

Feb. 18, 1947.

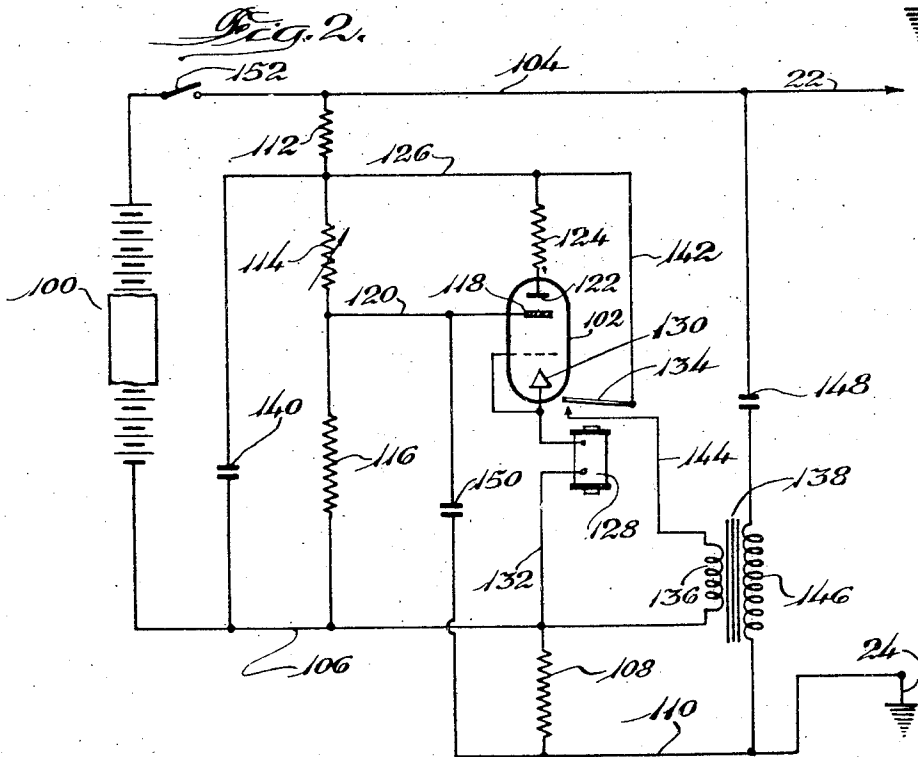
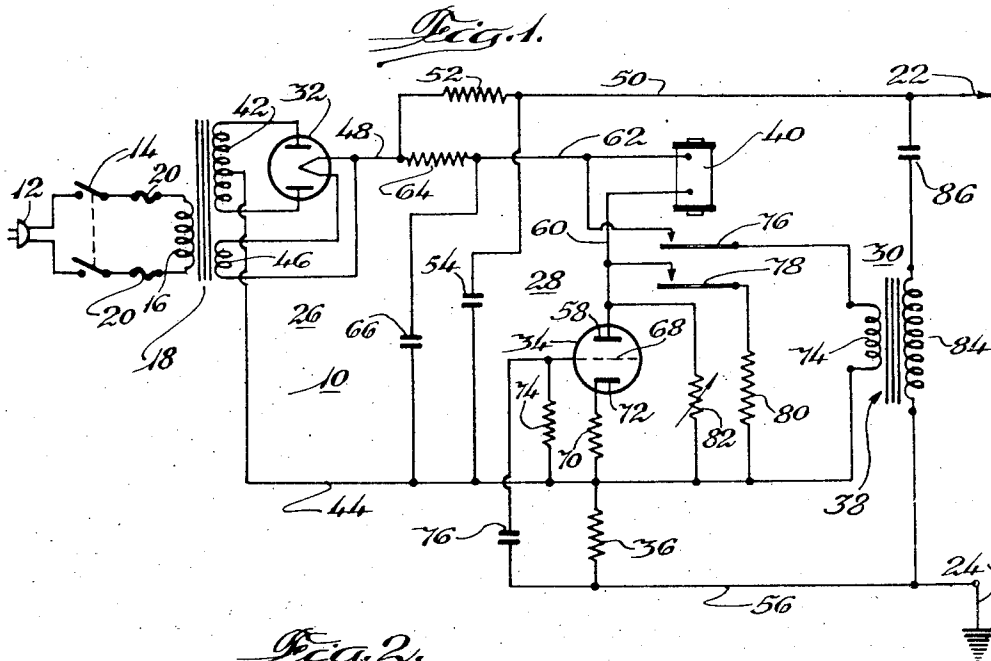
W. F. FAGEN

2,415,944

ELECTRIC FENCE CHARGING APPARATUS

Filed Nov. 15, 1943

2 Sheets-Sheet 1



Inventor:
William F. Fagen
By *Williams, Bradbury & Hinkle*
Attorneys.

