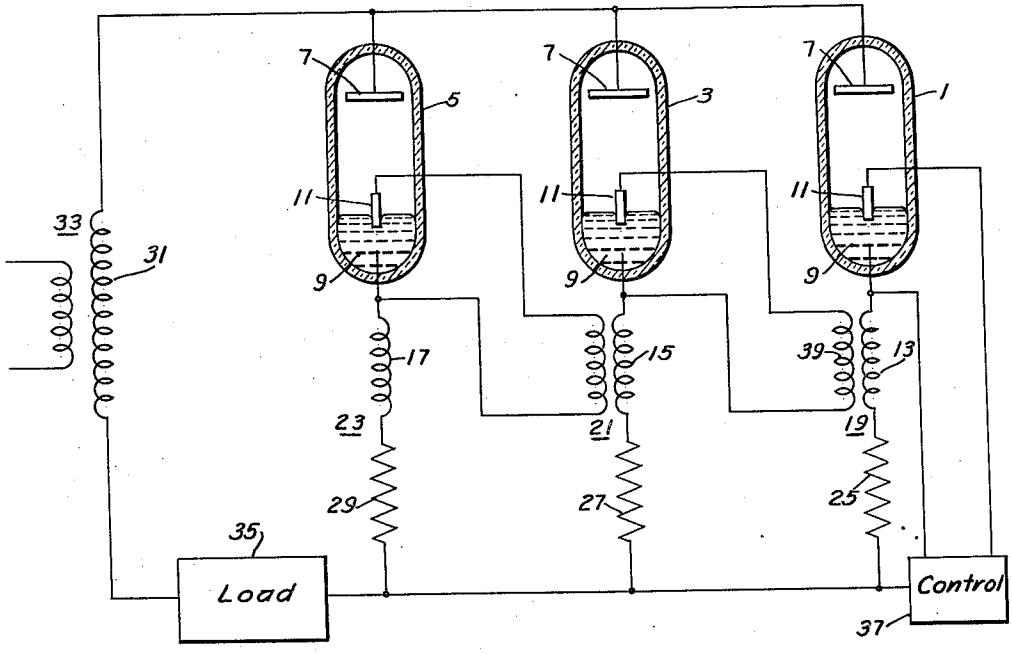
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TRANSLATING APPARATUS

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TRANSLATING APPARATUS

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My invention relates to translating apparatus and has particular relation to apparatus of the type wherein electric discharge devices are utilized to control the power supplied to a load.

It is an object of my invention to provide apparatus for supplying power from a source to a load through a plurality of electric discharge devices wherein the magnitude of the power supplied shall be controlled by controlling only one of the electric discharge devices.

Another object of my invention is to provide apparatus for controlling the supply of power from a source to a load by utilizing a plurality of electric discharge devices only one of which is controlled wherein the controlled electric discharge device shall regulate the operation of the other electric discharge devices.

A further object of my invention is to provide apparatus for supplying power to a load by utilizing a plurality of electric discharge devices for controlling the supply of power wherein the power shall be supplied through a predetermined number of the electric discharge devices depending on the magnitude of the power required. While applicable to high vacuum discharge devices my invention is particularly valuable when applied to gaseous discharge devices.

According to my invention, I provide a system in which power is supplied to a load from a source through a plurality of electric discharge devices which preferably are ignition tubes. One of the devices is controlled in the usual manner and starting circuit of a second device is inductively coupled to the output circuit of the first device. The starting circuit of a third electric discharge device is inductively coupled to the output circuit of the last named device and any number of additional electric discharge devices may be included in the system in a similar manner.

When the first electric discharge device is energized, current is transmitted through its output circuit and the second electric discharge device is energized. The third electric discharge device is energized by the initiation of the discharge in the second device and subsequent devices are energized in a similar manner. When the load is non-inductive the interval of time which elapses between the excitation of the first electric discharge device and the last electric discharge device is of the order of only a few micro-seconds.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawing, in which the single figure is a diagrammatic view showing the circuit of a system constructed and operated in accordance with my invention.

The apparatus shown in the drawing comprises a plurality of electric discharge devices 1, 3 and 5. Each electric discharge device comprises an anode 7 and a cathode 9, preferably of mercury, in which a starting electrode 11, preferably of carborundum or other material having a resistance high in comparison with the resistance of mercury is inserted. When a current of predetermined magnitude is transmitted between the starting electrode 11 and the cathode 9 of any one of the devices 1, 3 or 5, a discharge is initiated between the anode 7 and the cathode 9 providing the potential impressed between the latter electrodes is of sufficient magnitude.

