F. B. BADT.

INTERMITTENT ILLUMINATING SYSTEM.

APPLICATION FILED AUG. 9, 1905.

902,798. Patented Nov. 3, 1908.

2 SHEETS—SHEET 1.

Fig. 1.

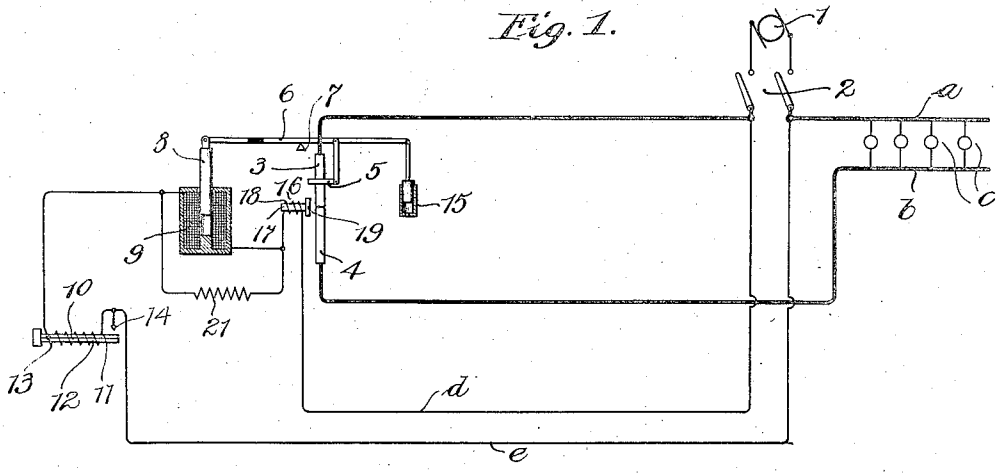


Fig. 2.

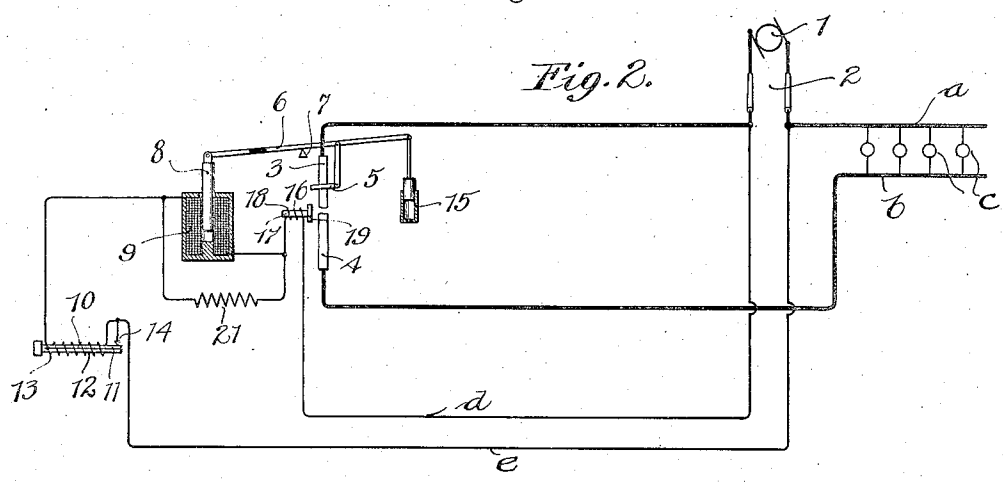
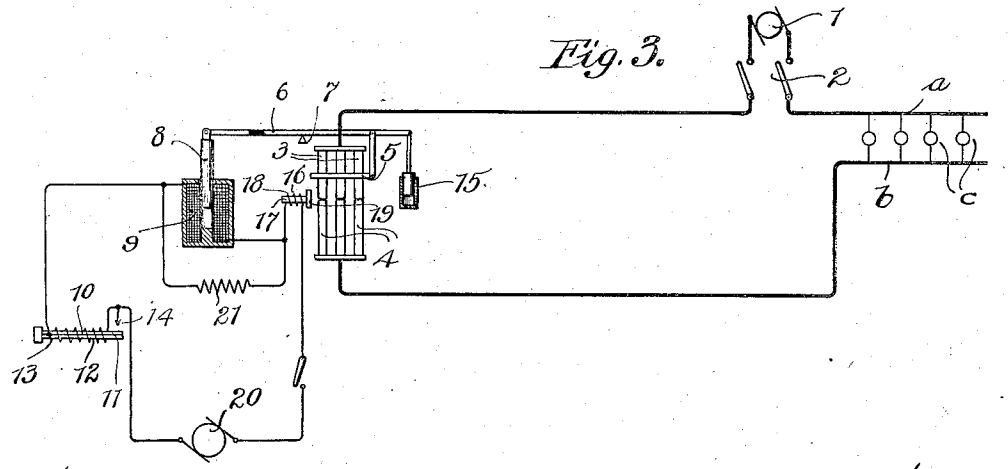


