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STEEL AND IRON DETECTOR

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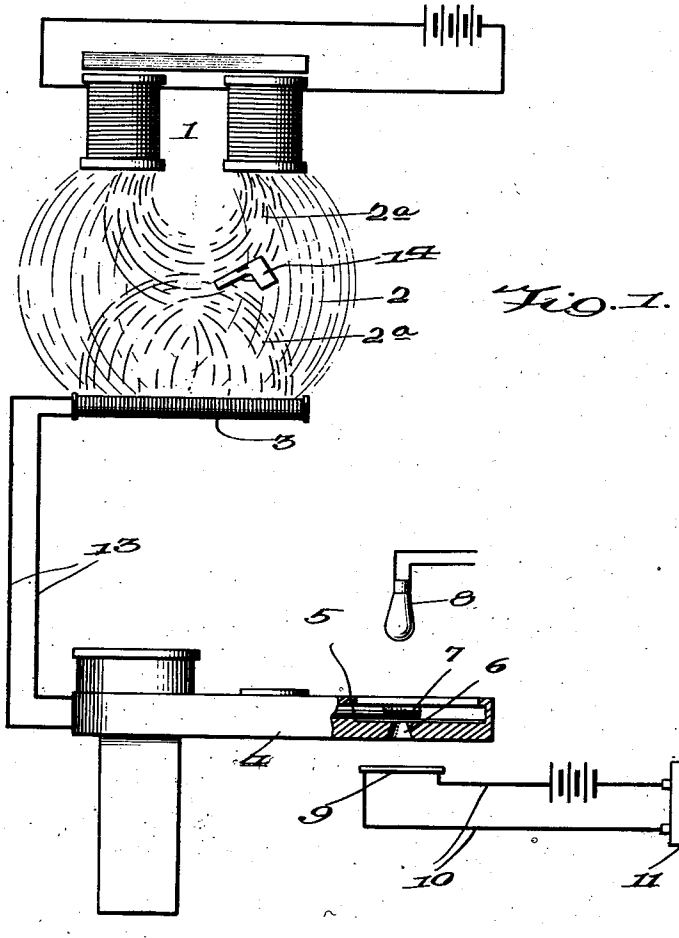


Fig. 1.

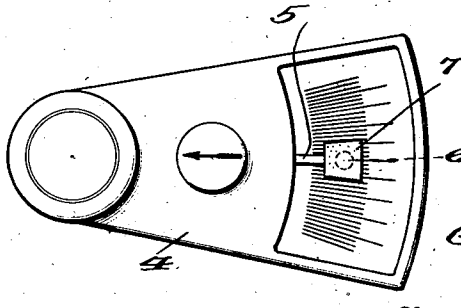


Fig. 2.

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STEEL AND IRON DETECTOR

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13 Claims. (Cl. 177—311)

This invention relates to apparatus or mechanism for detecting the presence of metal such as iron or steel in its passage between the parts of the device, above ground, and has special reference to the detection of guns, pistols, swords, knives and like articles and pieces of iron or steel of unusual size which may be carried on the person and intended for use in violation of the law.

Some of the objects of the present invention are for the purpose of detecting the presence of any object of iron or steel when moving above the ground through two certain points wherein there is a magnetic field and is especially designed to act as a gun or pistol finder or for the location of swords, extra large knives and the like, and the apparatus may be installed in entrances, both doors and windows of banks, dwelling houses, office buildings, prisons, railroad stations, steamship offices and wherever the same may be desired.

The invention is of such a nature that the passage of small articles such as keys, ordinary pocket knives and the like will not affect the same, it being necessary that the metal article passing between the parts of the apparatus be of such a size and character as to materially affect the magnetic field in the manner hereinafter described.

The mechanism is such that it may be installed in boxes or containers placed in the ground, spaced apart, or in opposite sides of a door frame and in such manner as to be concealed from view.

Another object is to provide a signalling or detecting means which becomes active upon the presence of metallic articles, of the character mentioned, in the space between the parts of this device, thereby calling attention to the fact that a party entering has on his person a gun, pistol or the like.

One form of apparatus for accomplishing the above results is shown in the accompanying drawing, wherein:

Fig. 1 is a diagrammatic plan view of my invention; and

Fig. 2 is a partial plan view of one form of instrument used in connection therewith.