Feb. 18, 1947.

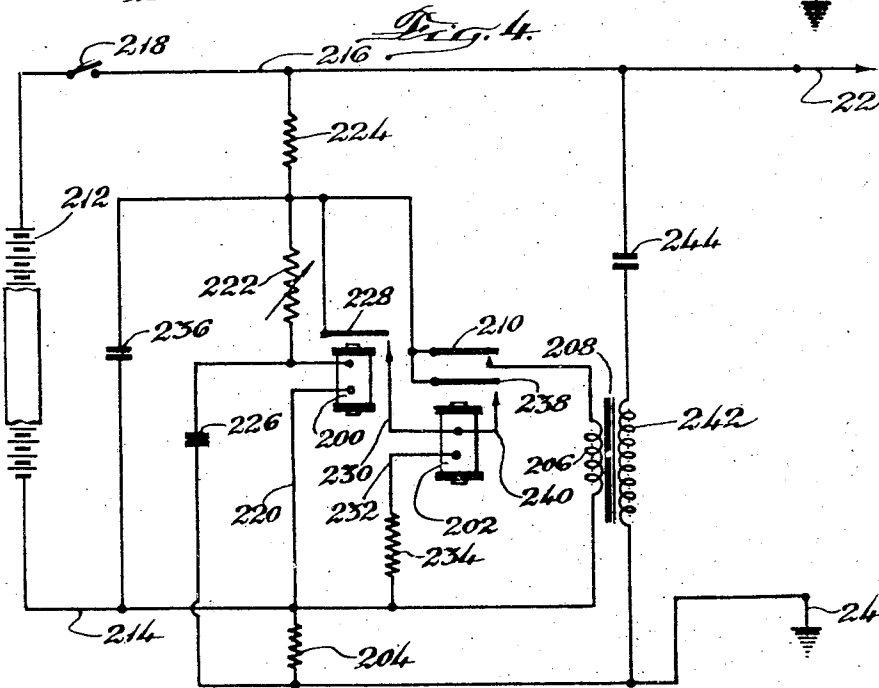
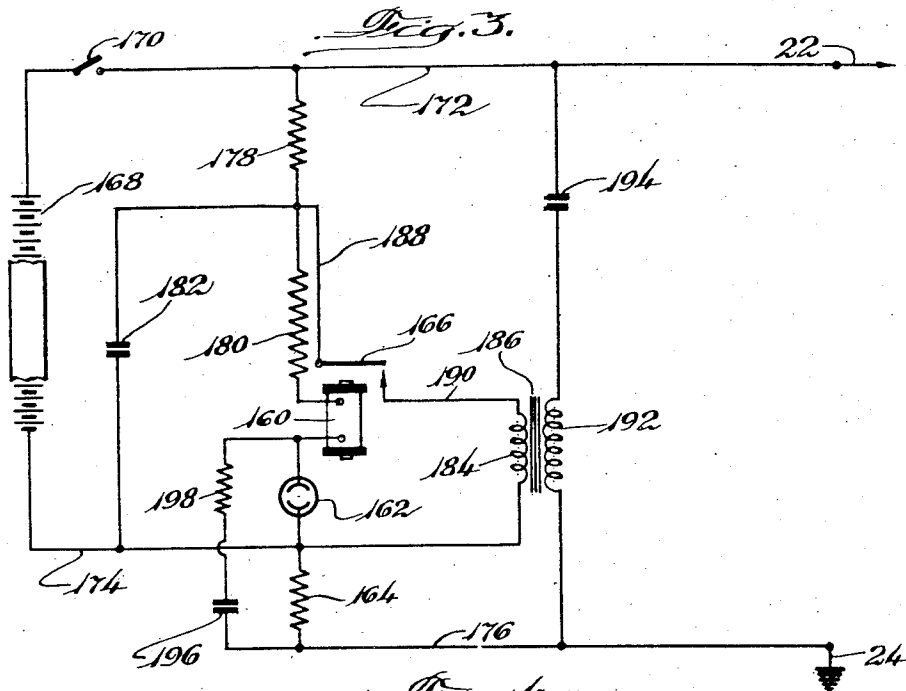
W. F. FAGEN

2,415,944

ELECTRIC FENCE CHARGING APPARATUS

Filed Nov. 15, 1943

2 Sheets-Sheet 2



Inventor:
William F. Fagen
By *Williams, Bradbury & Kirkle*
Attorneys.

