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J. P. HETHERINGTON.

TRANSFORMER CUT-OUT.

APPLICATION FILED DEC. 15, 1904.

Fig. 1.

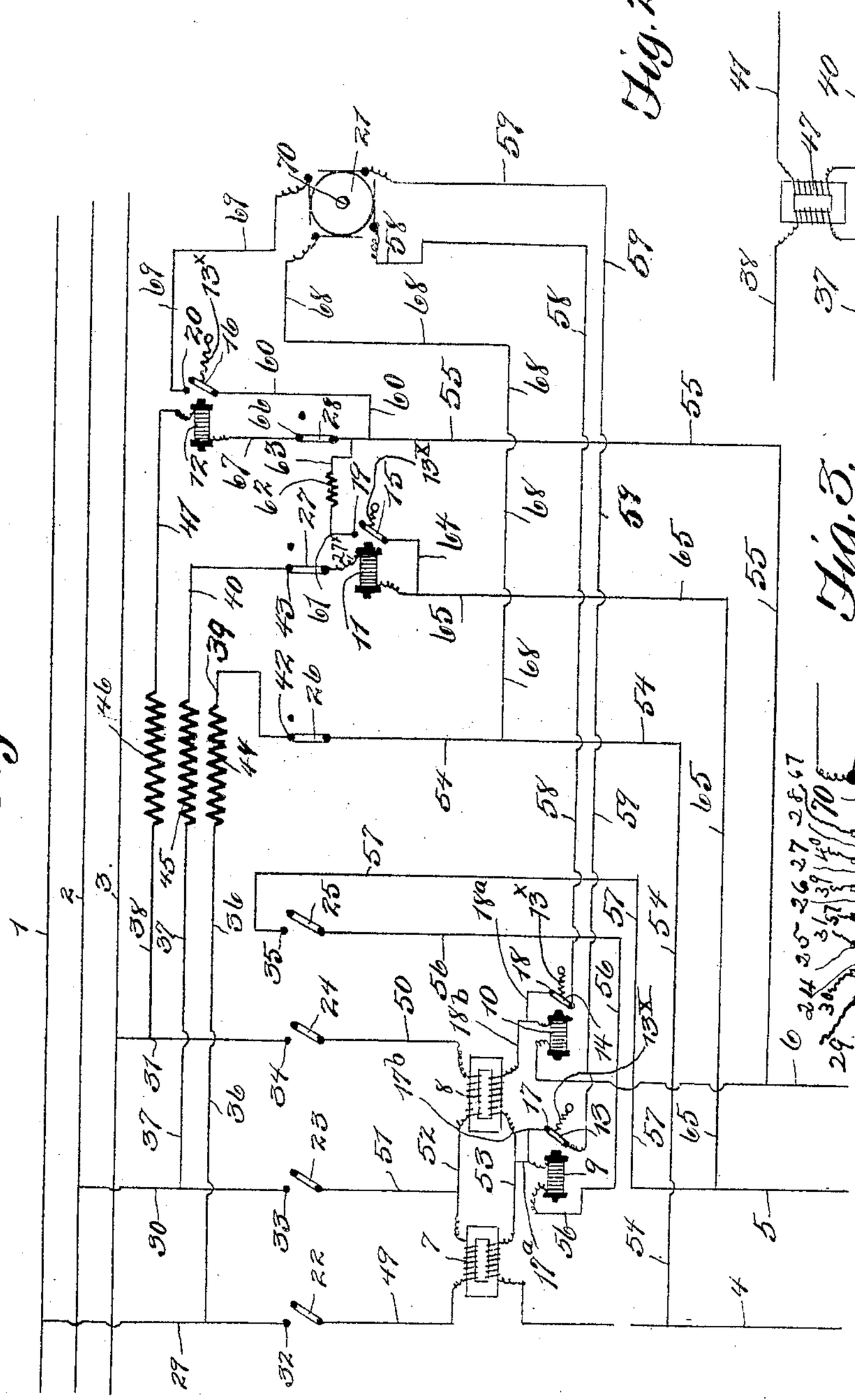
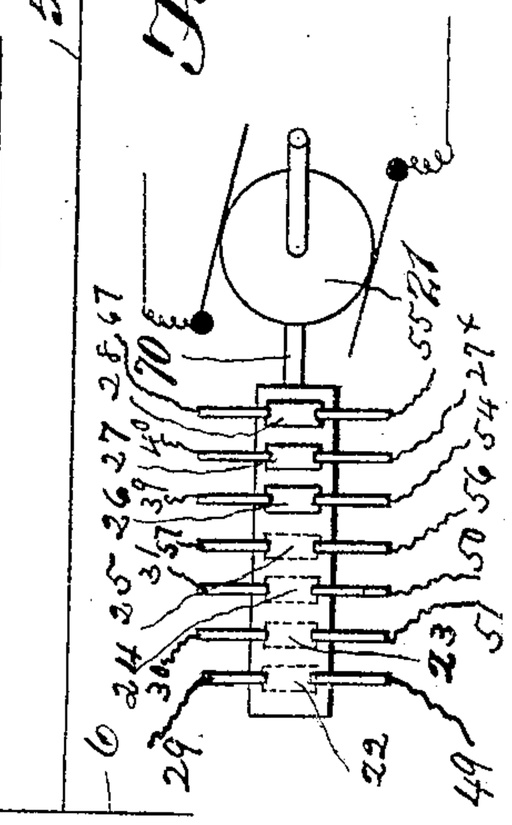