In the drawing, 1 designates an electromagnet, the normal magnetic field of which is noted by the dotted lines 2. Spaced a predetermined distance away from said electromagnet and within the field thereof is arranged a soft iron bar or control element 3, which, being in the magnetic field, functions as a magnet. This bar is first painted with insulating material and then covered or wrapped with silk or enamel copper wire, preferably No. 24 standard gauge copper enamel wire, the wires from said bar leading to an instrument, in the present instance, an ordinary galvanometer 4, although any instrument provided with a vibrating member as the needle 5 may be utilized, that is a member caused to vibrate by the passage through the instrument of an electric current. The galvanometer or other instrument may be installed in any place at any desired distance from the magnetic field.

In the base of said instrument 4 immediately below the outer end of the vibrating member 5 is provided an opening 6 which is normally closed by a cover 7 on the outer end of said vibrating member 5.

Arranged above the cover 7 is an electric light 8 which is continuously burning and below the opening 6 is located a light sensitive surface sheet of material or photoelectric cell 9. Wires 10 lead from this sensitive surface 9 through a relay 11 and thence to a signal bell 12. The bell of course may be replaced by a light which will answer the same purpose.

Normally the current through the wires 10 is not sufficient to ring the bell 12, but on the uncovering of the opening 6 light rays from the lamp 8 contact with the sensitive surface 9 and the resistance of the sensitive surface is then lowered and the current passing over the wires 10 increased sufficiently to operate the relay and ring the bell.

It is desirable that the signal be given only when an article of such character and size as to materially affect the magnetic field passes through such field. To this end the sensitivity of the device may be governed by the size and proportioning of the electromagnet and the control element 3, as well as by the predetermined spacing thereof, or distance between such elements.

Properly designed the device will not give a signal unless a body of metal of sufficient size such as a gun, pistol or large knife is brought between the electromagnet and the element 3.

It will be apparent that when a piece of metal of sufficient size as a gun, pistol, or large knife is brought within the intervening space between the electromagnet 1 and the control element 3, that at that time the magnetic field is distorted, due to the presence of a gun or pistol, or like metal, and said control element 3 energized and a current through the wires 13 and through the galvanometer varied, thus causing a vibration of the movable member or needle 5 thereof so as to uncover the opening 6 and permit passage of rays of light from the lamp 8 to the sensitive surface 9, and thereby increase the current in

the wires 10 sufficient to sound the alarm or bell 12. In other words, when metal of sufficient body, as for instance the gun 14, is brought within the magnetic field, the movement of the metal object causes a distortion of the magnetic field to induce a current in the winding of the control element 3 which is conveyed by the wires 13 through the galvanometer.

The foregoing description is of course illustrative of a preferred embodiment and the invention contemplates such changes or variations in wiring as may be deemed advisable. Thus the shutter 7 may be normally positioned to uncover the opening 6 leaving the surface 9 normally responsive to light from the lamp 8, whereupon movement of the shutter to close the opening 7 might be effective to cause an operation of the relay, and I do not intend to be limited except by the terms of the claims hereto appended.

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

1. In an apparatus of the character described, an electro-magnet, a magnetic element having a coil wound therearound and spaced from said magnet to establish a zone of detection therebetween, and so related to said magnet and its field that a magnetically responsive body passing between the magnet and the element will distort the electric field and cause a variation in the energization of said element, a signalling device, and means, effective to control said device, in circuit with said element and operated by said current variation to effect an actuation of said signalling device, when said magnetically responsive body enters the electric field.

2. In an apparatus of the character described, an electro-magnet, a magnetic element having a coil wound therearound and spaced from said magnet to establish a zone of detection therebetween, and so related to said magnet and its field that a magnetically responsive body passing between the magnet and the element will distort the electric field and cause a variation in the energization of said element, means in circuit with said element for indicating variations in the current from said element, a signalling device, and means to operate and control said signalling device from said current indicator in response to the current variations.

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 opposite sides of said zone of detection, means for maintaining therebetween and across said zone of detection a magnetic field generally transverse to the direction of movement of objects through said zone, a signal, and means to operate said signal in response to movement of metals permeable to magnetic lines of force into or through the gap between said coils, and means connecting the signal with one of said coils.

4. In an apparatus for detecting the presence of metals permeable to magnetic lines of force on persons passing through a doorway, means for maintaining a magnetic field across said doorway, and indicating means responsive to variations in said field due to the movement through said field of metals permeable to magnetic lines of force, the means for maintaining a magnetic field across said doorway including a coil on one side of said doorway and means for energizing said coil, a second coil on the opposite side of said doorway, and means connecting the indicating means on said second coil.