UNITED STATES PATENT OFFICE

2,415,944

ELECTRIC FENCE CHARGING APPARATUS

William F. Fagen, Chicago, Ill., assignor to
Stewart-Warner Corporation, Chicago, Ill., a
corporation of Virginia

Application November 15, 1943, Serial No. 510,308

9 Claims. (Cl. 256—10)

1

The present invention relates to electrical fences, and more particularly to automatically operable fence energizers or chargers of the type wherein a shocking impulse is applied to the fence when an animal comes into contact with the fence, as disclosed and claimed in my co-pending application, Serial No. 510,307 filed contemporaneously herewith.

An object of the present invention is to provide a new and improved electrical fence charging apparatus wherein a control voltage occurring upon contact between the fence and the animal is utilized to effect the operation of an electromagnetic relay having associated with it means for producing a high voltage energy impulse of short duration upon such operation.

A further object of the present invention is to provide an apparatus of the character specified wherein the relay, upon operation, is maintained in its operated condition for a time independently of a device responsive to the control voltage.

Other objects and advantages of the present invention will become apparent from the ensuing description, in the course of which reference is had to the accompanying drawings, in which:

Fig. 1 is a diagrammatic representation of one embodiment of the invention including an electromagnetic relay controlled by a vacuum tube;

Fig. 2 is a diagrammatic representation of a modified embodiment in which the electromagnetic relay is controlled by a grid controlled gas tube;

Fig. 3 is a diagrammatic representation of a further embodiment wherein the electromagnetic relay is controlled by a cold cathode gaseous discharge tube; and

Fig. 4 is a diagrammatic illustration of a further embodiment wherein the impulse producing electromagnetic relay is controlled by another electromagnetic relay.

The embodiment of the invention illustrated in Fig. 1 includes a fence charging apparatus 10 constructed in accordance with the present invention. The apparatus is supplied with power from a suitable power source (which may be a 110 volt supply line—not shown) to which the apparatus may be connected by a plug type connector 12 and upon closure of a power switch 14 connected to the primary winding 16 of a transformer 18 through fuses 20.

The output of the apparatus is adapted to be connected to a fence wire 22 and to ground through a ground connection 24. The fence wire 22 is of the bare conductive type and may be supported by insulators on suitable fence posts (not

2

shown). It should be understood that in some installations it is preferable to use two fence wires, one corresponding to the single wire 22 illustrated and the other to the earth or ground connection. It should be understood also that the term "fence" is not limited to fences for pastures or other enclosures for cows, horses, or the like, but is intended to be broad enough to include protective safeguards for houses, rooms, and the like to prevent, or at least tend to prevent, human beings from entering or leaving the premises.

The apparatus of the present invention includes a normally inoperative energy impulse producing means which is controlled in response to contact between the fence wire and an animal to produce an energy or shocking impulse through the wire and the animal in contact with it. The apparatus includes, in the main, a relatively low voltage power supply, control means, and impulse producing means, these being indicated generally by reference characters 26, 28 and 30. The power supply means includes a rectifier comprising a rectifier tube 32. The control means includes an electron tube 34, the conductivity of which is controlled in response to the flow of current through a control resistor 36 associated therewith and located in the fence circuit. The impulse producing means includes a transformer 38 and an electromagnetic relay 40 controlled by the tube 34 and adapted to control the flow of current through the transformer 38.

The low voltage power supply includes the rectifier tube 32, preferably of the full wave type. The plates of the tube are connected to a secondary winding 42, the midpoint of which is connected in conventional manner to a negative bus 44. The filament of the tube is connected across another secondary winding 46 and also to a conductor 48 forming the positive bus.

