

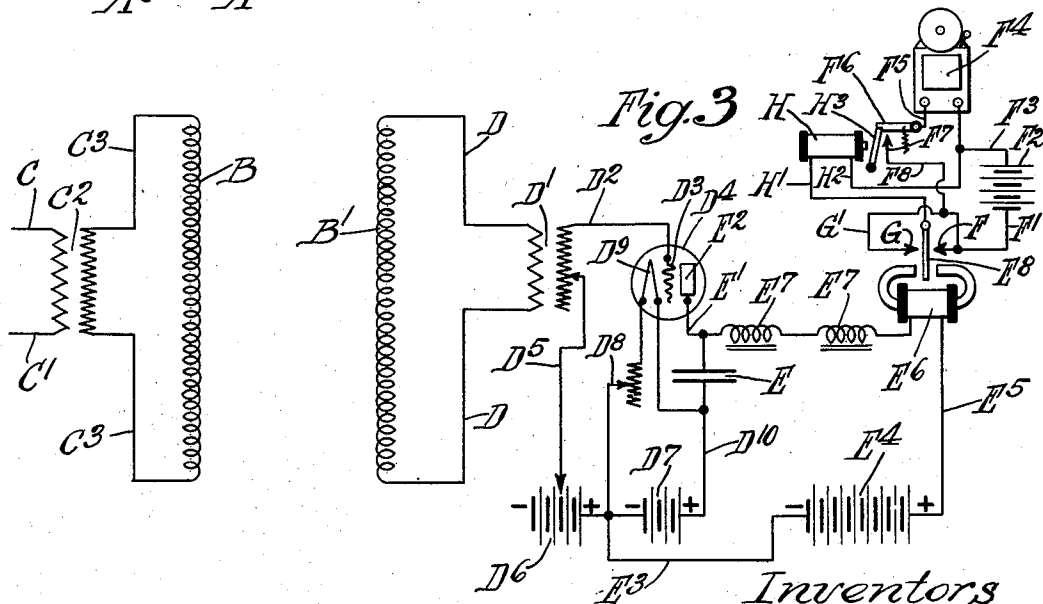
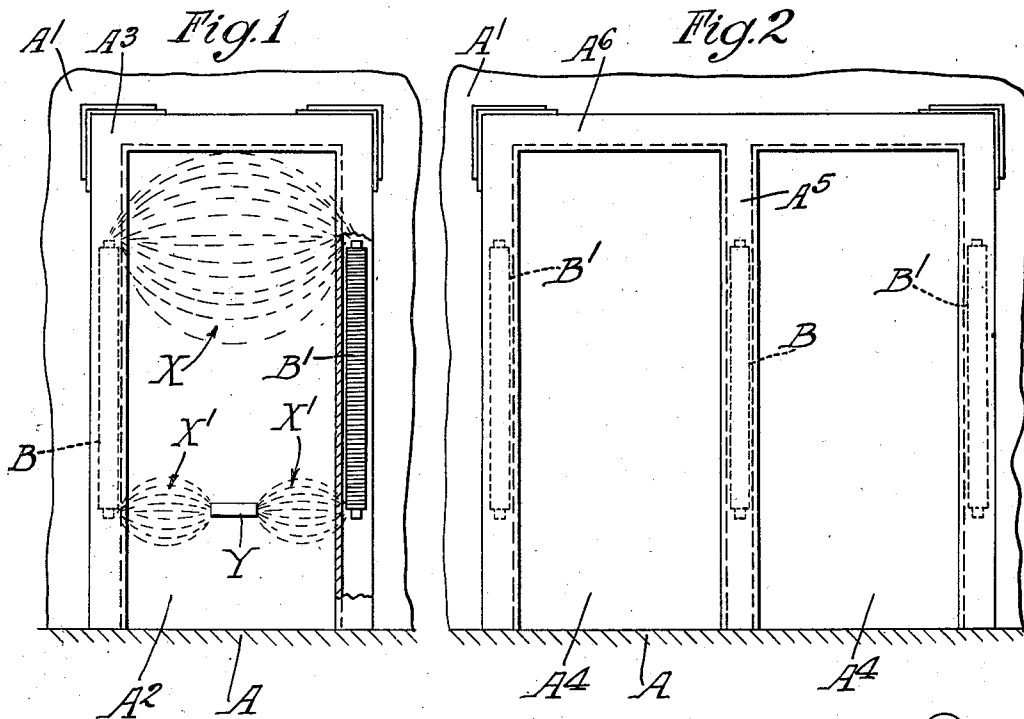
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BURGLAR ALARM

