

April 19, 1966

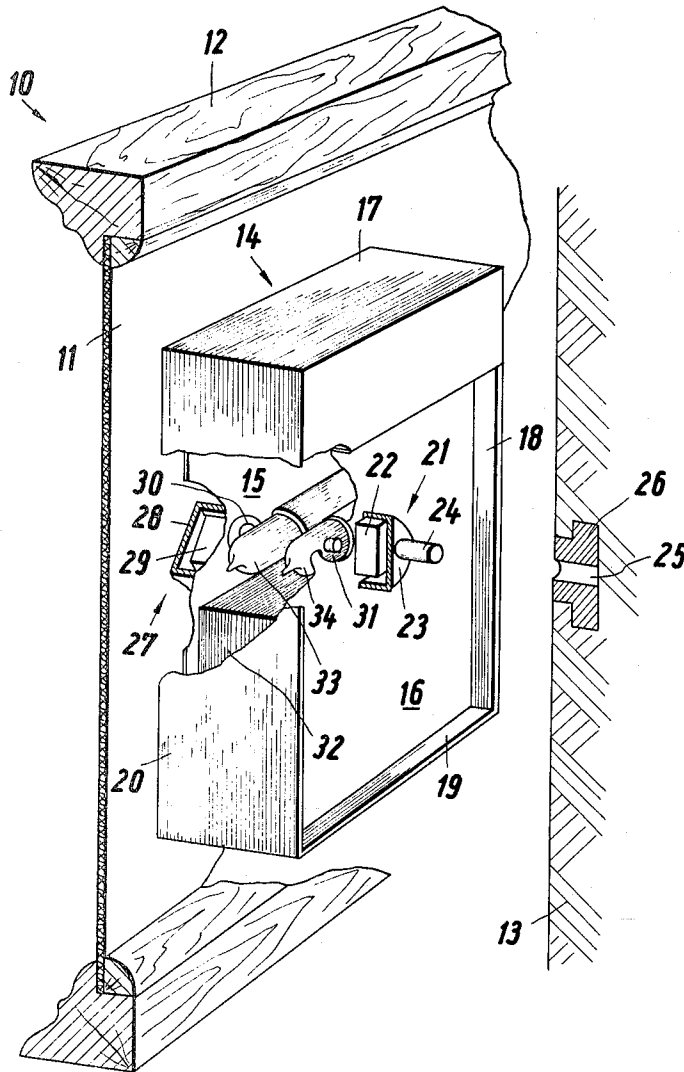
K. EBERTS
SYSTEM FOR SIGNALLING UNAUTHORIZED
DISPLACEMENT OF AN ARTICLE

3,247,502

Filed Oct. 21, 1963

2 Sheets-Sheet 1

Fig. 1



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Fig. 2

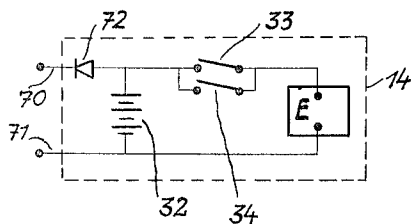


Fig. 3

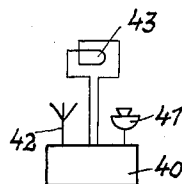


Fig. 5

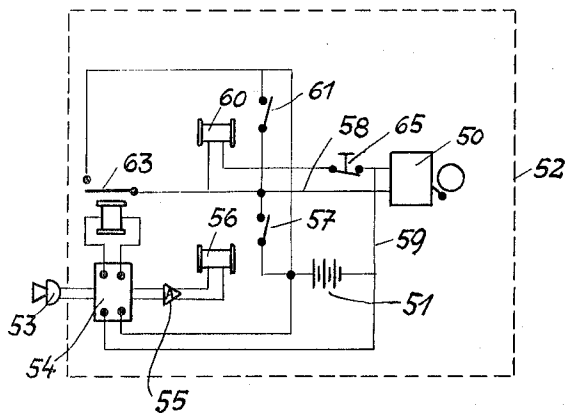


Fig. 4

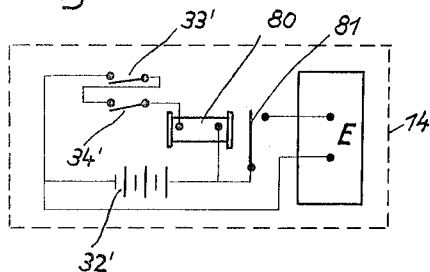
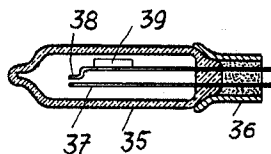