The primaries 13, 15 and 17 of transformers 19, 21 and 23 and additional impedances 25, 27 and 29 of any suitable type are connected in series with the principal electrodes 7 and 9 of each of the electric discharge devices 1, 3 and 5 respectively and the series networks consisting of the principal electrodes 7 and 9, the primaries 13, 15 and 17 of the transformers 19, 21 and 23 and the impedances 25, 27 and 29 are connected in parallel with each other. The secondary 31 of a transformer 33 whereby power is to be supplied to the system is connected between the terminals of the network through the load 35 to be supplied. The usual control system 37 is provided for the purpose of supplying starting current to energize one of the electric discharge devices 1.

When current is supplied between the starting electrode 11 and the cathode 9 of the last named electric discharge device 1, a discharge is initiated between the anode 7 and the cathode 9, and current is transmitted through the load 35. My invention is particularly applicable to the supply of power to a load which is substantially of the non-inductive type. When a load of this type is supplied and the discharge in the electric discharge device 1 is initiated, the current transmitted through the non-inductive load rises to its maximum value comparatively rapidly and a comparatively high electromotive force is induced in the secondary 39 of the transformer 19, the primary 13 of which is connected in series with the principal electrodes 7 and 9 of the energized electric discharge device 1.

The secondary 39 of the transformer 19 is connected in series with the starting electrode 11 and the cathode 9 of a second electric discharge device 3 and by the initiation of the discharge in the first device 1 an impulse of current of considerable magnitude is transmitted through the network including the secondary 39, the starting electrode 11 of the second device 3 and the corresponding cathode 9. If the load 35 is of such character that the current transmitted through the electric discharge device 1 and the series connected impedance 25 is of sufficiently large magnitude, the drop in potential across the second electric discharge device 3 may be of sufficient magnitude to energize the latter device. The last mentioned device will therefore be energized by the cooperation of the impulse induced in the secondary 39 of the transformer 19 associated with its starting electrode 11 and the potential impressed between its principal electrodes 7 and 9.

Similarly, a third electric discharge device 5 may be associated with the second device 3 in the same manner as the second device 3 is associated with the first device 1. It is seen that if the current required by the load 35 is comparatively small only one electric discharge device 1 will be energized. As the current increases the number of electric discharge devices which are energized increases and thus the active electric discharge devices 1, 3 and 5 varies in accordance with the current supplied. It is to be noted that the load current for which each successive device in its turn becomes energized may be regulated by varying the magnitude of the impedances 25, 27 and 29. If additional electric discharge devices are not to be added beyond the device 3, the impedance 29 may of course, be omitted.

My invention has been herein shown and described as applied to electric discharge devices of the mercury pool type incorporating current responsive starting electrodes. It is apparent that my invention is also applicable to electric discharge devices of the type wherein a discharge is initiated when the potential impressed between a control electrode and one or the other of the principal electrodes is varied. Of the devices of the latter type, I have found that gas-filled electric discharge devices of the hot cathode type, such as grid glow tubes and mercury-pool grid-controlled electric discharge devices may with advantage be utilized.

When grid-controlled devices are utilized, the initiating control potential is supplied between the control electrode and a principal electrode of one device, the principal circuit of this device is inductively coupled between the control electrode and the principal electrode of another device, the latter device being coupled to a third device in the same manner and additional devices being added in the same manner.

Although I have shown and described a certain specific embodiment of my invention, I am fully aware that many modifications thereof are possible. My invention therefore is not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims.

I claim as my invention:

1. A translating system comprising a plurality of electric discharge devices, each of said devices having a pair of principal electrodes between which a discharge is to pass and at least one control electrode so associated with said pair of principal electrodes that the properties of the discharge between said pair of principal electrodes varies as the potential impressed on said control electrode varies, means for impressing a potential on the control electrode of one of said electric discharge devices to initiate a discharge between the pair of principal electrodes of said device and means for coupling the circuit of the pair of principal electrodes of the last said device to the control electrode of another device, whereby a discharge is initiated in said last-named device by the initiation of a discharge in said first-named device.

