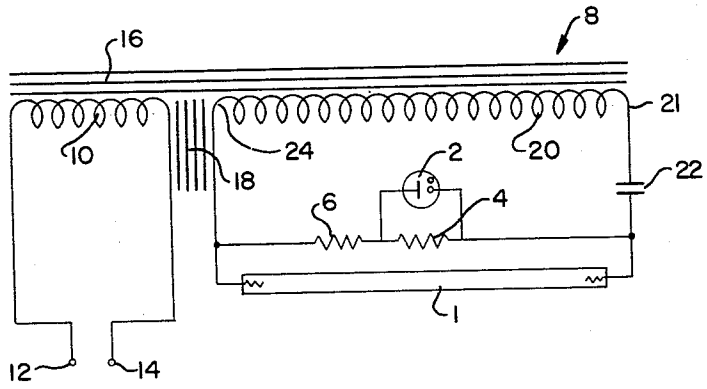
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SIGNAL LAMP TO INDICATE PRINTING LAMP CONDITION

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SIGNAL LAMP TO INDICATE PRINTING LAMP CONDITION

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This invention relates to an electronic circuit for indicating or signalling when an associated circuit has reached operating condition. More particularly, this invention relates to a device for providing a visual signal when a sensitized material printing machine has reached condition for printing.

Heretofore, sensitized material printing machines have been provided having illuminating lamps, such as mercury vapor lamps, for printing sensitive paper. In order to produce clear printed copy, it is necessary that the mercury vapor lamp be heated until the light emitted therefrom is of sufficient intensity to print the sensitive paper. If sensitive paper is passed through the machine prematurely, that is, before the mercury vapor lamp is sufficiently bright, the paper is wasted and illegible or faint copy is obtained.

It has been proposed that the operator of the machine visually observe the mercury vapor lamp and judge its brightness. However, it is difficult to make such a judgment or estimate and wasted paper, wasted time and effort result. It has also been proposed to employ a voltmeter but this is inconvenient and requires reading a dial and the instruction of personnel in reading the dial.

It is an object of the present invention to overcome the foregoing difficulties and disadvantages by providing an electronic circuit for visually signalling when the mercury vapor lamp has reached sufficient brightness for producing clear printing.

A further object of the invention is to provide an electronic circuit for signalling when an associated circuit has reached a predetermined voltage.

The invention also provides an electronic circuit including a gaseous indicating tube which glows when a parallel circuit has a predetermined voltage.

For a better understanding of the invention and its other objects, advantages and details, reference is now made to the present preferred embodiment of the invention which is shown, for purposes of illustration only, in the electrical schematic diagram of the accompanying drawing. The circuit illustrated in the drawing includes a leakage transformer and capacitor in the power source for the mercury vapor lamp. Other circuits can be employed as the power source. Among the other circuits are: (1) a circuit including a transformer and a reactance; (2) a circuit including a transformer, a reactance and a capacitor, (3) a circuit using only the leakage transformer; and the like.

Briefly stated, the invention includes a gaseous indicator tube connected in parallel with a printing mercury vapor lamp. Resistances are connected so that the voltage at which the indicator tube glows is in a fixed and predetermined ratio to the critical voltage across the mercury vapor lamp producing sufficient brightness for satisfactory printing. Electrical power is supplied to the circuit from a power source through a transformer.

Referring to the drawing, a mercury vapor lamp **1** is mounted in a sensitized material printing machine (not shown) for printing sensitive paper. The lamp **1** supplies the illumination for the printing. The lamp **1** must be heated until the voltage thereacross, V_1, reaches a critical value at which the lamp emits light of sufficient brightness or intensity to print clear copies on the sensitive paper.

A gaseous indicator or signal tube **2**, which can be a neon-filled electrical discharge tube, is connected in parallel with resistor **4**. Another resistor **6** is connected in series with the parallel array of indicator tube **2** and resistor **4**. The series combination of resistors **4** and **6** is connected in parallel with lamp **1**.