Fig. 2.

Fig. 3.



Witnesses:

R. A. Boswell.

Richard Maxwell

Inventor

John P. Hetherington

By E. G. Bond

His Attorney

UNITED STATES PATENT OFFICE.

JOHN P. HETHERINGTON, OF LOGANSPORT, INDIANA.

TRANSFORMER CUT-OUT.

No. 801,588. Specification of Letters Patent. Patented Oct. 10, 1905.

Application filed December 15, 1904. Serial No. 237,049.

To all whom it may concern:

Be it known that I, JOHN P. HETHERINGTON, a citizen of the United States of America, and a resident of Logansport, in the county of Cass and State of Indiana, have invented certain new and useful Improvements in Transformer Cut-Outs, of which the following is a specification.

This invention relates to certain new and useful improvements in transformer cut-outs to be used by electrical power or lighting plants or elsewhere.

In the present construction of transformers there is a considerable waste, as there is the same internal transformer-core loss when the lights or power is turned off as when the power is on or the lights are burning.

The present invention has for its objects, among others, to provide an improved construction and arrangement whereby this waste is prevented and wherein provision is made for the automatic cutting in or out of the transformer when the lights or power is turned on or off. This provision for the automatic cutting of the transformer in or out of circuit in the present instance is shown as applied to a three-wire system; but it is to be understood that the invention is not necessarily restricted thereto.

Other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be specifically defined by the appended claims.

The invention is clearly illustrated in the accompanying drawings, which, with the numerals of reference marked thereon, form a part of this specification, and in which—

Figure 1 is a diagrammatic view illustrative of the present invention. Fig. 2 is a detail illustrating how I may sometimes use small transformers in lieu of the resistance shown in Fig. 1. Fig. 3 is a detail showing the motor and the switches operated thereby.

Like numerals of reference indicate like parts in the different views where they appear.

1, 2, and 3 are the high-tension mains.

4, 5, and 6 are the secondary house or service wires.

7 and 8 are transformers of known or approved construction.

9, 10, 11, and 12 are magnets. 13, 14, 15, and 16 are the armatures of said magnets. The magnets 9 and 10 draw the armatures 13 and 14 away from the contacts 17 and 18. The magnets 11 and 12 draw the armatures 15 and 16 against the points 19 and 20.

In Fig. 1 the mechanism is supposed to be idle, no current being used. The armatures may be actuated in opposition to the magnets or solenoids by a spring or by gravity, depending upon the position of the magnets and armature. In the present instance I have shown springs $13^{\times}$ for this purpose.

21 is a motor, and 22, 23, 24, 25, 26, 27, and 28 are switches that are opened and closed by said motor.

29, 30, and 31 are lines or wires connecting the high-tension lines 1, 2, and 3 with the points 32, 33, 34, and 35, which latter are for coöperation with the switches 22, 23, 24, and 25, as will be apparent from Fig. 1.

36, 37, and 38 are wires that run from the wires 29, 30, and 31, respectively, and 39, 40, and 41 are wires that run from the contact-points 42 and 43 and the magnet 12, as shown in Fig. 1.

44, 45, and 46 are resistances, or they may be small transformers, as indicated at 47 and 48 in Fig. 2 in the lines 41 38, 37 40, and 36 39.

It is evident that solenoids or ampere-meters may be employed in lieu of the magnets, if desired.