The fence wire 22 is normally maintained at a relatively low positive direct current voltage. It is connected to the positive terminal of the rectifier by conductor 50 and a filter resistor 52. A filter condenser 54 is connected across conductors 50 and 44. Thus, under normal conditions, there is a small leakage current flowing through the control resistor 36 connected between the negative bus 44 and ground by conductor 56.

The electron tube 34 (which may be of the 6J5GT type) is rendered sufficiently conductive to operate relay 40 when an animal contacts the fence, but it is not sufficiently conductive to operate the relay under normal conditions. The relay winding is connected in the plate circuit

of the tube 34, one terminal of the winding being connected to the plate 58 by conductor 60. The other terminal of the winding is connected through conductor 62 and resistor 64 to the positive bus 48. A current impulse producing condenser 66 interconnects conductors 62 and 44.

The grid 68 of the tube is normally so biased that some current flows through the tube. The normal grid bias is provided by the self-biasing resistor 70 connected between the cathode 72 of the tube and conductor 44. A grid leak resistor 74 is connected across the grid and conductor 44.

When the voltage across resistor 36 changes at a predetermined rate, determined by the value of the coupling condenser 76 connected across conductor 56 and the grid 68, the grid is rendered more positive to increase the current flow through the relay to a value sufficient to operate the relay. Thus the relay is not operated in response to slow variations in leakage current, such as might be caused by vegetation coming into contact with the fence, by showers or the like.

When the relay 40 operates, it places the primary winding 74 of transformer 38 in circuit with the condenser 66. This is done by closure of the relay operated switch 76 serving to connect the primary winding 74 across conductors 62 and 44. When the relay operates it also closes a holding circuit for itself through a switch 78. When the switch 78 is closed the relay is energized through a resistor 80 which is so proportioned relative to condenser 66 that the relay returns to its non-operated position when the condenser 66 is discharged to some minimum value. Accordingly, once the relay is operated it enables the condenser 66 to be discharged through the primary winding 74 of the transformer.

The sensitivity of the apparatus is controlled by an adjustable resistor 82 connected across the plate of the tube and the negative bus 44. This resistor is in parallel with the tube and is adjustable to vary the biasing current normally flowing through the tube and the self-biasing resistor 70.

Each time the condenser 66 is discharged through the primary winding 74 of the transformer, a high voltage impulse is applied to the fence and an animal in contact therewith. This is accomplished by connecting the secondary winding 84 of the transformer across ground and the fence wire 22. A blocking condenser 86 is connected in series with the winding 84.

The apparatus may be placed into operation by connecting the plug connector 12 to a suitable source of alternating current and closing switch 14. This renders the rectifier operative to supply voltage to the fence and to the electron tube and relay. The fence is maintained at a relatively low positive voltage, and a small leakage current flows through the control resistor 36. A small flow of current also occurs through the relay winding 40 and the tube 34, but this is insufficient to operate the relay.

When an animal contacts the fence, the flow of current through resistor 36 increases, with the result that its ground end is rendered more positive. The conductivity of tube 34 is thereupon increased because the more positive potential is applied to its grid 68 through a coupling condenser 76. The relay 40 is energized sufficiently to operate switches 76 and 78. The former connects condenser 66 to the primary winding 74, and the condenser discharges through the winding. The discharge of the condenser through the winding results in the generation of a high voltage in the secondary winding 84 which is

applied to the fence, thereby to produce a shocking impulse. The closure of switch 78 completes a holding circuit for the relay winding 40, whereby the relay is energized independently of the tube 34 until such time as the condenser 66 is substantially discharged, after which the relay winding is deenergized to such an extent that the switches 76 and 78 are opened to return the apparatus to its initial condition.

The apparatus is so constructed and arranged that but one impulse is produced in response to contact between the fence and an animal, and it is so arranged also that successive impulses do not occur even when the fence may be contacted successively by several animals unless the contacts are spaced apart a certain time interval. The time interval between successive impulses is determined by the proportions between resistor 64 and condenser 66, the former controlling the length of time that it takes to charge the condenser 66 to a value sufficient to enable the conductivity of tube 34 to be increased sufficiently to operate relay 40.

In the embodiment of the invention illustrated in Fig. 2, the power supply includes a battery 100 and the control means includes a grid controlled gas discharge tube 102.