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

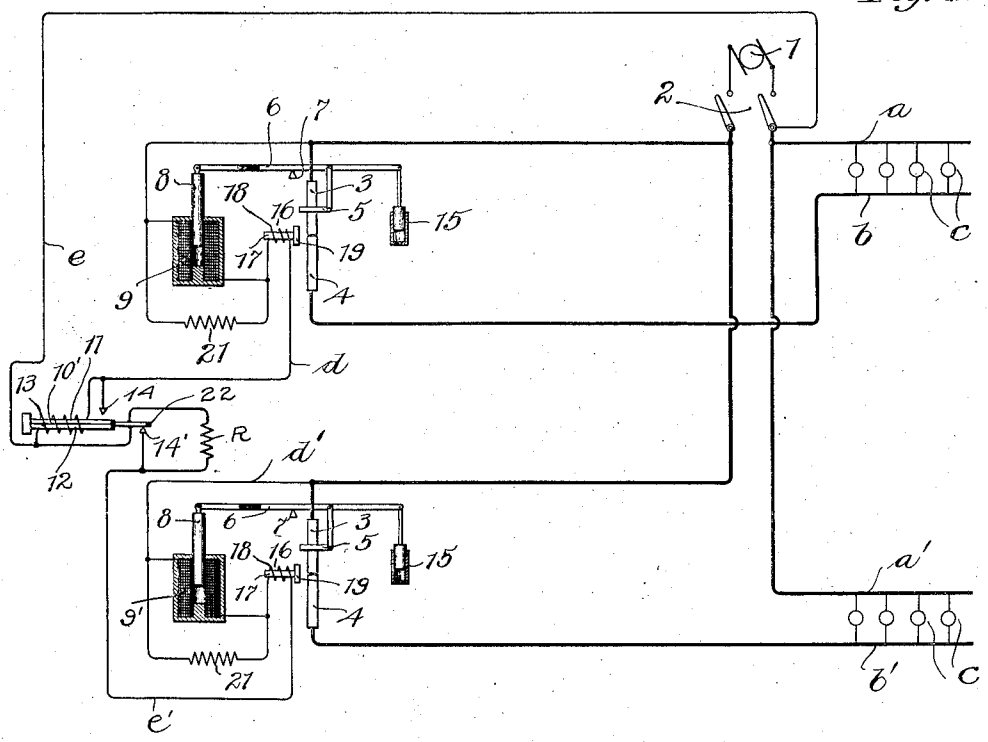
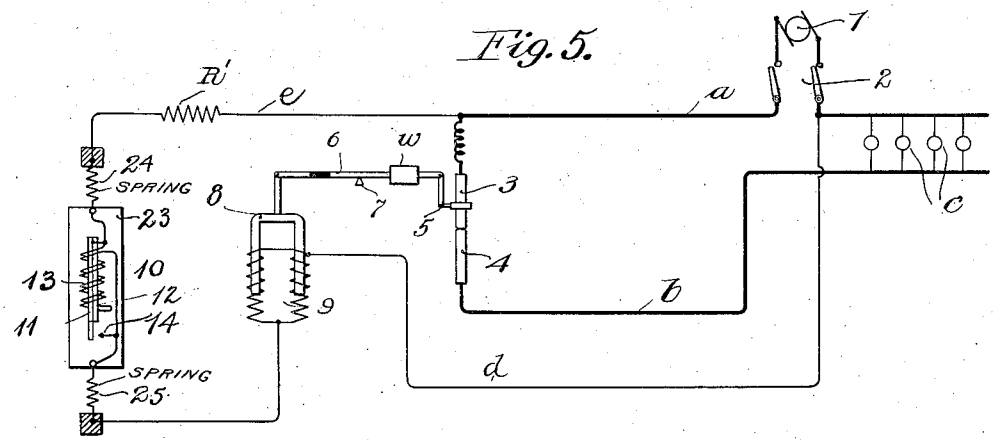