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BURGLAR ALARM

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This invention relates to an apparatus and a method for detecting the presence of metal objects. While it has many applications, in the form illustrated herewith one of the main objects is to provide what is in effect a burglar alarm. Another object of the invention is to provide means for indicating the presence of metal objects, such as revolvers and other weapons, on the persons of individuals entering buildings, passing through doors or coming into the vicinity of the device. Another object is to provide means for setting up a magnetic flux and for automatically detecting the presence of weapons upon the persons of individuals passing into or through such magnetic flux.

Other objects will appear from time to time in the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawing, wherein:

Figure 1 is an elevation with parts broken away and parts in section, showing the apparatus in position about a single doorway;

Figure 2 is a similar elevation showing the apparatus in position about a double doorway;

Figure 3 is a wiring diagram of one form of circuit for carrying out the method of this invention.

Like parts are designated by like characters throughout the specification and drawing.

As illustrated in Figure 1, the invention is applied to a single doorway. A indicates a foundation or floor. A¹ is a partition or wall through which an opening or doorway A² is formed. A³ is a door frame of any suitable design.

Positioned in the door frame or near it is a magnet B which is preferably a coil and provides a primary circuit. Positioned on the other side of the doorway is a coil or magnet B¹ providing a secondary circuit. When the primary circuit is properly energized, a current is induced in the secondary circuit and a magnetic flux is set up between the two. This is indicated diagrammatically in Figure 1 as at X. If a piece of metal or iron of sufficient size is brought into the magnetic flux, it reduces the air gap and, therefore, shortens the distance through which the lines of force must pass. Consequently it increases the magnetic flux linkage, reduces the reluctance and increases the induced current in the secondary circuit. This is indicated diagrammatically in Figure 1, in which an article of iron or steel is indicated at Y and the flux is indicated as divided into X¹, X².

As indicated in Figure 2, the wall A¹ has two

openings A⁴A⁴ separated by a partition or dividing member A⁵, the two openings being surrounded by a multiple door frame A⁶. The primary coil B of the primary circuit may be positioned on the dividing member A⁵ and two secondary coils B¹B¹ of the secondary circuit may be positioned on the sides of the door. The coils, their method of construction and the method of mounting may be varied. A single magnetic coil may be used for each of the primary or secondary circuits or multiple coils may be used. The details of construction and mounting of these parts form no particular part of the present invention and it is not limited to any particular construction. It is sufficient that primary and secondary circuits are set up, and that the primary circuit is properly energized and that the two co-operate to produce the magnetic flux across the gap.

As indicated in Figure 3, there is shown one circuit suitable for carrying out the invention. Leads C, C¹ are connected to a suitable source of alternating current. These lead to a transformer C² which is suitably connected by leads C³C³ to the primary coil or circuit B. The secondary coil or circuit B¹ is connected by leads DD to a variable transformer D¹. The transformer is connected at one end by a lead D² to a grid D³ of a vacuum tube D⁴. At its other end it is connected by a lead D⁵ to a source of C current or C battery D⁶. This latter is connected to one pole of an A battery D⁷ which pole is also connected, through a variable rheostat D⁸, to the filament D⁹ of the vacuum tube D⁴. The other pole of the battery D⁷ is connected by a suitable lead D¹⁰ to the filament D⁹ of the vacuum tube D⁴. The lead D¹⁰ is also connected to a condenser E, the opposite side of which is connected by a lead E¹ to the plate E² of the vacuum tube D⁴. The negative pole of the A battery D⁷ is connected by a lead E³ to the negative pole of a B battery E⁴. The positive pole of the B battery is connected by a lead E⁵ to one pole of a polarized relay E⁶. From the lead E¹ which is connected to the plate E², a connection is made to one or more choke coils E⁷, E⁷. From the second of these a connection is made to the opposite pole of the polarized relay E⁶.