The fence wire 22 is maintained at a relatively low positive voltage, it being connected to the positive terminal of the battery through conductor 104. The negative terminal of the battery is connected to a conductor 106 connected through a control resistor 108 to conductor 110 and the ground connection 24. The tube 102 is connected to the power supply through the resistance network including resistors 112, 114 and 116, of which resistor 114 is adjustable to vary the potential applied to the grid 118 of the tube. The grid is connected to the junction of resistors 114 and 116 by conductor 120 and resistor 114 is so adjusted as to maintain the tube normally nonconductive. The plate 122 of the tube is connected to the junction of resistors 112 and 114 through resistor 124 and conductor 126.

The impulse producing relay 128 is connected across the cathode 130 and the conductor 106 by the conductor 132. The relay 128 includes a normally open switch 134 adapted when closed to complete a circuit between the primary winding 136 of transformer 138 and the impulse producing condenser 140, the latter being connected across conductors 106 and 126. When the switch closes it interconnects conductors 142 and 144, the former of which is connected to conductor 126, and the latter to one terminal of the primary winding 136. The other terminal of winding 136 is connected to conductor 106. The secondary winding 146 of transformer 138 is connected across conductors 22 and 110 through a blocking condenser 148.

The conductivity of tube 102 is controlled in response to a change in voltage across the control resistor 108, the ground end of which is connected to the grid 118 of the tube through a coupling condenser 150 of a value such as to prevent the production of shocking impulses in response to slow changes in voltage across the resistor 108.

The apparatus may be placed into operation upon closure of a switch 152 interposed in conductor 104. When the switch is closed a control potential is applied to the fence and the tube is supplied with power. Under normal conditions the tube remains nonconductive by reason of the application of a suitable potential to the grid 118,

which potential is just sufficient to maintain the tube below its firing point.

When an animal comes into contact with the fence there is a change in current flow through resistor 108, and the change in voltage drop across the resistor occurs sufficiently rapidly so that the grid 118 of the tube is raised to a positive potential sufficient to render the tube conductive. When the tube is rendered conductive the relay 128 is energized sufficiently to close switch 134, and the condenser 140 is discharged through the primary winding 136 of transformer 138 (and in part through the tube 102, the resistor 124 preventing any substantial discharge through the tube). The current flowing through the primary winding induces a voltage across the secondary winding which is applied to the fence to provide the requisite shocking impulse. The relay 128 remains energized until the condenser 140 is discharged to a low value, at which time the gas tube 102 again becomes nonconductive. When this occurs, the switch 134 is opened and the apparatus is ready for a subsequent operation, which, however, cannot take place until the condenser 140 has been charged.

In the embodiment of the invention illustrated in Fig. 3, the impulse producing relay 160 is controlled by a cold cathode gaseous discharge tube 162 which is normally operated just below the breakdown point. The control voltage appearing across the control resistor 164 when an animal contacts the fence is utilized to effect the breakdown of tube 162 and operation of relay 160 to close a switch 166 to produce the shocking impulse.

Power is supplied by a battery 168. When the power switch 170 is closed, the battery is connected to the fence wire 22 through a conductor 172, thereby to apply a relatively low control voltage to the fence wire. The control resistor 164 is connected to the battery and ground connection 24 through conductors 174 and 176.

The tube 162 is normally maintained at a voltage just below its breakdown voltage. It is supplied with voltage from the battery through the series connected resistors 178 and 180 and relay winding 160.

The impulse producing condenser 182 is connected to the junction of resistors 178 and 180 and to conductor 174. When the relay 160 is operated, the condenser is connected by switch 166 to the primary winding 184 of transformer 186, the circuit extending through conductors 188, 190 and 174.

The shocking impulse is applied to the fence through the secondary winding 192 of the transformer, which is connected across conductors 172 and 176 through a blocking condenser 194.

The control voltage is applied to the gas tube through a coupling condenser 196 and resistor 198 which are connected in series across conductor 176 and the positive terminal of the gas discharge tube 162, so that when the voltage drop across resistor 164 increases, the positive voltage applied to the discharge tube is sufficient to break down the tube. Once the tube breaks down it remains conductive until the condenser 182 is discharged.