2. Apparatus for supplying power to a load comprising a plurality of electric discharge devices, each of said devices having a pair of principal electrodes between which a discharge is to pass and at least one control electrode so associated with said principal electrodes that the character of the discharge between said principal electrodes varies as the potential impressed on said control electrode is varied, means for impressing a potential on said control electrode of one of said electric discharge devices to initiate a discharge between said principal electrodes and inductive means for coupling the circuit through which said discharge passes to the control electrode of another electric discharge device whereby a discharge is initiated in said last-named electric discharge device by the initiation of the discharge in said first-named electric-discharge device.

3. Apparatus for supplying power to a load comprising a plurality of electric discharge devices, each of said devices having a pair of principal electrodes between which a discharge is to pass and at least one starting electrode so associated with said principal electrodes that a discharge is initiated between said principal electrodes by the transmission of a current through said starting electrode, means for transmitting a current through said starting electrode of one of said electric discharge devices to initiate a discharge between said principal electrodes and inductive means for coupling the circuit through which said discharge passes to the starting electrode of another electric discharge device whereby a discharge is initiated in said last-named electric discharge device by the initiation of the discharge in said first-named electric discharge device.

4. Apparatus for supplying power to a load comprising a power supply source, a plurality of electric discharge devices, each of said devices having a pair of principal electrodes between which a discharge is to pass and at least one control electrode so associated with said principal electrodes that the character of said discharge is a function of the potential impressed on said control electrode, means for connecting an electrode of the pair of principal electrodes of each of said discharge devices to a terminal of said source, means for connecting the remaining electrodes of the principal electrodes of each of said electric discharge devices to the other terminal of said source through said load, means for applying a potential on the control electrode of one of said electric discharge devices to initiate a discharge between the principal electrodes thereof and means for coupling the circuit through which the discharge current of the last said discharge devices passes to the control electrode of another discharge device whereby a discharge is initiated in said last-named electric discharge

device by the initiation of a discharge in said first named discharge device.

5. Apparatus for supplying power to a load comprising a power supply source, a plurality of electric discharge devices, each of said devices having a pair of principal electrodes between which a discharge is to pass and at least one control electrode so associated with said principal electrodes that the character of said discharge is a function of the potential impressed on said control electrode, an impedance connected in series with the principal electrodes of each of said electric discharge devices, means for connecting the networks including the principal electrodes of each of said electric discharge devices and said series-connected impedances in parallel with each other, means for connecting said power source to the network of parallel connected impedances and electrodes through said load, means for impressing a potential on the control electrode of one of said electric discharge devices to initiate a discharge between the principal electrodes thereof and means for coupling the circuit through which the current of said discharge is transmitted to the control electrode of another of said electric discharge devices, whereby a discharge is initiated between the principal electrodes of said last-named device by the initiation of a discharge in said first-named device.

6. Apparatus for supplying power to a load comprising a power supply source, a plurality of electric discharge devices, each of said devices having a pair of principal electrodes between which a discharge is to pass and at least one control electrode so associated with said principal electrodes that the character of said discharge is a function of the potential impressed on said control electrode, an impedance connected in series with the principal electrodes of each of said electric discharge devices, means for connecting the networks including the principal electrodes of each of said electric discharge devices and said series-connected impedances in parallel with each other, means for connecting said power source to the network of parallel connected impedances and electrodes through said load, means for impressing a potential on the control electrode of one of said electric discharge devices to initiate a discharge between the principal electrodes thereof and means for coupling the circuit through which the current of said discharge is transmitted to the control electrode of another of said electric discharge devices, whereby a discharge is initiated between the principal electrodes of said last-named device by the initiation of a discharge in said first-named device, the impedance connected in series with said first-named discharge device being of such magnitude that a discharge is initiated in said last-named device only when the current transmitted by said first-named device is at least a predetermined minimum value.

7. Apparatus for supplying power to a load comprising a power supply source, a plurality of electric discharge devices, each of said devices having a pair of principal electrodes between which a discharge is to pass and at least one control electrode so associated with said principal electrodes that the character of said discharge is a function of the potential impressed on said control electrode, an impedance connected in series with the principal electrodes of each of said electric discharge devices, means for connecting the networks including the principal electrodes of each of said electric discharge devices and said series-connected impedances in parallel with each other, means for connecting said power source to the network of parallel connected impedances and electrodes through said loads, means for impressing a potential on the control electrode of one of said electric discharge devices to initiate a discharge between the principal electrodes thereof and means including a transformer for coupling the circuit through which the current of said discharge is transmitted to the control electrode of another of said electric discharge devices, whereby a discharge is initiated between the principal electrodes of said last-named device by the initiation of a discharge in said first-named device, the impedance connected in series with said first-named discharge device being of such magnitude that a discharge is initiated in said last-named device only when the current transmitted by said first-named device is at least a predetermined minimum value.