Fig. 5.



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INTERMITTENT ILLUMINATING SYSTEM.

No. 902,798. Specification of Letters Patent. Patented Nov. 3, 1908.

Application filed August 9, 1905. Serial No. 273,339.

To all whom it may concern:

Be it known that I, FRANCIS B. BADT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Intermittent Illuminating Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to intermittent illuminating systems, and its object is to provide a more simple, durable and more inexpensive, and in general, a more efficient system than has been heretofore employed.

In my improved system, the lamp circuit is interrupted at carbon contact points and these contacts are controlled by electromagnetic mechanism included in an independent circuit which may be connected in derivation of the main circuit. The movable part of the electromagnetic mechanism is mechanically associated with the contacts to control the opening and closure thereof, and the circuit through the electromagnetic mechanism is governed by some circuit controlling means which in this application I shall show in the form of thermostatic apparatus. The resistance of this controlling circuit may be made very high and thus the current consumption reduced to a minimum, at the same time giving the highest efficiency. As electromagnetic mechanism and thermostat mechanism is used, there will practically be no wearing or deterioration of parts and thus the expense of maintenance and operation will be very small indeed.

The thermostat may be of various designs and arranged in various ways to control the continuity of the circuit through the electromagnetic mechanism, the operation of the thermostat mechanism being periodic whereby the main illuminating circuit will be alternately opened and closed.

My invention will be best understood by reference to the accompanying drawings, in which

Figure 1 shows an illuminating circuit controlled by the electromagnetic mechanism, there being no current flow through the circuits. Fig. 2 is a similar view, the circuits being connected with the source of current. Fig. 3 shows a modified arrangement of circuits and apparatus. Fig. 4 shows two main lines controlled by a common thermostatic apparatus, and Fig. 5 shows another modified arrangement of circuits and apparatus.

The source of current 1 upon closure of the switch 2 supplies current to the main circuit line limbs *a* and *b* between which may be connected translating devices such as lamps *c*. Contacts 3 and 4 are shown included serially in the line limb *b* and may be in the form of ordinary electric light carbons. The lower contact 4 may be stationary and the upper contact 3 engaged by clutch mechanism 5 connected with the lever 6 pivoted at 7, whose one end is pivoted to the upper end of the solenoid core 8, provided with the solenoid winding 9. This solenoid winding is included in the circuit *d*, *e* which may be connected in derivation of the main line, and upon sufficient current flow through the controlling circuit the solenoid will become sufficiently energized to attract the core 8 thereby to separate the contacts 3 and 4 and to open the illuminating circuit.