To place the apparatus in operation, the power switch 170 is closed to apply the control voltage to the fence and to apply a suitable operating potential to the gas tube 162 to condition it for operation when an animal contacts the fence. When an animal contacts the fence the flow of current through resistor 164 increases, with the result that its ground end is rendered more posi-

tive. This more positive potential is applied to the positive terminal of tube 162, thereby to raise the voltage across the tube to a value sufficient to cause its breakdown. Once the tube breaks down the relay 160 is operated to close the switch 166, and the condenser 182 discharges through the relay and tube in series and also through the primary winding 184 of the transformer. The flow of current through the primary winding of the transformer induces a voltage in the secondary winding which is applied to the fence to provide the requisite shocking impulse. Once the tube 162 becomes conductive it remains conductive until the condenser 182 has been discharged. After it becomes nonconductive the relay 160 is deenergized and the switch 166 opened, thereby to condition the apparatus for a further operation after the lapse of a time interval sufficient to charge condenser 182. After the condenser has been recharged, then upon the occurrence of a further change in current flow through the control resistor 164 the apparatus will again operate in the manner described above.

An arrangement enabling the use of a rugged type relay with heavy contacts to complete a circuit to the transformer of the impulse producing means is illustrated in Fig. 4, to which reference is now had. In the first place, it may be noted that two electromagnetic relays 200 and 202 are utilized. The first of these is a sensitive relay controlled in response to the control voltage appearing across the control resistor 204, and the second is a more rugged type with heavy contacts adapted to complete a circuit to the primary winding 206 of transformer 208 through a normally open switch 210.

Power is supplied by a battery 212, the negative terminal of which is connected to conductor 214 and the positive terminal of which is adapted to be connected to a conductor 216 upon closure of the power switch 218. When the power switch is closed a relatively low control voltage is applied to the fence wire through the conductor 216. In addition, a circuit is completed through the sensitive relay 200 to apply a voltage thereacross which, however, is insufficient to operate it. The relay 200 is connected across conductors 214 and 216 through conductor 220 and resistors 222 and 224, the first of which is adjustable for the purpose of varying the sensitivity of the apparatus.

The relay 200 is adapted to be energized sufficiently to operate when an animal contacts the fence. When this occurs the current flow through the control resistor 204 increases to make the ground end thereof more positive. This more positive voltage is applied to the positive terminal of the relay 200 through the coupling condenser 226, of a value such as to prevent operation of the relay in response to slow variations in current flow through the control resistor.

When the sensitive relay is thus operated, it energizes the more rugged relay 202 through a circuit including a switch 228 operated by the relay 200, conductors 230 and 232, and a protective resistor 234. Both the relays are energized through a resistor 224, but this resistor is of such high value that neither of relays 200 or 202 is maintained in operated position because of the current flow therethrough. When the relay 202 operates it closes the previously referred to switch 210 to connect the primary winding 206 of the transformer to the condenser 236 which thereupon discharges through the primary winding and also maintains the relay 202 in operated

position even after the relay 200 has released. The condenser 236 also discharges through the sensitive relay 200 but the resistor 222 is of such value as to prevent this discharge from maintaining the relay in operated condition. The holding circuit for relay 202 is completed by a normally open relay operated switch 238 and conductor 240. Thus when the relay 202 is once operated it remains in its operated condition until the condenser 236 has been discharged.

To place the apparatus in operation it is necessary only to close the switch 218, whereupon the relay 200 is conditioned for operation in response to the control voltage appearing across 204 and a control voltage is supplied to the fence wire 22. When an animal comes into contact with the fence the flow of current through resistor 204 increases, making the ground end of the resistor more positive. This more positive potential is applied through coupling condenser 226 to the sensitive relay 200 which closes the switch 228. Closure of switch 228 results in the operation of relay 202, as the relay is connected to the condenser 236. Operation of relay 202 closes switches 210 and 238, the first of which connects the condenser 236 to the primary winding 206 of transformer 208, and the latter of which establishes a holding circuit to maintain relay 202 in operated position after relay 200 releases. The flow of current through the primary winding 206 induces a voltage in the transformer secondary winding 242 which is connected to the fence circuit through the blocking condenser 244. After the condenser 236 has been discharged the relay 202 likewise releases to open switches 210 and 238. When the switches are opened the apparatus is returned to its initial condition wherein condenser 236 is charged in readiness to produce a further shocking impulse when an animal comes into contact with the fence.