Fig. 6



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3,247,502

SYSTEM FOR SIGNALLING UNAUTHORIZED DISPLACEMENT OF AN ARTICLE

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Filed Oct. 21, 1963, Ser. No. 317,618

Claims priority, application Germany, Apr. 17, 1963,

A 42,907

9 Claims. (Cl. 340-280)

My invention relates to a system for signalling unauthorized displacement of an article positioned on a surface, such as a picture suspended on a wall, to thereby protect the article from theft.

It is the object of my invention to provide a system of this character which is inexpensive, simple and reliable in operation and may be installed with a minimum of effort and expense. More particularly, it is an object of my novel system to permit installation thereof in an inconspicuous manner which does not require that signalling wires extend to the individual pictures to be protected. Furthermore, it is an object of my invention to provide a signalling system of the type referred to hereinabove which will trigger an alarm in event a thief should tamper with a signalling device in an attempt of putting it out of function prior to the removal of the picture.

Further objects of my invention will appear from a detailed description of various preferred embodiments of my invention following hereinafter and the features of novelty will be pointed out in the claims. It is to be understood, however, that my invention is in no way limited or restricted to the details described hereinafter but is capable of numerous modifications within the scope of the appended claims.

In the drawings in which various examples of my novel system are illustrated

FIG. 1 is a perspective view of a self-contained signalling unit forming part of my novel system, this unit being disposed in a sheltered position between a wall shown in cross section and a picture suspended thereon, the picture being likewise shown in perspective, partly broken away,

FIG. 2 is a circuit diagram of the emitter unit shown in FIG. 1,

FIG. 3 represents a receiver forming part of my novel system, the receiver being disposed at a remote alarm station,

FIG. 4 is a modified circuit diagram of the emitter unit shown in FIG. 1,

FIG. 5 is a circuit diagram of the receiver shown in FIG. 3, and

FIG. 6 is a sectional view of one of the switches included in the emitter unit of FIG. 1 and shown in FIGS. 2 and 4.

A picture or painting 10 consisting of a canvas 11 held by a frame 12 is suspended on a wall 13, such as the wall of a hall in a museum, and a self-contained signalling unit 14 is disposed in a sheltered or hidden position between the substantially plane back-face of the picture 10 and the plane surface of the wall 13 confronting the back-face of the painting. The housing of unit 14 has a front wall 15 and a back wall 16 both extending parallel to each other and to the wall surface and consisting of steel or another suitable ferromagnetic material. Moreover, the

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housing has side walls 17, 18, 19 and 20 which extend at right angles to the wall surface and project beyond the front wall 15 and the back wall 16 a certain distance towards and into contact with the back-face of the painting and the wall surface. In FIG. 1 the painting, the unit 14 and the wall 13 are illustrated as being spaced apart for the purpose of exposing the housing to view. In fact, however, the edges of the side walls 17-20 contact the painting and the wall surface. The unit 14 is so far spaced from the frame 12 as to be invisible and practically inaccessible. It is fixed to the wall by suitable detachable means. In the embodiment illustrated in FIG. 1 this means comprises a cup-shaped shield member 21 of steel or of another ferromagnetic material fixed to the wall 13 and a permanent magnet 22 inserted in the cup-shaped member 21 and in contact with the plane bottom 23 thereof and with the back wall 16 of the housing. The cup-shaped member 21 has a pin 24 projecting from the bottom 23 thereof and the pin 24 is inserted in a bore 25 of a socket member 26 inserted in the wall 13 and suitably fixed thereto. In this manner the cup-shaped member 21 is securely held on the wall 13 and the permanent magnet 22 firmly adheres to the cup-shaped member and to the back wall 16 of the housing, whereby this housing is held in position on the wall 13.

Another cup-shaped shield member 27 having a plane bottom 28 encloses a second permanent magnet 29 which adheres to the front face of the front wall 15 of the housing and to the bottom 28 of member 27. The bottom wall 28 is suitably fixed to the painting 10, for instance adhesively attached to the back of the canvas 11.

Each of the walls 15 and 16 has an aperture 30, or 31 respectively, whose diameter is smaller than the length of the permanent magnet 29, or 22 respectively, so that this magnet may extend across the aperture having its end portions firmly adhering to portions of the housing wall adjacent to the aperture.

