No. 616,079. Patented Dec. 20, 1898.

C. COLEMAN.

ELECTRICAL BURGLAR ALARM.

(Application filed June 29, 1896.)

(No Model.) 2 Sheets—Sheet 1.

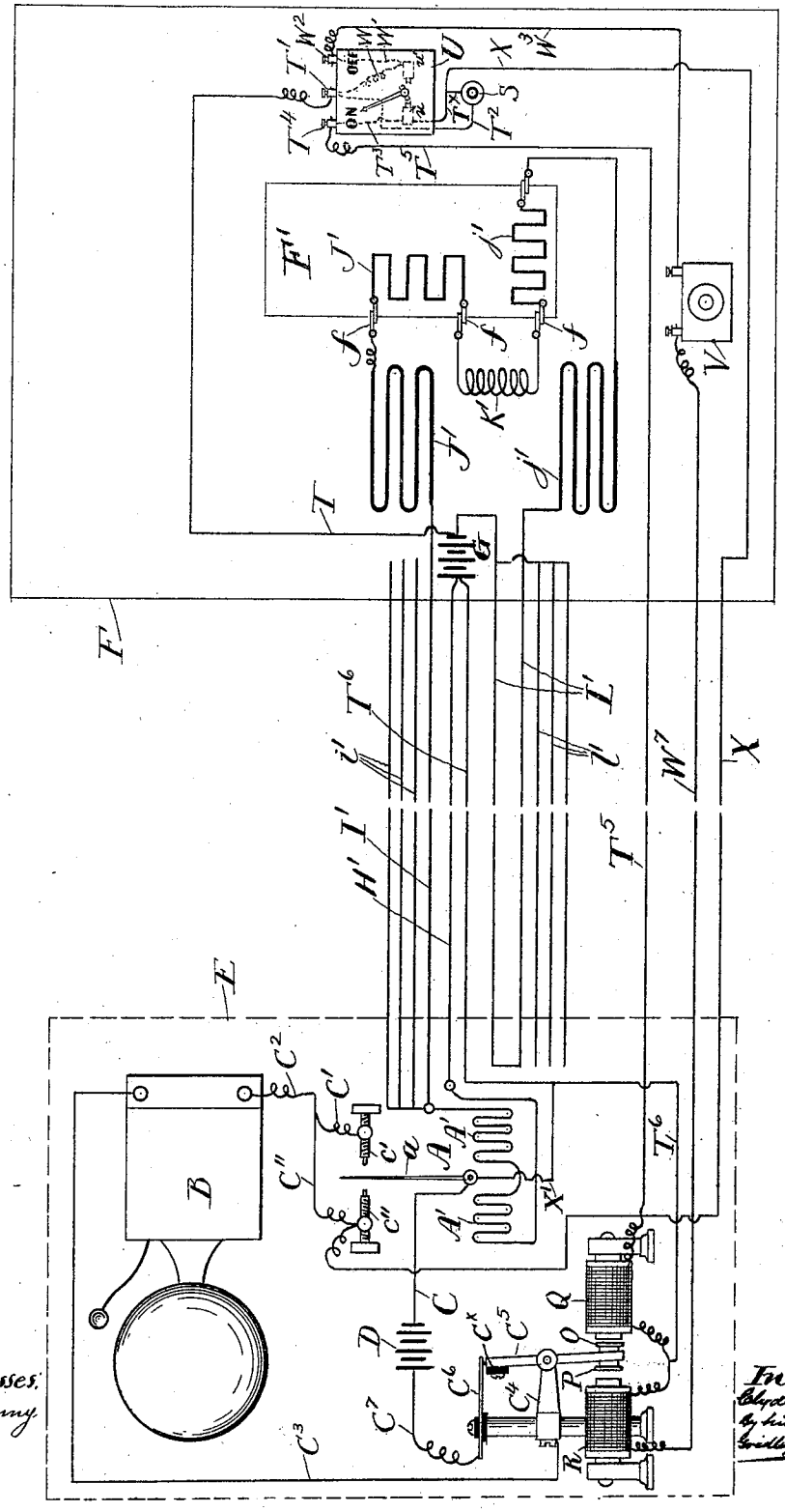


FIG. 1.

Witnesses:
J. Halpenny
S. Gross

Inventor
Colyer Coleman
by his attorneys
Bailey & Hopkins

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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(No Model.) 2 Sheets—Sheet 2.

FIG. 5.

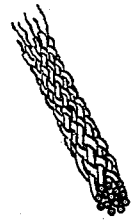


FIG. 3.