While the present invention has been described in connection with the details of different embodiments thereof, it should be understood that such details are not to be construed to be limitative of the invention except insofar as set forth in the accompanying claims.

What I claim as new and desire to secure by Letters Patent is:

1. Apparatus for energizing a fence comprising a conductive wire adapted to be placed in circuit with the body of an animal contacting the fence, including in combination, means including a normally charged condenser and an electromagnetic relay for coupling the condenser to the wire and effecting the discharge of said condenser for supplying an energy impulse to the wire, voltage supplying means coupled to the wire for applying a control voltage to the wire, means controlled in response to a momentary change in current flow in the wire and controlling said relay for effecting operation of said relay to supply an energy impulse to the wire, and current supplying means associated with the relay for maintaining said relay operated for a time to effect a desired discharge of said condenser.

2. Apparatus for energizing a fence comprising a conductive wire adapted to be placed in circuit with the body of an animal contacting the fence, including in combination, means including a condenser and an electromagnetic relay for coupling the condenser to the wire and effecting the discharge of said condenser for supplying an energy impulse to the wire, means including a source of control voltage applied to the wire for providing a control impulse when an animal contacts the

wire, relay means coupled to the wire and controlling said electromagnetic relay and operable in response to said control impulse for effecting operation of said electromagnetic relay to effect the discharge of said condenser, and means connected to the electromagnetic relay including said condenser for supplying current to said relay and maintaining said electromagnetic relay in operated condition for a time to effect discharge of said condenser to a predetermined minimum value.

3. Apparatus for energizing a fence comprising a conductive wire adapted to be placed in circuit with the body of an animal contacting the fence, including in combination, means including a normally charged condenser, a transformer inductively coupled to the wire and having a primary winding through which the condenser is adapted to be discharged and an electromagnetic relay operable to connect said condenser to said primary winding for supplying an energy impulse to the wire, means including a source of control voltage applied to the fence circuit for providing a control impulse of brief duration when an animal contacts the wire, means including an electron tube in circuit with said relay and means coupling it to the wire to render it conductive upon occurrence of a control impulse to operate said electromagnetic relay for connecting the condenser to the primary winding, and circuit controlling means in circuit with said electron tube and relay and operable by said relay for shunting said electron tube and energizing said relay from said condenser to maintain said relay in operated condition independently of said tube.

4. Apparatus for energizing a fence comprising a conductive wire adapted to be placed in circuit with the body of an animal contacting the fence, including in combination, means including a normally charged condenser, a transformer connected to the wire and having a primary winding through which the condenser is adapted to be discharged and an electromagnetic relay operable to connect said condenser to said primary winding for supplying an energy impulse to the wire, means including a source of control voltage applied to the wire for providing a control impulse when an animal contacts the wire, means including a second electromagnetic relay controlling said first mentioned relay and means coupling said second relay to the wire for connecting the condenser to the primary winding, and circuit controlling means operable by said first mentioned relay and in circuit with the relay and condenser for shunting said second mentioned relay and energizing said first mentioned relay from said condenser to maintain the first mentioned relay in operated condition independently of said second mentioned relay.

5. Apparatus for energizing a fence comprising a conductive wire adapted to be placed in circuit with the body of an animal contacting the fence, including in combination, means including a normally charged condenser, a transformer inductively connected to the wire and having a primary winding through which the condenser is adapted to be discharged and an electromagnetic relay operable to connect said condenser to said primary winding for supplying an energy impulse to the wire, means including a source of control voltage applied to the wire for providing a control impulse of brief duration when an animal contacts the wire, relay means coupled to the wire and operable in response to said control impulse and controlling said electromagnetic relay

for effecting operation of said electromagnetic relay to effect the discharge of said condenser through said primary winding, and circuit controlling means operable by said electromagnetic relay in circuit with said relay means and condenser for shunting said relay means and energizing said electromagnetic relay from said condenser to maintain said electromagnetic relay in operative condition independently of said relay means until said condenser is substantially discharged.

6. Apparatus for energizing a fence comprising a conductive wire adapted to be placed in circuit with the body of an animal contacting the wire, including in combination, means including normally inoperative energy impulse supplying means adapted to be coupled to the fence wire and comprising an electromagnetic relay operable to render said impulse supplying means operative to supply an energy impulse to the fence wire, voltage supplying means adapted to be coupled to the fence wire for applying a control voltage to the wire, means adapted to be coupled to the fence wire for producing a change in current flow when an animal contacts the wire, and change responsive relay means coupled to said last mentioned means and controlled in response to a change in current flow occurring above a predetermined rate upon contact between the wire and the body of an animal and controlling said electromagnetic relay for operating the latter to render operative said impulse supplying means to supply an impulse to the fence wire.

