

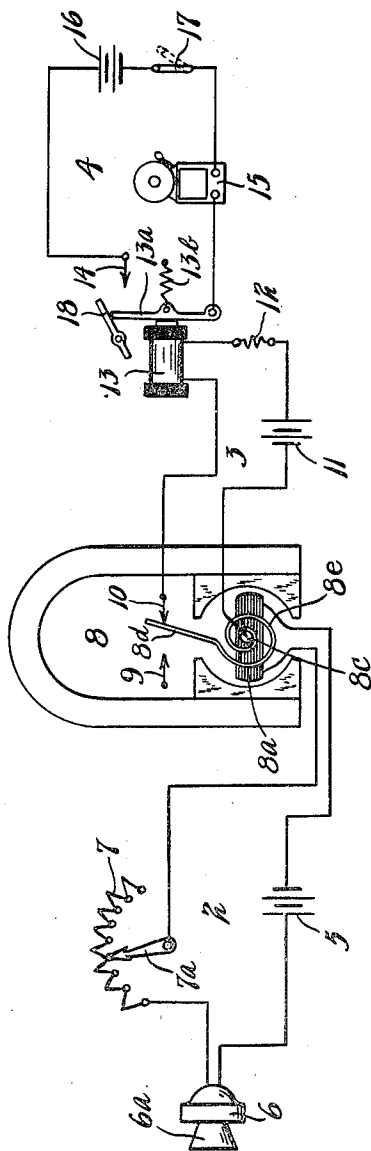
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ALARM CIRCUIT OPERATED BY MICROPHONE

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ALARM CIRCUIT OPERATED BY MICROPHONE.

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This invention relates to an alarm apparatus such as a burglar alarm which may be used in bank vaults and similar places, and the invention particularly relates to such an alarm adapted to be operated by sound or sound waves.

It is an object of this invention to provide a simple and efficient apparatus which can be easily and inexpensively placed in a bank vault or other location and which will be operated to sound an alarm when a sound is made in said bank vault or other place.

It is a further object of the invention to provide such an apparatus comprising a series of circuits including an alarm circuit and an operating circuit, the latter having therein a sound-operated element adapted to vary the resistance in said circuit.

It is still another object of the invention to provide such an apparatus comprising an alarm circuit, an operating circuit adapted to have a resistance therein varied by a sound operated means and an intermediate circuit for controlling the alarm circuit including a balanced relay which is also included in the operating circuit.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings in which the single figure is a more or less diagrammatic view of the apparatus and the circuits comprised therein.

Referring to the drawings, an apparatus is illustrated which includes three circuits designated respectively as 2, 3 and 4. The circuit 2 will be referred to as the operating circuit and this circuit will include a source of current or electromotive force, such as a battery 5, and a sound operated variable resistance element, such as a microphone 6. This microphone may be of standard or well known construction comprising a multiplicity of articles or granules adapted to be compressed by a sound operated diaphragm whereby the resistance of said particles is lowered. The microphone 6 is illustrated as having a flaring receiving end 6^a. The circuit 2 also includes a rheostat 7 having the adjustable arms 7^a by which the resistance thereof can be varied when circuit 2 is adjusted. Also included in circuit 2 is the winding 8^a of a biased relay 8. While this relay may be variously constructed and ar-

anged, in the embodiment of the invention illustrated, it is shown as comprising a U-shaped permanent magnet 8^b between the poles of which is mounted a coil or winding 8^a on a pivot shaft 8^c. The shaft 8^c carries a contact or armature 8^d adapted to move between contacts 9 and 10 and said shaft is urged by a spiral spring 8^e normally to engage contact 9. In the device disclosed the contact 9 is merely a dead contact. When sufficient current flows through winding 8^a shaft 8^c and said winding are turned to cause contact 8^d to engage contact 10. The shaft 8^c and contact 10 of the relay 8 are included in circuit 3 which also includes a source of current or electro-motive force such as the battery 11 and, preferably, an adjustable resistance 12, as well as the winding of a relay 13, which will be of the ordinary drop or spring-actuated type having an armature 13^a adapted to engage an off contact 14 when the winding 13 is de-energized. The armature 13^a can, as stated, be operated by gravity or by a suitable spring 13^b. A gravity pawl 18 is pivoted adjacent armature 13^a and drops in front of said armature when the latter moves away from winding 13, thus preventing said armature from again being moved out of engagement with contact 14 until said pawl is moved to release said armature. The armature 13^a and contact 14 are included in the circuit 4 which also includes an alarm device or bell 15, a suitable source of current or electro-motive force, such as a battery 16 and a simple switch 17.