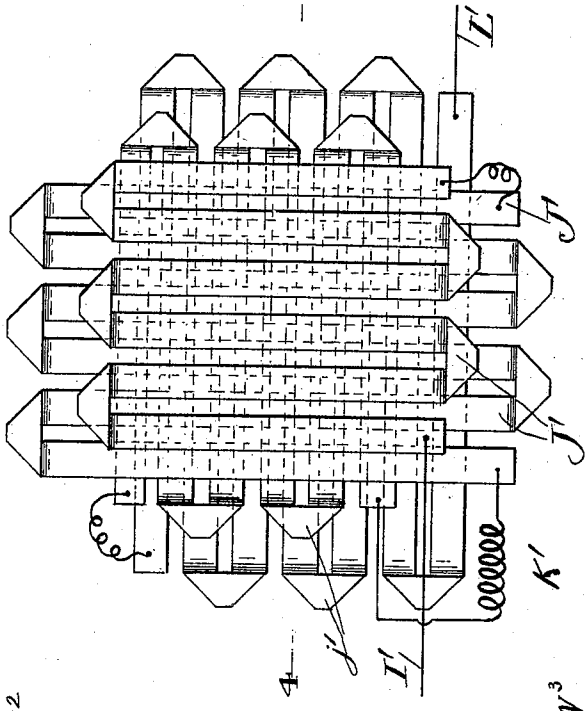


FIG. 4.

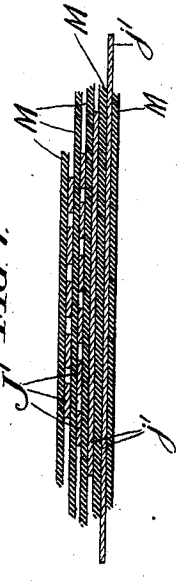
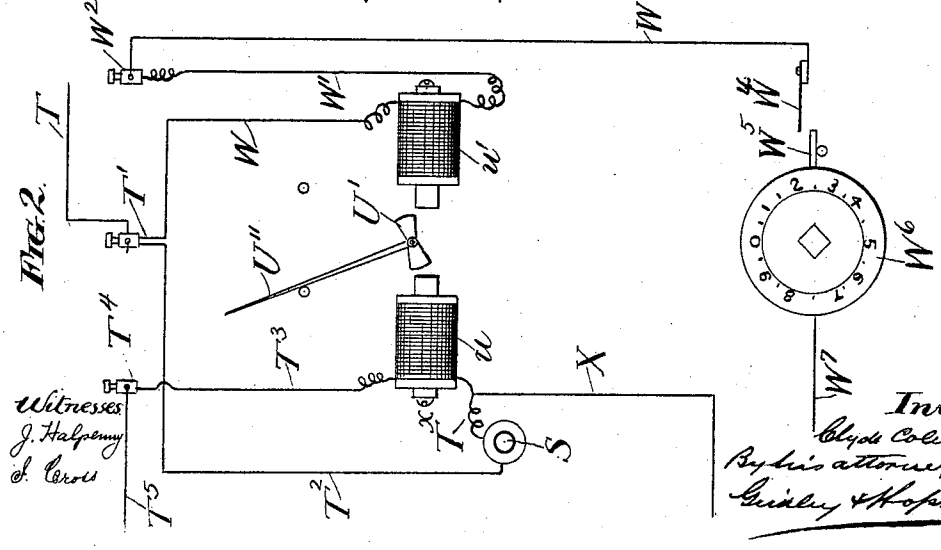


FIG. 2.



Witnesses
J. Halpenny
J. Carol

Inventor
Clyde Coleman
By his attorneys
Gridley & Hopkins

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CLYDE COLEMAN, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, OF TWO-THIRDS TO GEORGE P. JONES, OF SAME PLACE.

ELECTRICAL BURGLAR-ALARM.

SPECIFICATION forming part of Letters Patent No. 616,079, dated December 20, 1898.

Application filed June 29, 1896. Serial No. 597,445. (No model.)

To all whom it may concern:

Be it known that I, CLYDE COLEMAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electrical Burglar-Alarms, of which the following is a specification.

The present invention relates to that class of burglar-alarms which have a main or controlling circuit extending from the guarded structure to the alarm-station and an electrical device that is influenced by variations in the current passing through the main or controlling circuit and adapted when so influenced to cause a signal or alarm to be given, preferably by closing a local alarm-circuit.