The motor 21 employed may be of any suitable form, either a single reversible motor or a double motor, one to revolve each way. The magnets 9 and 10 may be directly in the circuit or shunted in, as may be found most expedient. The result is the same in either instance. The switch 22 is connected by wire 49 with the transformer 7, the switch 24 is connected with the transformer 8 by the wire 50, and the switch 23 is connected with the wire 51, which connects with the line 52, connecting the transformers 7 and 8, as seen clearly in Fig. 1. 53 is another wire connecting the transformers 7 and 8 for a purpose which will soon appear. The switch 26 connects by wire 54 with the line 4, the switch 28 connects by wire 55 with the line 6, the switch 25 connects by wire 56 with the magnet 9, while the contact-point 35 of said switch connects by wire 57 with the secondary house or service wire 5, all as seen clearly in Fig. 1. The armature 14 is connected by wire 58 with the motor, the armature 13 is connected by wire 59 with the motor, the armature 16 is connected by wire 60 with the line 55, while the contact-point 19 is connected by wire 61 with the resistance 62, which in turn is connected by wire 63 with the line 55 near its junction with the switch 28, as shown in Fig.

1. The armature 15 is connected by wire 64 with the wire 65, which connects with the house or service wire 5. The contact-point 66 of the switch 28 is connected by wire 67 with the magnet 12. The wire 68 connects the wire 54 with the motor, while the wire 69 connects the contact-point 20 with the motor. Fig. 3 shows the operative connections between the motor and the switches.

The operation is substantially as follows: In the drawings the transformers are shown as all cut out. If a light is turned on or current used for any purpose between the wires 4 and 5, it causes a current to pass from the line 1 over the line 29 and 36, through the resistance (or transformer) 44 along the line 39, over the switch 26, line 54, to the line 4, thence along the line 4 through the light or point of current consumption back through the line 5, line 65, to the magnet 11 (or solenoid,) switch 27, line 40, resistance (or transformer) 45, line 37 and line 30, to the high-tension main 2. The current passing through the magnet 11 (or solenoid) attracts its armature 15, which comes in contact with the contact-point 19. This permits part of the current to pass from the line 65 via line 64, armature 15, point 19, through the line 61, resistance 62, line 63, to the line 55. This current then passes through the switch 28, magnet (or solenoid) 12, line 47, resistance (or transformer) 46, line 38, and the line 31, to the high-tension main 3. This will all be clearly understood from an inspection of Fig. 1. The current in passing through the magnet (or solenoid) 12 attracts its armature 16, which comes in contact with the contact-point 20. This causes a current to pass from line 1 to 29, line 36, resistance (or transformer) 44, line 39, switch 26, lines 54 68, motor 21, line 69, point 20, armature 16, line 60, line 55, switch 28, line 67, magnet 12, line 41, resistance 46, lines 38 and 31, to main 3. The current passing through the motor 21 causes it to revolve and open the switches 26, 27, and 28 and close the switches 22, 23, 24, and 25. When the switches 28 and 26 are opened, the current is cut off from the motor and it stops, leaving the switches in that position. The current now passes from the line 1 through line 29, switch 22, line 49, transformer 7, line 52, line 51, switch 23, and line 30 to line 2. This induces a secondary current in the transformer 7, which passes down the line 4 to the point of current consumption and back through the line 5, switch 25, line 56, magnet 9, (which is shunted in,) line 17^a, line 53, and back to the transformer 7. The current (which may be shunted in) passing through the magnet (or solenoid) 9 attracts its armature 13 and holds it from its contact-point 17. When the circuit is broken between the lines 4 and 5, the magnet (or solenoid) 9 is demagnetized, allowing its armature 13 to be drawn against its contact-point 17. This allows a current to pass from the transformer 8 through the line 53, line 17^a, line 17^b, point 17, armature 13, line 59, motor 21, (or the reverse-motor, if a double motor is used,) line 58, armature 14, point 18, line 18^a, line 18^b, back to the transformer 8. This reverses the motor 21, (or moves the reverse-motor,) turning the switch-shaft of the motor and opens the switches 22, 23, 24, and 25 and closes the switches 26, 27, and 28, leaving the mechanism as at the beginning of this description. If the lines 5 and 6 are closed, the current passes from the line 2 through the line 30, line 37, resistance (or transformer) 45, line 40, switch 27, magnet 11, line 65, line 5, to the point of current consumption, and back through the line 6, line 55, switch 28, magnet 12, line 41, resistance (or transformer) 46, line 38, and line 31, to the main line 3. In passing through the magnet 12 the armature 16 is drawn against the point 20, causing a current to flow from the line 55, through the line 60, armature 16, point 20, line 69, motor 21, line 68, line 54, switch 26, line 39, resistance (or transformer) 44, line 36, line 29, to the main line 1. This causes the motor 21 to revolve, closing the switches 22, 23, 24, and 25 and opening the switches 26, 27, and 28, which stops the motor. The current now passes from line 2 through the line 30, switch 23, line 51, line 52, transformer 8, line 50, switch 24, and line 31, to line 3. This induces a secondary current in the transformer 8, which passes along the line 53, line 17^a, magnet (or solenoid) 9, line 56, switch 25, point 35, lines 57 and 5, to the point of current consumption, back through the line 6, magnet (or solenoid) 10, which is shunted in, line 18^b to the transformer 8. The current passing through the magnets (or solenoids) 9 and 10 hold their armatures 13 and 14 from the points 17 and 18. When the connections between the lines 5 and 6 are broken, the magnets (or solenoids) 9 and 10 are demagnetized, allowing the armatures 13 and 14 to come in contact with the points 17 and 18, respectively. The current now passes from the transformer 8, through the line 53, line 17^a, line 17^b, point 17, armature 13, line 59, motor 21, (or the reverse-motor, if a double motor be used,) line 58, armature 14, point 18, line 18^a, line 18^b, back to the transformer 8. This causes the motor to close the switches 26, 27, and 28 and open the switches 22, 23, 24, and 25, which stops the motor and leaves the mechanism as at the beginning. If the lines 4 and 6 are connected, a current flows from line 1, through the line 29, line 36, resistance (or transformer) 44, line 39, switch 26, line 54, line 4, connections between the lines 4 and 6, back through the line 6, line 55, switch 28, magnet 12, line 41, the resistance (or transformer) 46, the line 38, and the line 31, to the main line 3, all as will be clearly understood from Fig. 1. In passing through the magnet 12 the armature 16 is drawn against the point 20, causing a current to pass from the line 1 to 29, line 36, resistance