5. 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 at opposite sides of said zone of detection, means for maintaining therebetween and across said zone of detection a magnetic field, a signal, and means to operate said signal in response to movement of metals permeable to magnetic lines of force into or through the gap between said coils, one of said coils being a primary coil, the other being a secondary coil energized solely, by induction from the primary coil, and means connecting the signal with one of said coils.

6. In an apparatus for detecting the movement of metals permeable to magnetic lines of force through a zone of detection, means for maintaining a magnetic field across said zone, and indicating means responsive to said field and to indicate variations in said field in response to the presence in said field of metals permeable to magnetic lines of force, the means for maintaining a magnetic field including a primary electric circuit located on one side of the zone of detection and a secondary electric circuit located on the opposite side of the zone of detection and means for energizing the primary circuit whereby the secondary circuit is energized and a magnetic field created in a zone between the two, and means connecting the indicating means to the secondary circuit.

7. In an apparatus for detecting the movement of metals permeable to magnetic lines of force through a zone of detection, means for maintaining a magnetic field across said zone, and indicating means responsive to said field and to indicate variations in said field in response to the presence in said field of metals permeable to magnetic lines of force, the means for maintaining a magnetic field including a primary electric circuit located on one side of the zone of detection and a secondary electric circuit located on the opposite side of the zone of detection and means for energizing the primary circuit whereby the secondary circuit is energized and a magnetic field created in a zone between the two, the primary and secondary circuits including coils and cores therefor, and means connecting the indicating means to said secondary circuit.

8. In an apparatus for detecting the presence of metals permeable to magnetic lines of force on persons passing through a doorway, means for maintaining a magnetic field across said doorway, and indicating means responsive to variations in said field due to the movement through said field of metals permeable to magnetic lines of force, the means for maintaining a magnetic field including a primary coil located on one side of the doorway and a secondary coil located on the opposite side of the doorway, said coils being each provided with a core and having their axes disposed in spaced substantially parallel relation generally perpendicular with respect to the direction of movement of persons through the doorway, and means for energizing the primary coil whereby the secondary coil is inductively energized by a magnetic field extending transversely of the path of movement of persons through the doorway between the two coils, and means connecting the indicating means to said secondary coil.

9. In an apparatus for detecting the passage of concealed articles of metal through doorways

and the like, a plurality of coils positioned on opposite sides of a doorway, means for maintaining a magnetic field therebetween and across the doorway, a signal, and means to operate said signal in response to the movement of metals through said field and through the doorway between said coils, one of said coils at one side of the doorway being a primary coil and the other at an opposite side of the doorway being a secondary coil, energized solely by induction from the primary coil, and means for connecting the signal with one of said coils.

10. In an apparatus for detecting concealed articles of metal, a door frame, a plurality of coils positioned on opposite sides of said frame and concealed within said frame, means for maintaining a magnetic field therebetween and across the door space within said frame, a signal, and means to operate said signal in response to the movement of metals through said door space and through said field, one of said coils located at one side of the doorway being a primary coil and the other, at an opposite side of the doorway, being a secondary coil, and means for connecting the signal with one of said coils.

11. In an apparatus for detecting concealed articles of metal, a door frame, a plurality of coils positioned on opposite sides of said frame and concealed within said frame, means for maintaining a magnetic field therebetween and across the door space within said frame, a signal, and means to operate said signal in response to the movement of metals through said door space and through said field, one of said coils located at one side of the doorway being a primary coil, and the other, at an opposite side of the doorway, being a secondary coil, and means for connecting the signal with one of said coils, the axes of said coils being generally parallel and vertical.

12. In an apparatus for detecting the movement of metals susceptible to electric attraction through a zone of detection, a plurality of coils positioned laterally of and at opposite sides of said zone of detection, means for maintaining a field therebetween and across said zone of detection generally transverse to the direction of movement of objects through said zone, a signal, and means to operate said signal in response to movement of such metals into or through the gap between said coils, and means connecting the signal with one of said coils.

13. In an apparatus for detecting the presence of metals susceptible to electric attraction on persons passing through a doorway, means for maintaining a field across said doorway, and indicating means responsive to variations in said field due to movement therethrough of such metals, the means for 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, and means connecting the indicating means to said second coil.

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