In this specification I shall refer to the device which is influenced by variations in the condition of the main or controlling circuit and which causes the alarm to be sounded when such variations occur as a "meter;" but I desire to have it understood that the invention is not limited to a "meter," strictly so called, this term as used in this specification being intended to comprehend any device that will be affected by a variation in the electrical condition of the controlling-circuit.

The term "guarded structure" as used in this specification is intended to comprehend a safe, a building, or any part of a building or other structure which is equipped with the alarm system. The term "station" is intended to comprehend any place where it is desired to give the alarm when the system is tampered with. The term "alarm" is intended to comprehend any device which will produce an audible or a visible signal.

The drawings show a burglar-alarm system adapted for application to only one structure to be guarded; but the invention is not limited in this respect, and to provide a system for guarding any desired number of structures it is simply necessary to duplicate those parts that are hereinafter said to be located at the guarded structure and to extend the wiring accordingly.

The invention consists in the features of novelty that are particularly pointed out in the claims hereinafter, and in order that it may be fully understood I will describe it with reference to the accompanying drawings, which are made a part of this specification, and in which—

Figure 1 is a diagrammatic representation of a burglar-alarm system embodying the invention and adapted for application to a single guarded structure. Fig. 2 is a view showing, partly in section, partly in elevation, and partly in diagram, portions of the switch-circuits and their accessories. Figs. 3 and 4 are detail views showing the preferred manner of constructing the barrier. Fig. 5 is a detail view of a portion of the braided conductors.

A represents the device hereinbefore termed a "meter," which is so associated with the main or controlling circuit and with a local alarm-circuit that upon a variation in the condition of the current in the main or controlling circuit it will close the alarm-circuit and cause an alarm to be given. As shown in the drawings, the alarm consists of a magneto-electric bell B; but any other form of signaling device may, if desired, be used. The alarm-circuit comprises a wire C, extending from one pole of a battery D to the shaft of the needle *a* of the meter, two wires C′ C″, connected with binding-posts in which are arranged two contact-screws *c′ c″* whose points are located upon opposite sides of the needle *a* and in the path traveled thereby when in motion, a wire C^2, leading from the wires C′ C″ to one of the binding-posts of the alarm, a wire C^3, leading from the other binding-post of the alarm to a bracket C^4, contact-plates C^5 C^6, and a wire C^7, leading from the contact-plate C^6 to the other pole of the battery D. When the current in the main circuit is normal, the needle *a* will remain in a central position between the contact-screws *c′ c″*; but when the condition of the current in the main circuit is varied the needle will be deflected and come in contact with one or the other of said screws, according to the nature of the variation, and the alarm-circuit will thereby be closed. I prefer to use an audible electric alarm, such as above described; but, as already stated, the invention is not limited thereto. Furthermore, where such an electrical alarm is used I prefer to control it by means of a balanced galvanometer or a balanced relay; but, as before intimated, the

invention is not limited thereto, but, on the contrary, comprehends any device of such construction that it will be influenced by a variation in the condition of the main circuit, and whatever be the construction of this device it is the intention that the term "meter" as used in this specification shall comprehend it.

The dotted line E represents the office or station, and F represents the outline of the structure to be guarded.

G represents a battery which is located within the guarded structure and is by preference the only battery used in the system, excepting the battery of the local alarm-circuit, already described. The main or controlling circuit includes a wire H', leading from one pole of the battery, which is located at the guarded structure to the station, the coils A' of the meter, a wire I', leading to the guarded structure, one member J' of a barrier, a resistance-coil K', a second member j' of the barrier, and a wire L', which extends to the guarded structure and is there doubled upon itself and returned to the other pole of the battery.

The present invention in its broadest aspect is not limited to a barrier of any particular construction, albeit I prefer to use a barrier of the construction herein shown and described. Considered in detail this barrier consists of four layers of tin-foil, each of which is separated from the next by means of an insulating-sheet M. Each of these layers is made up of a number of parallel strips of tin-foil, the strips of the first and second layers being parallel with each other and so arranged that the strips of the one break joints with the strips of the other. The strips of the third and fourth layers are similarly arranged with relation to each other, but at right angles to the strips of the first and second layers, the strips of all four layers being electrically connected in series. These details in the arrangement of the strips are shown in Fig. 3; but for the sake of clearness the insulating-sheets are omitted and the several layers of tin-foil are shown as being made up of strips of different lengths. In practice, however, this will not be the case, it being the intention that the entire area of all sides of the guarded structure shall be protected by a barrier made up of the four layers arranged as described. With a barrier of this construction it will be impossible to penetrate the structure without either completely severing one of the strips of which the barrier is made up or else electrically connecting two of the strips at points upon opposite sides of the resistance-coil. It will be noticed that the barrier is divided into two practically equal parts or members J' j' and that the resistance-coil is disposed between these two members, so that if said members are electrically connected the resistance-coil will be short-circuited, and this will increase the current passing through the coils of the meter, and thereby cause its needle to be deflected and come in contact with one or the other of the contacts c' c''. The barrier is disposed upon the door F' as well as upon other parts of the guarded structure, and the portions of the barrier which are so disposed upon the door are electrically connected with the portions that are disposed upon the other parts of the guarded structure when the door is closed by contact-plates f, so arranged that when the door is opened the main circuit, which includes these contacts, will be broken.