In FIG. 2 the housing of unit 14 is diagrammatically indicated by broken lines. It encases a signalling circuit which includes a signalling device E, a source of current, such as an accumulator battery 32, and a pair of magnetically operable switches 33 and 34 each being of the type which tends to assume its connecting position but will stay in its disconnecting position, when subjected to a magnetic field. The switches 33 and 34 are preferably of the well known type shown in FIG. 6 which comprises an evacuated glass bulb 35 mounted in a socket 36 and enclosing a relatively stationary contact leaf 37 and a relatively movable contact leaf 38 carrying a small armature 39 of a suitable ferromagnetic material, such as steel, for attraction by one of the magnets 22, 29. For this purpose each of the switches 33, 34 is located adjacent to the aperture 30, or 31 respectively, as will appear from FIG. 1.

The sockets 36 of the bulbs 35 of the switches constitute a support suitably fixed to the housing wall 15 in such a position that armature 39 of switch 33 is confronted with magnet 29, whereas armature 39 of switch 34 is confronted with magnet 22. As a result, both of the switches 33 and 34 are maintained in the open condition illustrated in FIGS. 2 and 6 by the magnetic attracting forces produced by the magnetic field lines extending from the magnets 22, 29 through the apertures 31, 30 to the armatures 39.

The shield members 21, 27 have their edges disposed in substantial engagement with the housing walls 16, and

15 respectively, and these edges are spaced from the wall surface and from the canvas of the painting a distance corresponding substantially to the distance by which the side walls 17-20 project beyond the front and back walls 15 and 16 of the housing.

As will appear from the above description, the permanent magnets 22 and 29 inserted in the cups 21 and 27 have a coercitive force of such strength as to be operative to do both

(a) Attract the shield members 21 and 27 and the housing 14 for holding the latter in its normal position and

(b) Cause their magnetic fields to extend through the apertures 31 and 30 of the opposed housing walls and to hold the switches 33, 34 in their disconnecting positions in which the signalling device E is disconnected from the battery 32.

Unauthorized displacement of the painting 10 on the wall 13, however, will cause either one or both of the cup-shaped shield members 21, 27 and the permanent magnets 22, 29 encased therein to be moved out of registry with the apertures 31, 30. The same will happen, if a thief tampers with unit 14 of the signalling system in an attempt of putting it out of function by introduction of a tool between the painting 10 and the wall 13 to engage and to destroy the unit 14. As soon as at least one of the two permanent magnets gets out of registry with the coordinated aperture 30, 31, the armature 39 of the switch 33 or 34 mounted behind the armature will cease to be attracted and permits its contact leaf 38 to engage the contact leaf 37 whereby an electrical circuit will be closed extending from one terminal of the battery 32 through the closed switch 33, or 34, the signalling device E and back to the other terminal of the battery 32. As a result, the signalling device E will be energized and will emit a suitable acoustic or electromagnetic signal. Suitable receiving means, such as shown in FIG. 3, are disposed outside of and at a distance from the housing 14, for instance in a remote alarm station. This receiving means may comprise a receiver 40 equipped with a microphone 41 where the signalling device E is an alarm bell emitting sound, or an antenna 42, where the signalling device E is a radio transmitter, or a loop antenna 43, where the signalling device E in housing 14 is so constructed as to transmit inductive low frequency impulses.

The cup-shaped shield members 21 and 27 in cooperation with the housing walls 15 and 16 consisting of iron or the like will effectively shield the armatures 39 of the switches 33 and 34 from any magnetic field which a thief may produce in an attempt of maintaining the switches 33 and 34 in their disconnecting positions while removing the painting 10 from the wall.

The embodiment of my invention described hereinabove with reference to FIG. 1 is capable of numerous modifications. Thus, the cup-shaped shield member 21, the permanent magnet 22 therein and the switch 34 may be omitted, if the housing 14 is fixed to the wall 13 by other suitable means. Compared with this modification, the embodiment shown in FIG. 1 has the advantage of a reliable response of the self-contained unit 14 to any attempt of tampering therewith. If the unit 14 is immovably fixed to the wall 13, a thief may try to drill a hole into the housing to thereby destroy the battery. With the embodiment shown in FIG. 1, however, any such attempt will inevitably result in a slight displacement of the housing 14 relative to the cup-shaped member 21 and in a consequent sounding of the alarm by switch 34.