Electrical power is supplied to the tube **2** and lamp **1** by a leakage transformer **8** including a primary winding **10** supplied with power across the terminals **12** and **14**, a core **16**, a leakage path **18**, and a secondary winding **20**. One end **21** of secondary winding **20** is connected to one terminal of condenser or capacitor **22**. The opposite terminal of condenser **22** is connected to the parallel array of resistor **4**, indicator tube **2**, and mercury vapor lamp **1**. The opposite end **24** of secondary winding **20** is connected to the resistor **6** and lamp **1**.

Because of the parallel relationship, the voltage across the mercury vapor lamp **1**, V_1, equals the sum of the voltage across the resistor **6**, V_6, plus the voltage across the resistor **4**, V_4. That is, $V_1=V_6+V_4$. Also, the voltage drop across the indicator tube **2** equals the voltage across resistor **4**, V_4. Thus, the voltage drop across the indicator tube **2**, V_2, is in a fixed ratio or proportion to the voltage across the lamp V_1. The resistor **6** serves to prevent short circuit through tube **2** when tube **2** fires. Further, the resistor **6** reduces the rating of tube **2** required for indicating when the lamp **1** has reached critical voltage. That is, the tube **2** has a firing voltage below the critical voltage of lamp **1**. The critical voltage is that voltage which just produces sufficient light intensity of lamp **1** required for clear printing. Thus, smaller tube **2** can be employed, with greater longevity and less expense. The tube **2** is selected with a firing voltage, V_{2F}, such that V_{2F} plus V_6 equals the critical voltage of lamp **1**.

The operation of the illustrated embodiment of the invention will now be described. Power is supplied across the terminals **12** and **14** to energize the primary winding **10** and produce an induced voltage in secondary winding **20**. Leakage path **18** maintains a steady voltage in winding **20** by smoothing out surges of voltage in primary winding **10**.

The voltage across the lamp **1** increases until the critical voltage is reached. Then the lamp **1** emits light of sufficient intensity to print clearly. When lamp **1** reaches the critical voltage, the indicator tube **2** reaches its firing voltage and fires with resultant visible glowing of the tube. The operator observes the glowing and then commences printing.

Thus, it will be seen that the invention provides an electronic indicator circuit for efficiently and accurately signalling when a mercury vapor lamp has reached printing brightness.

While a present preferred embodiment of the invention has been illustrated and described, it will be recognized that the invention can be otherwise variously embodied and practiced within the scope of the following claims.

I claim:

1. A machine for printing on sensitized material including a circuit comprising an electrical discharge lamp that emits a printing light when at least a critical voltage is applied to said lamp; a first resistor and a second resistor connected in series with each other, the combination of said first and second resistors being connected in parallel with said lamp; a gaseous glow tube connected in parallel with said first resistor, said tube glowing when a firing voltage is applied thereto; means continuously applying to said circuit a voltage that rises to said critical voltage, said means being connected across said lamp, the characteristics of said printing lamp, said resistors, and said glow tube being so selected and proportioned that when the glow tube fires and is lit, the lamp will be emitting a printing light.

2. A machine for printing on sensitized material including a circuit comprising an electrical discharge lamp that emits a printing light when at least a critical voltage is applied to said lamp; a first resistor and a second resistor connected in series with each other, the combination of said first and second resistors being connected in parallel with said lamp; a gaseous glow tube connected in parallel with said first resistor, said tube glowing when a firing voltage is applied thereto; a capacitor having one terminal thereof connected to one end of said lamp, a transformer including a primary winding and a secondary winding, said secondary winding having one end thereof connected to the other terminal of said capacitor, said secondary winding having its other end connected to the other end of said lamp; means continuously applying electrical power to said prinmary winding so that a voltage is induced in said secondary winding and the voltage across said lamp rises to said critical voltage, the characteristics of the aforementioned elements of the circuit being so selected and proportioned that when the glow tube fires and is lit, the lamp will be emitting a printing light.

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