It will be understood that in the normal condition of the apparatus the current passing through the meter will maintain its needle in a central position between its contacts c' c'' and that upon a disturbance in the current passing through the meter, however this disturbance may be caused, the needle will be deflected and close the local alarm-circuit in the manner already described. Such a disturbance will be produced by severing the main circuit or by bridging it at such points as to short-circuit the resistance-coil or any considerable portion of the main circuit itself.

The local alarm-circuit includes a movable contact-plate C^5, which is held in any position to which it may be moved by the frictional contact therewith of a spring contact-plate C^6. The contact-plate C^5 is fulcrumed to the arm C^4, and one of its arms carries two armatures O and P, located between two magnets Q and R, the arrangement being such that when the magnet Q is energized the armature O will be attracted and the contact-plate C^5 be in electrical connection with the contact-plate C^6, and when the magnet R is energized the armature P will be attracted and thereby shift the contact-plate C^5, so as to bring the contact-plate C^6 to a bearing upon an insulating-block $C^\times$. In this way the local alarm-circuit is either completed or broken at this point.

The magnet Q is included in what I term the "manual-switch" circuit, which consists of a wire T, leading from the battery G to one of the binding-posts T' of an annunciator U, a wire T^2, leading from this binding-post to the switch S, a wire $T^\times$, leading from this switch to one of the electromagnets u of the annunciator, a wire T^3, leading from said magnet to a binding-post T^4, a wire T^5, leading from this binding-post to the magnet Q, and a wire T^6, leading from said magnet back to the battery G, the wires T and T^6 being also common to the chronometer-switch circuit and test-circuit.

The magnet R is included in what I term the "chronometer-switch" circuit, which consists of the wire T, a wire W, leading from the binding-post to the magnet u', a wire W', leading from the magnet to the binding-post W^2 of the annunciator, a wire W^3, leading from said binding-post to a spring-plate W^4, forming one member of the chronometer-switch, a plate W^5, forming the other member of the chronometer-switch, one of the in-

sulated disks W^6 of a time-lock or chronometer V, which is located within the guarded structure, so as to be protected thereby, a wire W^7, leading from said disk to the magnet R, and the wire T^6, leading from said magnet back to the battery. The test-circuit includes the wire T, the binding-post T', the wire T^2, the manual switch S, a portion of the wire $T^\times$, a wire X, leading from the wire $T^\times$ at a point between the switch S and magnet u to the binding-post of one of the contacts c' c'', the needle a, a wire X', extending from the shaft of the needle to the wire T^6, and that portion of the wire T^6 which extends from its point of connection with the wire X' back to the battery.

The annunciator is provided with an oscillating armature U', mounted upon a horizontal axis which is slightly above the pole-pieces of the magnets u u', the arrangement being such that when either of the magnets is energized it will cause the side of the armature which is nearest it to be drawn down, and thereby change the position of the index U'', which is secured to the armature-shaft, the weight of the index being sufficient to hold it in either position to which it may be moved by the magnets. The annunciator is provided with the words "On" and "Off," so disposed that when the magnet u is energized the index will point to the word "On," and when the magnet u' is energized the index will point to the word "Off."