For controlling the circuit including the electromagnetic mechanism I preferably utilize thermostatic mechanism 10 which in its simplest form may consist of the two strips 11 and 12 surrounded by the winding 13, or which may be of the construction shown in my Patent No. 548,904 granted October 29, 1895. The winding 13 is included serially in the controlling circuit, and one terminal of this winding is in contact with the strips. A contact 14 connects with the other terminal of the winding, and upon engagement of this contact with the strips the strips will form a short circuit path about the winding. The controlling circuit is thus never broken, but is closed either through the thermostat winding or through the short circuiting path about said winding. The resistance of the circuit, however, when the thermostat winding is included in circuit, is sufficiently high to prevent attraction of the core 8 and disengagement of the contacts 3 and 4. This current flow, however, through the thermostat winding heats the strips and causes them to move into engagement with the contact 14, and as the winding is now short-circuited sufficient current may flow to cause attraction of the core 8 and separation of the contacts 3 and 4. Upon cessation of current flow through the thermostat winding the strips cool and return to their normal position in which current can again flow through the winding and the same operations repeated.

Even though the contacts 3 and 4 are of carbon there is apt to be considerable sparking as they are drawn apart to break the illuminating circuit, particularly where the translating devices are numerous, and magnetic blow-out mechanism 16 may be used for destroying the arc between the separating contacts. This blow-out mechanism may consist of the core 17 surrounded by a winding 18 which may be included serially in the controlling circuit, and to continue the arc destroying effect of the blow-out mechanism, the core 17 may be provided with a shoe 19 which is of sufficient length to cover the maximum distance that the contacts will separate. When the current flowing through the illuminating circuit is very large two or more contacts may be connected in parallel to distribute the arcs, as shown in Fig. 3, and blow-out mechanism may be used in a similar manner as above described for destroying the several arcs. Current supply for the controlling circuit also need not necessarily be derived from the main source connected with the translating devices, but may be derived from an independent source 20 which may be a dynamo machine or a battery. Also to provide against the evil results of counter-electromotive force or back kick of current upon disengagement of the strips from the contact 14, a non-inductive resistance 21 may be bridged about this winding.

In Fig. 4 I have shown two illuminating circuits *a b* and *a' b'* controlled by a common thermostat mechanism 10. One terminal of the winding 13 connects with the core of the thermostat and with a contact extension 22 secured to the core, the contact 14 connected with the other terminal of the winding 13 being normally out of engagement with the core. The conductor *e'* of the controlling circuit for the main circuit *a' b'* connects with this contact extension 22 but includes a resistance R which is preferably of the same resistance as the winding 13 of the thermostat. A contact 14' also connected with this conductor *e* is normally in engagement with the contact 22 and with this contact forms a short circuiting path about the resistance R. Upon closure of the main switch 2, current flows through the conductor *e* to the thermostat, part of the current flowing through the winding 13 and through the controlling circuit of the main line *a b*, the remaining current flowing through the contacts 22 and 14' and through the controlling circuit of the main line *a' b'*. The resistance of the winding 13, however, prevents sufficient current flow through the solenoid 9, but as the resistance R is short-circuited there will be sufficient current flow through the solenoid winding 9' and the main circuit *a' b'* will be opened. After an interval of current flow through the winding 13, however, the thermostat core becomes heated and moves into engagement with the contact 14 at the same time causing the contact 22 to disengage from the contact 14'. The winding 13 being then short-circuited sufficient current will flow through the solenoid winding 9 and the main circuit *a b* will be opened. Upon disengagement of the contacts 22 and 14' the resistance R will become effective and will reduce the current flow through the controlling circuit *d' e'* and the electromagnetic mechanism will be restored to close the main circuit *a' b'*. When the core cools upon cessation of current flow through the winding 13 it will again become disconnected from the contact 14 to cause deënergization of the solenoid 9 and the resistance R will again become short-circuited to allow actuation of the solenoid 9', and so on the electromagnetic mechanisms are alternately actuated and the translating devices connected with the circuits *a b* and *a' b'* will be alternately illuminated.