The various elements of the circuit are normally balanced so that the movable member E⁸ of the polarized relay E⁶ is held in the position shown in Figure 3.

F is a contact member adjacent the movable member E⁸, positioned to be contacted by it. A lead F¹ connects the member F with a battery or source of current F². A lead F³ running from the opposite pole of the battery F² connects the

latter to one pole of an annunciator F^4 . A lead F^5 runs from the opposite pole of the annunciator F^4 and is connected to a movably mounted contact arm F^6 which is adapted, when free to do so, to make contact with a contact member F^7 which is connected by a suitable lead F^8 to the lead F^1 and thus to the battery F^2 .

G is a contact member positioned adjacent the movable member E^3 and generally opposite the contact member F. By means of a lead G^1 it is connected to the lead F^8 .

H is a magnet which, by means of a lead H^1 attached to one of its poles, is connected to the movable member E^3 . A lead H^2 runs from the opposite pole of the magnet to the lead F^3 . H^3 is a member positioned for movement and adapted to be drawn against the magnet when the latter is energized. The member H^3 normally holds the movably mounted arm F^6 out of engagement with the contact member F^7 , holding it in the position shown in Figure 3.

It will be realized that whereas we have herewith shown and described a practical operative device, nevertheless many changes might be made in the size, shape, number and disposition of parts without departing from the spirit of the invention and we wish, therefore, that our showing be taken as in a sense diagrammatic. In particular, many different circuits might be used for actuating the circuit and the annunciator and for carrying out other steps of the invention. It is sufficient for the purpose of the invention that connections be used which establish a magnetic flux and that means be provided for detecting variations in the field thus created and, if desirable, for actuating an annunciator in response to such variations. More than one annunciator might be used. More than one indicator might be used in addition to the annunciator. The flux might be set up, not in a doorway or opening but at any desired point. In one arrangement a railing is used in a generally open space and the magnetic flux is set up in the neighborhood of the railing.

The use and operation of our invention are as follows:

With the parts arranged as shown in Figures 1 and 2, or in any way in which a magnetic flux is set up, the primary circuit will be energized by suitable current and induced current will thereby be set up in the secondary circuit. The parts of the secondary circuit will be so adjusted that the current is varied for the size of opening or air gap. The current is also adjusted to be affected by a suitable object. Thus it may be adjusted so that so small an object as a bunch of keys will not cause a sufficient change to actuate the annunciator and so that a larger object, such as a revolver, will cause a sufficient change to actuate the annunciator or alarm and to cause an immediate movement in the current indicator, if any is used, sufficient to be readily obvious to an observer. Thus if someone comes into the field of the magnetic flux with such a metallic object, the air gap will be shortened, the secondary circuit will be disturbed, in this case by having an increase in current, the current indicator, if one is used, will indicate this change in current and the annunciator will be actuated. Thus a guard or observer will be notified at once of the presence of someone in the vicinity carrying a relatively large object of iron or steel and such a person may be at once put under observation. If the current or circuit is broken, the indicator, if used, will indicate that fact and the

annunciator will again be actuated. This will take place whether the circuit is broken purposefully or accidentally.

Assuming the circuit as shown in Figure 3 and in position as shown in Figure 1, the parts are balanced so that the movable member E^3 of the polarized relay is held in intermediate position, out of contact with either of the contact members adjacent it. If now an article such as a piece of metal Y is brought into the flux, the air gap will be shortened and current will be increased. This will unbalance the relay so that the member E^3 will swing to one side, for example, making contact with the member F. Thus through the circuit shown and described, the magnet H is energized, the member H^3 is drawn to the magnet, the member F^6 is then free to move and make contact with the member F^7 , thus completing the annunciator circuit is actuated. The variation in current caused by the presence of the article Y in the flux will, of course, have shown on the indicator, if one is used. Thus the annunciator has been actuated and the indicator has also been actuated.