As shown in Fig. 1 of the drawings, the alarm is on and the meter is balanced. If the condition of the current passing through the controlling-circuit be varied in any way, the meter will be thrown out of balance and the needle a will touch one or the other of the contacts c' c'', and thus complete the alarm-circuit. Unless a disturbance of this kind takes place the parts will remain in the conditions shown until the time-lock is nearly run down, whereupon the chronometer-switch circuit will be closed at W^4 W^5 and the current will pass through this circuit, energizing the magnets R and u'. This will open the alarm-circuit at C^5 C^6, as already described, and move the index U'' to "Off." The door of the guarded structure may then be opened without giving an alarm. When it is desired to again set the alarm, the door is closed and the manual switch S is operated for both testing the system and throwing it on. Let it be supposed that because of corrosion or some foreign substance at the contacts f the controlling-circuit is not established. The operation of the switch S will complete the circuit at this point; but by reason of the fact that the manual-switch circuit is of greater resistance than the test-circuit the major portion of the current will take the latter, which is completed through whichever of the contacts c' c'' the needle a happens to be in contact with. The fact that the index does not move from "Off" to "On" will indicate to the operator that the controlling-circuit has not been established. On the other hand, let it be supposed that the controlling-circuit is established by closing the door. This will cause the meter to balance and open the test-circuit at a, so that when the manual switch S is operated the current instead of taking the test-circuit will take the manual-switch circuit, thereby energizing the magnets Q and u. This will complete the alarm-circuit at C^5 C^6 and will move the index of the annunciator from "Off" to "On." The parts W^4 W^5 of the chronometer-switch are so related that the circuit is completed at this point a few minutes before the time-lock opens, so that it will remain completed for a short while and then be broken by the continued movement of the disk W^6.

In practice the wires of the controlling and testing switching-circuits are all insulated from each other and braided together, and with them are braided any desired number of interrupted wires i' l', all of which latter are charged with electricity at the same potential as is the controlling-circuit. This may be accomplished by connecting them with separate batteries; but I prefer to accomplish it by connecting one end of each of them directly with the controlling-circuit. I prefer also that there shall be a plurality of them, laid in reverse directions—*i. e.*, some of them shall be connected with the controlling-circuit at the guarded structure and extend thence to the office, while others shall be connected with the controlling-circuit at the office and extend thence to the guarded structure. The object of these interrupted conductors is to render it more difficult to locate the wires of the controlling-circuit, the difficulty being increased by charging all of the wires with electricity at the same potential. If in attempting to locate the wires of the controlling-circuit two or more of the interrupted wires laid in the same direction are connected, the meter will not be influenced; but if two of them extending in opposite directions are connected, or if one of them is connected with the controlling-circuit, the resistance will be cut out and the meter, responding to the consequent variation in the current, will complete the alarm-circuit.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In an electrical alarm system, the combination with a closed controlling-circuit and a meter electrically connected therewith and adapted to be influenced by either an increase or a decrease in the current in the controlling-circuit, of a normally open circuit insulated from the main circuit and braided therewith, said circuits being so disposed that when electrically connected the current in the main circuit will be varied and the meter thereby influenced, causing a signal to be given, substantially as described.

2. In an electrical alarm system, the combination with a closed controlling-circuit and

a meter electrically connected therewith and adapted to be influenced by either an increase or a decrease in the current in the controlling-circuit, of a plurality of normally open circuits insulated from each other and from the controlling-circuit, all of said circuits being braided together and so disposed that when one of the normally open circuits is electrically connected with any other circuit the current in the controlling-circuit will be varied and the meter thereby influenced, causing a signal to be given, substantially as set forth.

3. In an electrical alarm system, the combination with a closed controlling-circuit comprising a plurality of conductors extending from the guarded structure to the station and having normally a difference of potential, and a meter electrically connected with said circuit and adapted to be influenced by either an increase or a decrease in the current therein, of a plurality of normally open circuits charged at the same potential as the controlling-circuit, said circuits being electrically insulated from each other, braided together, and so disposed that when one of the normally open circuits is electrically connected with the closed controlling-circuit the current in the latter circuit will be varied and the meter thereby influenced, causing a signal to be given, substantially as set forth.

4. In an electrical burglar-alarm system, the combination with a closed controlling-circuit, a resistance included therein, and a meter electrically connected therewith for controlling the alarm, of an interrupted circuit charged at the same potential as is the controlling-circuit, said circuits being insulated from each other and braided together, substantially as set forth.

5. In an electrical burglar-alarm system, the combination with a closed controlling-circuit, a resistance included therein, and a meter electrically connected therewith for controlling the alarm, of an interrupted circuit electrically connected at one end with the controlling-circuit, said circuits being insulated from each other and braided together, substantially as set forth.

6. In an electrical burglar-alarm system, the combination with a closed controlling-circuit, of a plurality of interrupted circuits laid in reverse directions and charged with electricity at the same potential as is the controlling-circuit, all of said circuits being insulated from each other and braided together, substantially as set forth.