In Fig. 5 is shown another modified arrangement of circuits and apparatus. I have found that a thermostat of the construction described is very sensitive to vibrations or sudden shocks or jolts, and I find that it is necessary to so support the thermostat mechansim that it will be free from such sudden jolts or vibrations. This arrangement in Fig. 5 showing the thermostat base or support 23 suspended between springs 24 and 25 I find to operate very successfully. I also find that the thermostat is sensitive to inductive effects, one result being more or less sticking at the contact 14. This can be prevented by arranging the winding 13 to be non-inductive as shown. To further adjust the current flow through the controlling circuit a resistance R' may be included in said circuit. Also to prevent sudden and perhaps harmful engagement of the contacts upon deënergization of the solenoid winding, the solenoid winding may be so adjusted that although the current flow therethrough when a thermostat winding is included in circuit is insufficient to cause actuation of the core 8 to disengage the contacts 3 and 4 it will be of sufficient strength to prevent sudden return of the core to its normal position upon short-circuiting of the thermostat winding, and the movement of the core 8 to its normal position will be more or less retarded. Dash pot mechanism 15 such as shown in Figs. 1, 2, 3 and 4, however, may also be provided to prevent too sudden engagement of these contacts. A weight *w* may also be provided to compensate for the weight of the solenoid core as shown in Fig. 5.

Many other changes and modifications in the arrangement of circuits and apparatus may be made without departing from the spirit of my invention, and I do not, therefore, wish to be limited to the arrangements herein shown.

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

1. In a controlling system, the combination with a main circuit connected with a source of current supply, of contacts for controlling said circuit, a solenoid armature, lever mechanism connecting said armature with said contacts, a solenoid winding for said armature, a permanently closed independent circuit and including said solenoid winding and receiving current from the main circuit, a thermostat device for controlling said independent circuit, a heat producing winding surrounding the core of the thermostat device and included in said independent circuit, one terminal of said winding being connected with said core, and the other terminal thereof being connected with a contact adapted to be engaged by said core upon heating thereof whereby said winding will be short-circuited, short-circuiting said winding allowing sufficient current flow through the independent circuit to cause sufficient energization of the solenoid mechanism to cause operation of the main line contacts, removal of said short circuit causing reduction in current flow whereby said solenoid mechanism is allowed to return to its normal position to cause restoration of the contacts to their normal position, the current flow through said solenoid winding upon inclusion of the thermostat winding and circuit being sufficient to retard the restoring movement of the solenoid armature whereby the main line contacts are slowly restored to normal position.

2. In a controlling system of the class described, the combination with a main circuit connected with a source of current supply, of contacts for controlling said circuit, a solenoid core, lever mechanism connecting said core with one of said contacts, a solenoid winding for said core, a circuit connected in bridge of the main circuit and including the solenoid winding, a thermostat device for controlling said bridge circuit, said thermostat comprising a core and a winding surrounding the core and normally included in the bridge circuit, said one contact and lever mechanism normally overbalancing the solenoid core to prevent movement thereof by the solenoid winding during diminished current flow therethrough when the thermostat winding is included in the bridge circuit, an interval of current flow through the thermostat winding causing heating movement of its core, a contact connected with the bridge circuit and engaged by the thermostat core upon movement thereof to short circuit the thermostat winding, the increased current flow through the bridge circuit upon removal of the thermostat winding from said circuit causing increased current flow through the solenoid winding and contraction of its core, whereby the lever mechanism and contact are moved to disengage the main circuit contacts, disconnection from circuit of the thermostat winding allowing its core to cool and to return to normal position so that the thermostat winding is again included in circuit and the current flow through the bridge circuit again diminished so that the solenoid core will return to its normal position, the diminished current flow through the solenoid winding being sufficient to create a magnetic drag so that the restoring movement of the solenoid core is sufficiently retarded to prevent harmful reëngagement of the main circuit contacts.

In witness whereof, I hereunto subscribe my name this 5th day of August A. D., 1905.

FRANCIS B. BADT.

Witnesses:

CHARLES J. SCHMIDT,

JOHN STAHR.