In practice, the microphone 6 will be conveniently disposed in the wall of a bank vault or any other location which it is desired to protect. The rheostat 7 and biased relay 8 may be placed in said vault or in a room or other location adjacent thereto. The alarm device 15 will, of course, be placed in a building or location where parties are located to whom the alarm should be given. In operation, the circuit 2 will normally be closed and the rheostat 7 so adjusted that the current flowing through the circuit and the winding 8^a of the biased relay 8 will be sufficient to sufficiently energize said winding to move contact 8^d into engagement with contact 10. The circuit 3 will be closed and will have a small current

flowing therein. The circuit 3 being closed winding 13 will be energized and armature 13^a will be held up by said winding so that the circuit 4 will be open. When the apparatus is set for operation, the switch 17 will be in closed position. The various circuits being adjusted and set, as described, if a sound is made in the vicinity of the microphone 6 the same will be operated and will lower the resistance in circuit 2 which passes through the said microphone. Such sound may be made by burglars drilling in the door or walls of the vault or in talking or in other operations adjacent the vault. When the resistance in circuit 2 is thus decreased, the current will increase therein sufficiently to allow spring 8^e to overcome the torque of winding 8^a and move contact 8^d into engagement with contact 9. This will cause circuit 3 to be opened. When circuit 3 is opened the winding of relay 13 will be de-energized and armature 13^a will drop or be pulled into engagement with contact 14. This will close circuit 4 and the alarm bell 15 will be operated, thus giving the alarm that persons are operating in the vault or other room in which the microphone 6 is located. The biased relay 8 preferably will be located adjacent the vault or room to be protected so that the conductors or wires of circuit 3 will lead therefrom. It will be noted that if burglars or other persons should cut the wires or conductors of circuit 3 in an attempt to render the alarm inoperative, that circuit 3 would thus be opened. This would de-energize relay 13 so that circuit 4 would be closed, as described, and the alarm 15 thus sounded. When the sound operating the microphone 6 ceases, the full current will be restored in circuit 2 and winding 8^a will again rotate and move contact 8^d into engagement with contact 10, thus closing circuit 3. Relay 13, however, cannot pull up its armature 13^a, and the alarm circuit will continue to operate until someone moves pawl 18 and allows armature 13^a to be pulled up by energization of relay 13 and thus break circuit 4. When the device is to be rendered inoperative, as in the daytime, the switch 17 can be opened so that the alarm 15 will not be sounded even if circuit 4 is closed.

The current flowing in circuit 2 is exceedingly small, the battery 5 having only approximately 1 1/2 volts. The current also, in practice, in circuit 2, is approximately two milli-amperes. This produces a very sensitive device. If a larger current were used in circuit 2 too much residual magnetism would collect in the balanced relay 8 which would interfere with its freedom of action. It is highly important to note that the electrically influenced element 8^d of the biased relay will be subjected to a bias depending on the flow of current in the first

circuit 2 and that this normal current flow, that is the current flow when not modified by the action of sound waves on the microphone, may be varied to a very fine degree by adjustment of the rheostat 7—7^a. This adjustment in the present invention is electrical as distinguished from mechanical adjustment such as would be produced by variation in the tension of a spring. In the system illustrated this variation in the flow regulation in the first circuit regulates the pressure or bias under which electrically influenced contact 8^d will engage with fixed contact 10 of the second circuit. In any arrangement, the very accurate adjustment of the current flow in the first circuit so as to very accurately determine the bias under which the electrically influenced element of the balanced relay will be set is of the utmost importance.

From the above description it is seen that applicant has provided a very simple and efficient apparatus including a novel and efficient arrangement of circuits, by which an alarm will be given when a sound is made in a certain locality. The apparatus necessary is quite simple and of standard type and can be easily and inexpensively procured and installed.

It will, of course, be understood, that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of applicant's invention, which, generally stated, consists in a device capable of carrying out the objects above set forth, in the novel parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:

1. A microphonic vault protecting system comprising a plurality of circuits, an electromagnetic relay and a normally restrained alarm device, said relay having an electrically influenced element, a fixed contact and a co-operating movable contact, the first circuit being a normally closed circuit and including a microphone and the electrically influenced element of said relay, the second circuit including an electromagnet and the fixed and movable contacts of said relay, said electrically influenced element being biased by the current flow in the first circuit, so as to cause said movable contact to engage said fixed contact and close said second circuit, and means whereby said alarm device will be operated when said second circuit is opened and its magnet de-energized.

2. A microphonic vault protecting system comprising three circuits and an electromagnetic relay, said relay having an electrically influenced element, a fixed contact and a co-operating movable contact, the first circuit being a normally closed circuit and including a microphone and the electrically influenced element of said relay, the

second circuit including an electromagnet and the fixed and movable contacts of said relay, said electrically influenced element being biased by the current flow in the first circuit so as to cause the movable contact to engage said fixed contact and close said second circuit when said microphone is at rest, and said third circuit including an alarm device and an armature subject to the electromagnet of said second circuit and normally held in position to open said third circuit but when released from said magnet serving to close said third circuit and operate said alarm device.

3. A microphonic vault protecting system comprising a plurality of circuits, an electromagnetic relay and a normally restrained alarm device, said relay having an

electrically influenced element, a fixed contact and a co-operating movable contact, the first circuit being a normally closed circuit and including a microphone and the electrically influenced element of said relay, the second circuit including an electromagnet and the fixed and movable contacts of said relay, said electrically influenced element being biased by the current flow in the first circuit in respect to said fixed contact and subject to variations in the current flow in said first circuit to open and close said second circuit, and means also in said first circuit for varying the resistance therein and the resulting normal bias to which said electrically influenced element is subjected.

In testimony whereof I affix my signature.

THOMAS C. ADAMS.