7. In an electrical burglar-alarm system, the combination with a closed controlling-circuit, a resistance included therein, and a meter electrically connected therewith for controlling the alarm, of a plurality of interrupted circuits electrically connected with the controlling-circuit and laid in reverse directions, said circuits being insulated from each other and braided together, substantially as set forth.

8. In an electrical burglar-alarm system, the combination with a closed controlling-circuit, including a resistance-coil, and a meter electrically connected therewith, of a plurality of interrupted circuits connected with the controlling-circuit upon opposite sides of the resistance-coil, said circuits being insulated from each other and braided together, substantially as set forth.

9. In an electrical burglar-alarm system, the combination with a local alarm mechanism and a main circuit extending between the alarm-station and the guarded structure and adapted to control the alarm mechanism, of an electrical appliance for establishing the operative condition of the alarm mechanism, said appliance including a circuit extending between the alarm-station and the guarded structure, and a manually-operated switch included in said circuit and located at the guarded structure, and an electrical appliance for rendering the alarm mechanism inoperative, said appliance including a chronometer located at the guarded structure, and a circuit extending between the guarded structure and alarm-station, substantially as set forth.

10. In an electrical burglar-alarm system, the combination with a local alarm-circuit including a switch, of an electrical appliance for closing said switch, a circuit including said appliance, a manually-operated switch included in said circuit and located at the guarded structure, an electrical appliance for opening the switch of the alarm-circuit, and a chronometer located at the guarded structure for controlling said appliance, substantially as set forth.

11. In an electrical burglar-alarm system, the combination of a local alarm-circuit including a switch, a meter included in said circuit, a controlling-circuit extending from the station to the guarded structure, an electrical appliance for operating the switch of the alarm-circuit, a circuit including said appliance and having a switch located at the guarded structure, and a single battery for supplying both the controlling and switching circuits, substantially as set forth.

12. In an electrical burglar-alarm system, the combination with a controlling-circuit, and a local alarm-circuit including a switch, of an electrical appliance for opening said switch, a circuit including said appliance, a chronometer-switch included in said circuit and located within the guarded structure, and an annunciator operatively connected with the chronometer-switch circuit and located at the guarded structure, and adapted to indicate whether the system is on or off, substantially as set forth.

13. In an electrical burglar-alarm system, the combination with a local alarm-circuit having a switch, a meter included in said circuit, and a closed controlling-circuit electrically connected with the meter and extending from the station to the guarded structure,

of a test-circuit including the meter, and an annunciator adapted to show the condition of the main circuit, substantially as set forth.

14. In an electrical burglar-alarm system, the combination with a local alarm-circuit having a switch, a meter included in said circuit, and a closed controlling-circuit electrically connected with the meter and extending from the station to the guarded structure, of an electrical appliance for controlling the switch of the alarm-circuit, a circuit including said appliance, a test-circuit, a switch common to both of these latter circuits, and an annunciator located at the guarded structure and adapted to show the condition of the main circuit, substantially as set forth.

15. In an electrical burglar-alarm system, the combination with a local alarm-circuit having a switch, a meter included in said circuit, and a closed controlling-circuit electrically connected with the meter and extending from the station to the guarded structure, of an electrical appliance for closing the switch of the alarm-circuit, a circuit including said appliance and extending to the guarded structure, a switch included in said circuit and located at the guarded structure, an annunciator also included in said circuit, and a test-circuit including the meter and having a switch located at the guarded structure.

16. In an electrical burglar-alarm system, the combination with a local alarm-circuit having a switch, a meter included in said circuit, and a closed controlling-circuit electrically connected with the meter and extending from the station to the guarded structure, of an electrical appliance for closing the switch of the alarm-circuit, a circuit including said appliance and extending to the guarded structure, a switch included in said circuit and located at the guarded structure, a test-circuit including the meter, and a switch located at the guarded structure, and an annunciator included in the switching-circuit, substantially as set forth.

17. In an electrical burglar-alarm system, the combination with a local alarm-circuit having a switch, a meter included in said circuit, and a closed controlling-circuit electrically connected with the meter and extending from the station to the guarded structure, of an electrical appliance for closing the switch of the alarm-circuit, a circuit including said appliance and extending to the guarded structure, a switch included in said circuit and located at the guarded structure, an annunciator also included in said circuit, and a test-circuit branching from the switching-circuit at a point between the switch and the magnet of the annunciator and returning to the battery through the meter, substantially as set forth.

CLYDE COLEMAN.

Witnesses:
L. M. HOPKINS,
I. CROSS.