If the circuit is broken, the current turned off or the balance otherwise destroyed, the parts having been in the position shown in Figure 3 will again become unbalanced, the member E^3 will move in the opposite direction, making contact for example with the member G, thus again completing the magnet circuit, energizing the magnet H and, as above described, permitting the member F^6 to make contact with the member F^7 to complete the annunciator circuit. Thus, once the parts are balanced, such variation of the current in either direction, either an increase or a decrease, will act upon the relay to cause movement to complete the annunciator circuit and, of course, variation of the current is indicated on the indicator, if one is used. Frequently an indicator is not necessary. If so, an indicator is added to the circuit or the movable element E^3 is so arranged that its position and movement can be seen. In that case it serves as an indicator.

Ordinarily the annunciator will continue to ring or give whatever signal it is arranged to give, until it has been reset. Thus it will continue to give its signal even after the member Y has moved out of the magnetic field. Where it is desirable, an automatic reset may be arranged which will result in resetting the circuit and returning the annunciator to its normal position as soon as the object Y has moved out of the magnetic field.

The device may be used with a series of annunciators and they may be located anywhere. For instance, an annunciator might be located at a police station or at any other suitable point as well as adjacent the device.

We claim:

1. In an apparatus for detecting the movement of metals permeable to magnetic lines of force through a zone of detection, a plurality of coils positioned laterally of and at the opposite sides of said zone of detection, means for creating and maintaining therebetween and across said zone of detection an alternating current field generally transverse to the direction of movement of metals through said zone, adjustable electrical means connected to one of the coils and effective to accommodate variable transverse dimensions of the zone of detection, and also to accommodate variable bodies of metal, a signal, means connected with the signal and the adjustable electrical means to operate said signal upon

disturbance of the field by presence of metal therein, and means in communication with said adjustable electrical means and coupled with said signal operating means to initiate the signal operating means upon the failure of the alternating current.

2. In an apparatus for detecting the movement of metals permeable to magnetic lines of force through a zone of detection, an energized primary coil on one side of the zone of detection, a secondary coil on the opposite side of the zone of detection whereby a magnetic field is created between the coils, generally transverse to the movement of metals through said zone, adjustable electrical means connected to the secondary coil and effective to accommodate variable transverse dimensions of the zone of detection, and also to accommodate variable bodies of metal, a signal, means connected with the signal to operate same upon disturbance of the field by movement of metal therethrough, and means in communication with said adjustable electrical means and coupled with said signal operating means to initiate the signal operating means upon failure of the magnetic field.

3. In an apparatus for detecting the movement of metals permeable to magnetic lines of force through a zone of detection, a plurality of coils positioned laterally of and at the opposite sides of said zone of detection, means for creating and maintaining therebetween and across said zone of detection an alternating current field generally transverse to the direction of movement of metals through said zone, adjustable electrical means connected to one of the coils and effective to accommodate variable transverse dimensions of the zone of detection, and also to accommodate variable bodies of metal, a signal, means connected with the signal and the adjustable electrical means to operate said signal upon variation in the intensity of the field other than by said adjustable means.

4. In an apparatus for detecting the presence of metals in a zone of detection, means positioned laterally of and at opposite sides of said zone of detection, alternating current means including said first means for creating and maintaining therebetween and across said zone of detection, a field generally transverse of said zone, adjustable electrical means connected to one of the means positioned at opposite sides of the zone of detection effective to accommodate variable transverse dimensions of the zone of detection, and also to accommodate variable bodies of metal, a signal, means connected with the signal to operate same, and means in communication with said adjustable electrical means and coupled with said signal operating means to initiate operation of the signal operating means upon disturbance of the field caused by the presence therein of a body of metal.

5. In an apparatus for detecting the presence of metals in a zone of detection, means positioned laterally of and at opposite sides of said zone of detection, alternating current means including said first means for creating and maintaining therebetween and across said zone of detection, a field generally transverse of said zone, adjustable electrical means connected to one of the means positioned at opposite sides of the zone of detection effective to accommodate variable transverse dimensions of the zone of detection, and also to accommodate variable bodies of metal, a signal, means connected with the signal to operate same, and means in communication with said adjustable

electrical means and coupled with said signal operating means to initiate operation of the signal operating means upon disturbance of the field caused by failure of the alternating current means which normally maintains the field.