8. Apparatus for supplying power to a load comprising a power-supply source, an electric discharge device having a plurality of electrodes between which a discharge is to pass, means for initiating the discharge between said electrodes, an impedance connected in series with said electrodes, another electric discharge device incorporating a pair of principal electrodes between which a discharge is to pass and at least one control electrode for controlling the discharge between said principal electrodes, means for connecting the network comprising the electrodes of said first-named device and the series-connected impedance in parallel with the principal electrodes of said last-named device, means for connecting said power source to the terminals of the parallel network including the electrodes of said electric discharge devices and said impedance, means for coupling the control electrode of said last-named device to the output circuit of said first-named device whereby a discharge is initiated in said last-named device by the initiation of a discharge in said first-named device, said impedance being of such magnitude that the discharge in said last-named device is only initiated when said load draws current of at least a predetermined magnitude through said first-named device.

9. A translating system comprising a plurality of electrical discharge devices of the gaseous type, each of said devices having a pair of principal electrodes connected to a source of current therefor and a control electrode so associated with said pair of principal electrodes as to cause the initiation of current flow therebetween when voltage of a predetermined magnitude is impressed upon said control electrode, and a transformer having its primary traversed by current flowing through one of said pairs of principal electrodes and its secondary connected to impress on the control electrode associated with another of said pairs of principal electrodes a voltage of such polarity as to initiate current flow through said other pair as a result of the initiation of current flow through said one pair of principal electrodes.

10. Apparatus for supplying power to a load comprising a power source, a plurality of discharge paths, each of said paths having a pair of electrodes between which a discharge is to pass, means to be actuated by the passage of current for controlling the discharge between the pair of electrodes of each of said paths, an

impedance connected in series with the electrodes of each path, means for connecting the networks including the electrodes of each path and the associated impedance in parallel with each other, means for connecting said power source to the network of parallel connected impedances and electrodes through said load, means for supplying current to actuate the controlling means associated with the electrodes of one of said paths to initiate a discharge in said path and means for coupling the circuit through which the current of the last said discharge is transmitted to the controlling means associated with the electrode of another of said paths, whereby a discharge is initiated between the electrodes of said last-named paths by the initiation of a discharge in said first-named path, the impedance connected in series with said first-named path being of such magnitude that a discharge is initiated in said last-named path only when the current transmitted through said first-named path is at least a predetermined minimum value.

11. Apparatus for supplying power to a load comprising a power source, a first discharge path, means to be actuated by the passage of current for controlling the discharge in said path, an impedance connected in series with said path, a second discharge path, means to be actuated by the passage of current for controlling the discharge in said second path, means for connecting the network including the first path and the series connected impedance in parallel with the second path, means for connecting said power source to the network comprising the parallel connected paths and the impedance through said load, means for supplying current to actuate the controlling means of the first path to initiate a discharge in said first path, and means for coupling the circuit through which the current of said initiated discharge is transmitted to the controlling means of the second path, whereby a discharge is initiated in said second path by the initiation of a discharge in said first path, said impedance being of such magnitude that the discharge is initiated in said second path only when the current transmitted through said first-named path is at least a predetermined minimum value.

12. A translating system comprising a plurality of electric discharge paths, each of said paths having a pair of principal electrodes between which a discharge is to pass and at least one control electrode so associated with said pair of principal electrodes that the properties of the discharge between said pair of principal electrodes varies as the potential impressed on said control electrode varies, means for impressing a potential on the control electrode of one of said electric discharge paths to initiate a discharge between the pair of principal electrodes of said path, means for coupling the circuit of the pair of principal electrodes of the last said path to the control electrode of another path, thereby to produce a tendency to initiate a discharge in said last-named path by the initiation of a discharge in said first-named path, and means for preventing said tendency from becoming effective unless the discharge current in said first-named path is of a predetermined magnitude.

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