As a thief may silence the signalling device E within a few seconds after starting the alarm by destroying the self-contained unit 14 upon removal of the painting from the wall, means are preferably provided for keeping the alarm device in the receiver 40 in operation after the receipt of signals from the signal transmitting device E

will have stopped. As a result, the alarm device in the receiver 40 cannot be put out of function by wilful destruction of the self-contained unit 14. Moreover, I prefer to so construct the receiver 40 that the alarm device therein will continue to function even if the microphone 41 or the antenna 42 or 43 to which the thief may have access should be destroyed.

This is illustrated in FIG. 5 which shows the circuit diagram of a receiver equipped with an alarm bell 50 and with a battery 51 for the operation thereof. The receiver shown in FIG. 5 comprises a self contained unit 52 indicated by a broken line and disposed in a remote central alarm station in the museum building and a microphone 53 mounted in the same hall of the building in which paintings safeguarded by units 14 are accommodated. The input of a scrambling or voice distorting unit 54 of well known conventional design is connected by a suitable cable to the microphone 53, whereas the output of the unit 54 which is supplied with electrical energy by the battery 51 is connected with the input of an amplifier 55 whose output is connected with the winding of a relay 56 having a normally open contact 57. When alarm sound emitted by the signalling device E of a unit 14 reaches the microphone 53, the received energy will be magnified and rectified by the amplifier 55 and supplied to the relay winding 56 whereby the contact 57 thereof will be closed and will establish an electrical circuit extending from one terminal of the battery 51 through contact 57, wire 58, alarm bell 50 and wire 59 to the other terminal of the battery 51. As a result an alarm will be sounded indicating that one of the paintings in the museum hall has been displaced. As a result of this alarm immediate steps will be taken to prevent the theft.

A second relay 60 is shunted across the alarm bell 50 by connection to wires 58 and 59. This second relay has a normally open contact 61 which represents a holding contact which is placed parallel to the contact 57 and maintains both relay winding 60 and alarm bell 50 in energized condition after contact 57 may have opened as a result of a discontinuation of the emission of sound by the signalling device E or as a result of a destruction of the microphone 53.

The alarm bell may be silenced by opening press button switch 65. Suitable means may be provided to make the alarm bell 50 responsive to a deenergization of the receiver such as exhaustion of the battery 51. For this purpose a third relay 62 may have a normally closed contact 63 and a winding connected to the battery 51 via the scrambling unit 54. When the battery 51 runs low but is still capable of sounding the bell 50, the relay contact 63 will close and will establish a circuit through the alarm bell 50 and through the battery 51.

It is the purpose of the scrambling unit 54 to prevent misuse of the microphone 53 by connection to the output of amplifier 55 of a telephone permitting a person in the central alarm station to overhear conversation held in the hall in which microphone 53 is installed.

As the battery 51 constitutes a source of energy which is individually coordinated to the alarm station and supplies energy to the receiver 52, my system is independent of the supply of electrical power from a power station.

The batteries 51 and 52 may be of the non-spillable transportable type which can be re-charged upon exhaustion. In order to facilitate the re-charging operation, leads 70 and 71 may lead from the terminals of battery 32 through suitable holes in the walls of unit 14 to a socket disposed in an easily accessible position for connection to a source of a re-charging voltage. At least one of the wires 70 and 71 includes the blocking diode 72, such as a rectifier, which prevents the battery from being shortcircuited by a person tampering with the conductors 70, 71.

In FIG. 4 I have illustrated an embodiment of my invention in which the switches 33' and 34' are mounted in

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reversed position in which the contact leaf 37 rather than the contact leaf 38 is confronted with the permanent magnet, whereby this magnet keeps the switch in its closed position by magnetic attraction. A relay 80 is mounted within the housing 40 and has a normally closed contact 81. The winding of relay 80 has one terminal directly connected with one terminal of the battery 32' and has its other terminal connected with the other terminal of the battery 32' via the switches 33', 34' arranged in series. As long as the switches are kept in closed condition by magnetic attraction, the relay winding 80 is energized. Its resistance is so high that the energizing current is quite feeble but just sufficient to attract armature 81. If one or the other of the permanent magnets is displaced by an attempt of tampering with the painting or with the unit 14, the switch 33' or the switch 34' or both will be opened thereby interrupting the circuit through the winding of relay 80 permitting contact 81 to close and to thereby connect battery 32' to the signalling device E thus causing the alarm to be sounded. The alarm will be also sounded, if the voltage of battery 32' owing to partial exhaustion has dropped below the limit required to keep contact 81 open. This limit voltage, however, will still suffice to operate the signalling device E.