7. Apparatus for energizing a fence comprising a conductive wire adapted to be placed in circuit with the body of an animal contacting the wire, including in combination, means including normally inoperative energy impulse supplying means adapted to be coupled to the fence wire and comprising an electromagnetic relay operable to render said impulse supplying means operative to supply an energy impulse to the fence wire, voltage supplying means adapted to be coupled to the fence wire for applying a control voltage to the wire, means adapted to be coupled to the fence wire for producing a change in current flow when an animal contacts the wire, and change responsive relay means including an electron tube coupled to said last mentioned means and controlled in response to a change in current flow occurring above a predetermined rate upon contact between the wire and the body of an animal and controlling said electromagnetic relay for operating the latter to render operative said impulse supplying means to supply an impulse to the fence wire.

8. Apparatus for energizing a fence comprising a conductive wire adapted to be placed in circuit with the body of an animal contacting the wire, including in combination, means including normally inoperative energy impulse supplying means adapted to be coupled to the fence wire and comprising an electromagnetic relay operable to render said impulse supplying means op-

erative to supply an energy impulse to the fence wire, voltage supplying means adapted to be coupled to the fence wire for applying a control voltage to the wire, means adapted to be coupled to the fence wire for producing a change in current flow when an animal contacts the wire, and change responsive relay means coupled to said last mentioned means and controlled in response to a change in current flow occurring above a predetermined rate upon contact between the wire and the body of an animal and controlling said electromagnetic relay for operating the latter to render operative said impulse supplying means to supply an impulse to the fence wire, said change responsive relay means including a cold cathode gas discharge tube connected in series with said relay, means for normally supplying said tube with a voltage slightly below its breakdown voltage, and means coupled to said current flow changing means for raising the voltage across said tube and rendering it conductive upon the occurrence of the change.

9. Apparatus for energizing a fence comprising a conductive wire adapted to be placed in circuit with the body of an animal contacting the wire, including in combination, means including normally inoperative energy impulse supplying means adapted to be coupled to the fence wire and comprising an electromagnetic relay operable to render said impulse supplying means operative to supply an energy impulse to the fence wire, voltage supplying means adapted to be coupled to the fence wire for applying a control voltage to the wire, means adapted to be coupled to the fence wire for producing a change in current flow when an animal contacts the wire, and change responsive relay means comprising a second electromagnetic relay coupled to said last mentioned means and controlled in response to a change in current flow occurring above a predetermined rate upon contact between the wire and the body of an animal and controlling said impulse supplying means for rendering the latter operative.

WILLIAM F. FAGEN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,172,050	Mayberry	Sept. 5, 1939
2,258,669	Agnew	Oct. 14, 1941
2,333,224	Agnew	Nov. 2, 1943
2,259,570	Klumb	Oct. 21, 1941
1,738,299	Kille	Dec. 3, 1929
2,294,343	Nunn	Aug. 25, 1942
2,169,023	Dawson	Aug. 8, 1939

FOREIGN PATENTS

Number	Country	Date
109,051	Australian	Nov. 8, 1939

Certificate of Correction

Patent No. 2,415,944.

February 18, 1947.

WILLIAM F. FAGEN

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows: Column 7, line 58, claim 1, after "means" insert the words *coupled to the wire and*; column 8, line 23, claim 3, for "fence circuit" read *wire*; line 54, claim 4, for "relay" second occurrence, read *relays*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of July, A. D. 1947.

[SEAL]

LESLIE FRAZER,
First Assistant Commissioner of Patents.

Certificate of Correction

Patent No. 2,415,944.

February 18, 1947.

WILLIAM F. FAGEN

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows: Column 7, line 58, claim 1, after "means" insert the words *coupled to the wire and*; column 8, line 23, claim 3, for "fence circuit" read *wire*; line 54, claim 4, for "relay" second occurrence, read *relays*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of July, A. D. 1947.

[SEAL]

LESLIE FRAZER,

First Assistant Commissioner of Patents.