(or transformer) 44, line 39, switch 26, lines 54 68, motor 21, line 69, point 20, armature 16, line 60, line 55, switch 28, line 67, magnet 12, line 41, resistance 46, lines 38 and 31, to main 3. This causes the motor to close the switches 22, 23, 24, and 25 and open the switches 26, 27, and 28, which stops the motor. The current now passes from the line 1, through the line 29, switch 22, line 49, transformer 7, line 52, transformer 8, line 50, switch 24, and the line 31, to the main line 3. The secondary current induced now passes from the transformer 7 through the line 4, to the line 6, through the magnet (or solenoid) 10, line 18^b, transformer 8, line 53, to the transformer 7. The current passing through the magnet (or solenoid) 10 holds the armature 14 from the point 18. When the connection between the lines 4 and 6 is broken, the magnet (or solenoid) 10 is demagnetized, allowing the armature 14 to come in contact with the point 18. The current now passes from the transformer 8, through the line 53, line 17^a, line 17^b, point 17, armature 13, line 59, motor 21, (or the reverse-motor, if a double motor is employed,) line 58, armature 14, point 18, line 18^a, line 18^b, to the transformer 8. This causes the motor to close the switches 26, 27, and 28 and open the switches 22, 23, 24, and 25 and stop the motor and leave the mechanism as at the beginning.

From the above it will be evident that I have devised a simple and practical form of transformer cut-out, and while the embodiment of the invention as hereinbefore disclosed is what I at the present time consider preferable it is evident that the same is subject to changes, variations, and modifications, and I therefore do not wish to be restricted to the precise construction and arrangement of parts herein set forth, but reserve the right to make such changes, variations, and modifications as come properly within the scope of the protection prayed.

What is claimed as new is—

1. In a transformer cut-out, high-tension mains, a motor and switches controlled thereby, transformers connected with said high-tension mains, and interposed switches and magnets and connections to cut both primary transformer-wires, as set forth.

2. In a transformer cut-out, high-tension mains, a motor and switches, transformers connected with said high-tension mains, interposed switches, magnets and connections, said motor and magnets being energized by current from said transformers and high-tension mains.

3. In a transformer cut-out, high-tension mains, service-wires, transformers and switches interposed therebetween, a motor and connections for controlling said switches by the motor, and magnets and resistances interposed between said motor and mains and between the motor and the transformers.

4. In a three-wire system for the purpose specified, the combination with the high-tension mains, of transformers, service-lines, and switches, a motor and connections for controlling the switches, transformer connections, and means controlled by the motor for shunting the current, as and for the purposes specified.

5. In a three-wire system for the purpose specified, high-tension mains, transformers connected therewith, service-lines, magnets and shunt-circuits between said service-lines and the transformers, and a motor and connections for controlling the service-lines.

6. In a transformer cut-out, high-tension mains, transformers connected therewith with interposed switches, a motor and connections for controlling said switches, service-wires and magnets or solenoids supplied and energized with current from said transformer and high-tension mains, operatively interposed as and for the purpose specified.

Signed by me at Logansport, Indiana, this 12th day of December, 1904.

JOHN P. HETHERINGTON.

Witnesses:

FRANCIS C. SWADENER,

BENJAMIN C. STEVENS.