **16**, and relay arm **21** alternatively in contact with either of relay contacts **22** or **23** (as described in operation hereinafter), and alternatively variable resistance **12** or resistance **17**, repectively, depending on which of contacts **22** or **23** is in the circuit. A load **18** is connectible to the same or any other suitable source of potential through contact **22**, contact arm **21** and switch contacts **31, 32**.

Prior to operation in the unenergized state switch **16** is in position to close contacts **33, 34** (to be described in operation hereinafter). In this position of switch **16** the capacitive impedance **11** is completely discharged and relay arm **21** is in contact with contact **22**, arm **21** normally being biased into engagement with this contact. No voltage is applied to the timing system and no current is flowing in the relay coil, and the load is deenergized.

When it is desired to energize the load **18**, which may be an incandescent lamp or welder or otherwise as desired, for a predetermined time interval the switch **16** is moved to close contacts **31** and **32**. This immediately closes a circuit supplying potential to the load **18** and begins a predetermined time interval at the end of which this circuit will be broken and the load will be deenergized. This predetermined period is determined primarily by the time constant of the capacitive impedance **11** and resistance **12**, either or both of which may be varied to increase or decrease the time interval. Increasing the value of either of these elements will increase the time interval.

Upon the closing of contacts **31, 32**, the capacitive impedance **11** begins to charge through resistance **12**. At the beginning of this cycle the voltage drop appears primarily across the resistance **12**, with no voltage drop across capacitive impedance **11**, and thus no voltage across the electrodes of tube **13**. The charge on capacitive impedance **11** gradually builds up through resistance **12** until it reaches the firing potential of tube **13**. This ends the predetermined time interval, tube **13** thereupon firing and providing a low impedance path for the discharge of the capacitive impedance **11**. This sudden flow of current in the discharge loop energizes the relay coil, thus opening contacts **21—22** and closing contacts **21—23**. This opens the load circuit and de-energizes the load **18**. The closing of contacts **21, 23** establishes a relay holding circuit from the source of potential through rectifier **15**, the coil of relay **14**, resistance **17**, relay contact **23**, relay arm **21**, switch contacts **31, 32** and return to the source of potential. The tube **13** is extinguished very shortly after the discharge of the condenser **11** therethrough begins as the voltage across the condenser, and thus the tube **13**, decreases below the extinction potential of the tube **13**.

To prepare the system for a new timing cycle the capacitive impedance **11** is completely discharged by manually moving the switch **16** to open contacts **31, 32** and to close contacts **33, 34**. Opening switch contacts **31, 32** breaks the relay holding circuit and the relay contact arm **21** again establishes contact with contact **22**, thus completing the cycle and readying the system for a new timing operation. It will be apparent that the reset time is almost instantaneous.

It will be apparent that if the timer is to be used on D.-C. voltage exclusively, the rectifier **15** may be omitted, if desired.

Fig. 2 shows a modification in which the variable resistance **12** is connected directly to switch **16** by line **19** (which line also connects contact arm **21** to the switch **16**) instead of through relay contacts **21, 22** as in the embodiment of Fig. 1. Thus, when the switch **16** is moved to close contacts **31, 32**, a circuit is set up from the potential source to rectifier **15**, the parallel network **11, 14, 13**, resistance **12**, switch contacts **31, 32** and return to the source of potential, as well as a parallel circuit from the potential source through load **18**, contact **22**, contact arm **21**, line **19**, switch contacts **31, 32**

and return to the potential source. At the end of the predetermined time interval the capacitive reactance **11** will discharge through relay **14** and tube **13**, energizing relay **14** to thereby open contacts **21—22** (thus de-energizing the load **18**) and close contacts **21—23**, as in the embodiment shown in Fig. 1. A holding circuit is thus established through rectifier **15**, the coil of relay **14**, resistance **17**, contact **23**, contact arm **21**, line **19**, and switch contacts **31**, **32**. Preparation for a new timing cycle is accomplished in the same manner as with the embodiment shown in Fig. 1 by moving the switch **16** to close contacts **33** and **34**.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

Having described my invention, what is claimed is:

1. An interval timer of the character disclosed comprising a source of D. C. potential, a condenser and a resistor connected in series circuit across said source, a load connected across said series connected condenser and resistor, a current responsive translating means and a gaseous electron discharge device connected in series across said condenser, normally open manual switch means in said series circuit for energizing said load from said source and concurrently charging said condenser from said source through said resistor as the switch means is closed thereby to initiate a timing interval which is terminated when the voltage across the condenser has increased to a value sufficient to render said electronic discharge device conducting, and transfer and holding contact means included in said translating means and operable thereby for disconnecting said load from said source and transferring connection of said source across said load to connection and holding across the translating means as the translating means operates on current discharged from said condenser through said electron discharge device, whereby energization of the translating means is maintained until said manual switch means is returned to its normally open position.

2. An interval timer of the character disclosed comprising, in combination, a source of D. C. potential, a condenser and a resistor connected in series circuit across said source, a load connected across said series connected condenser and resistor, a current responsive translating means and a gaseous electron discharge device connected in series across said condenser, normally open manual switch means in said series circuit for energizing said load from said source and concurrently charging said condenser from said source through said resistor as the switch means is closed thereby to initiate a timing interval which is terminated when the voltage across said

condenser has increased to a value sufficient to render said electron discharge device conducting, said condenser and resistor normally being connected in series across said source when said switch means is closed, and transfer and holding contact means included in said translating means and operable thereby for disconnecting said load from said source and transferring connection of said source across said load and across said series connected resistor and condenser to connection and holding across said translating means as the translating means operates on current discharged from said condenser through said electron discharge device, whereby energization of the translating means is maintained until said manual switch means is returned to its normally open position.

3. An interval timer as in claim 1 in which at least one of said resistor and condenser elements is adjustable to vary said timing interval.

4. An interval timer as in claim 1 wherein said translating means and said load are each connected on one side thereof to one side of said source and said contact means includes a first contact connected to the other side of said load, a second contact connected to the other side of said translating means, and a movable contact arm connected by said switch means to the other side of said source, said translating means being a relay having said movable contact arm normally biased into engagement with said first contact and movable into engagement with said second contact as the relay operates upon energization thereof.

5. An interval timer as in claim 4 wherein said condenser is connected to said one side of the source, said resistor is connected to the other side of said condenser, and the other side of said resistor is connected to said first contact.

6. An interval timer as in claim 4 wherein said condenser is connected on one side thereof to said one side of the source and connected on the other side thereof to said resistor, said resistor being connected on the other side thereof to said movable contact.

7. An interval timer as in claim 4 wherein said switch means comprises a double pole, double throw switch, having a first pole connected to said contact arm and a first contact engageable by said pole and connected to said other side of said source and a second pole connected to said one side of the source and engageable with a second contact connected to the junction of said condenser and said resistor.

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