6. In an apparatus for detecting the presence of metals in a zone of detection, means positioned laterally of and at opposite sides of said zone of detection, alternating current means including said first means for creating and maintaining therebetween and across said zone of detection, a field generally transverse of said zone, adjustable electrical means connected to one of the means positioned at opposite sides of the zone of detection effective to accommodate variable transverse dimensions of the zone of detection, and also to accommodate variable bodies of metal, a signal, means connected with the signal to operate same, and means in communication with said adjustable electrical means and coupled with said signal operating means to initiate operation of the signal operating means upon disturbance of the field caused by the presence therein of a body of metal, or by failure of the alternating current means which normally maintains the field.

7. In an apparatus for detecting the presence of metal on persons passing through a doorway, means for creating and maintaining an alternating current field across said doorway, and indicating means responsive to variations in said field, due to presence therein of such metals, the means for creating and maintaining a field across said doorway including a coil on one side of said doorway, means for electrically energizing said coil, a second coil on the opposite side of said doorway, electrically energized by said first coil, and means connecting the indicating means to one of said coils whereby said indicating means will be operated by a disturbance or variation in the intensity of the field caused by the presence of such metals in the field.

8. In an apparatus for detecting the presence of metal on persons passing through a doorway, means for creating and maintaining an alternating current field across said doorway, and indicating means responsive to variations in said field, due to presence therein of such metals, the means for creating and maintaining a field across said doorway including a coil on one side of said doorway, means for electrically energizing said coil, a second coil on the opposite side of said doorway, electrically energized by said first coil, and means connecting the indicating means to one of said coils whereby said indicating means will be operated by a disturbance or variation in the intensity of the field caused by a failure in the electrical energization of said first member.

9. In an apparatus for detecting the presence of metals on persons passing through a doorway, means for creating and maintaining an alternating current field across said doorway, and indicating means responsive to variations in said field, due to presence therein of such metals, the means for creating and maintaining a field across said doorway including a coil on one side of said doorway, means for electrically energizing said coil, a second coil on the opposite side of said doorway, electrically energized by said first coil, and means connecting the indicating means to one of said coils whereby said indicating means will be operated by a disturbance or variation in the intensity of the field caused by the presence of such metals in the field, and by a failure in the electrical energization of said first member.

10. In an apparatus for detecting the presence of metals on persons passing through a doorway, means for creating and maintaining a field across said doorway, and indicating means responsive to variations in said field due to movement thereof of such metals, the means for creating and maintaining a field across said doorway including a coil on one side of said doorway, and means for electrically energizing said coil to vary the intensity of the field to accommodate variations in the volume of the metals to be detected, a second coil on the opposite side of said doorway, electrically energized by said first member, means connecting the indicating means to one of said coils whereby said indicating means will be operated upon a disturbance in the field by the movement of such metals in the field, and means to adjust said connecting means whereby to accommodate variable transverse dimensions of the field.
11. In an apparatus for detecting the presence of metals on persons passing through a doorway, means for creating and maintaining a field across said doorway, and indicating means responsive to variations in said field due to movement thereof of such metal, the means for creating and maintaining a field across said doorway including a coil on one side of said doorway, and means for electrically energizing said coil to vary the intensity of the field to accommodate

variations in the volume of the metals to be detected, a second coil on the opposite side of said doorway, electrically energized by said first coil, means to adjust one of said coils to regulate and vary the density of the field, and means connecting the indicating means to one of said coils whereby said indicating means will be operated upon a disturbance in the field by a failure in the electrical energization of said first member.

12. In an apparatus for detecting the presence of metals on persons passing through a doorway, means for creating and maintaining a field across said doorway, and indicating means responsive to variations in said field due to movement thereof of such metals, the means for creating and maintaining a field across said doorway including a coil on one side of said doorway, means for electrically energizing said coil, a second coil on the opposite side of said doorway, electrically energized by said first coil, and means including a vacuum tube translating device connecting the indicating means to one of said coils whereby said indicating means will be operated upon a disturbance or variation in the intensity of the field by the movement of such metals in the field.

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