It will be appreciated that in the embodiment of FIG. 4 the connecting position of the switches 33' and 34' causing the signalling device E to be connected to the battery is the open condition, whereas in FIG. 2 the connecting position of the switches 33 and 34 is the closed condition.

The advantages of the invention as here outlined are best realized when all of its features and instrumentalities are combined in one and the same structure, but useful devices may be produced embodying less than the whole.

It will be obvious to those skilled in the art to which the invention appertains, that the same may be incorporated in several different constructions. The accompanying drawing, therefore, is submitted merely as showing the preferred exemplification of the invention.

What I claim is:

1. System for signalling unauthorized displacement of an article positioned on a surface such as a picture suspended on a wall, said system comprising a signalling circuit including a signalling device, a source of current and a pair of magnetically operable switches for connecting said device to said source for current, each of said switches being of the type which tends to assume its connecting position but will stay in its disconnecting position when subjected to a magnetic field, a housing encasing said device, said source of current and said switches and therewith constituting a self-contained unit disposed in a normal position between said surface and said article and hidden by the latter, and a plurality of magnets, at least one of said magnets being fixed to said picture for maintaining one of said switches in its disconnecting condition as long as said article is left undisplaced relative to said unit, another one of said magnets being fixed to said wall for maintaining the other one of said switches in its disconnecting condition as long as said unit is left undisplaced relative to said wall, said unit having portions of ferromagnetic material for attraction by one of said magnets fixed to said picture and by one of said magnets fixed to said wall whereby said unit is normally held in said normal position.

2. System as claimed in claim 1 in which said portions of ferromagnetic material constitute portions of the wall of said housing.

3. System as claimed in claim 1 in which said housing has opposite parallel walls of a ferromagnetic material forming said portions and being provided with apertures, each aperture being aligned with one of said magnets and being so disposed and dimensioned that said magnetic field induced by said one magnet can pass therethrough and can thus reach said switches.

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4. System as claimed in claim 3 in which at least one of said magnets has a coercitive force of such strength as to be operative when disposed opposite to and aligned with one of said apertures to both attract said unit for holding it in said normal position and cause its magnetic field to extend through said aperture and to hold one of said switches in its disconnecting position.

5. System as claimed in claim 1 in which said housing has opposite plane front and back walls extending parallel to a plane face of said article and to said surface and a surrounding wall projecting beyond said front and back walls a certain distance towards and into contact with said article face and said surface, said distance amounting substantially to the thickness of said magnets.

6. System for signalling unauthorized displacement of an article having a substantially plane face and being positioned on a substantially plane surface confronting said plane face, such as a painting suspended on a wall, said system comprising a housing disposed in a normal position on said surface behind said article so as to be hidden thereby, said housing having parallel front and back walls consisting of a ferromagnetic material and extending parallel to and spaced from said face and said surface, each of said walls having an aperture, and side walls projecting beyond said front and back walls a certain distance towards and into contact with said article face and said surface, a signalling circuit confined within said housing and including a signalling device, a source of electrical current and a pair of magnetically operable switches for connecting said device to said source for operation, each of said switches being located adjacent to an aperture and being of the type which tends to assume its connecting position but will stay in its disconnecting position when subjected to magnetic attraction, a pair of cup-shaped shield members of ferromagnetic material one having its bottom fixed to said plane face of the article and the other one having its bottom fixed to said surface, each of said shield members being disposed in registry with the aperture of the opposed wall, said shield members having their edges disposed in substantial engagement with said walls and spaced from said face and said surface a distance corresponding substantially to said certain distance, and permanent magnets inserted in said shield members and having a coercitive force of such strength as to be operative to both attract said shield members and said housing for holding the latter in said normal position and cause their magnetic fields to extend through said apertures of said walls, respectively, and to hold said switches in their disconnecting positions, whereby displacement of said article relative to said housing or of said housing relative to said surface will cause at least one of said switches to move to its connecting position and to energize said signalling device.

7. System as claimed in claim 6 further comprising receiving means disposed outside of and at a distance from said housing for receiving signals emitted by said signalling device.

8. System as claimed in claim 6 further comprising means for normally energizing said receiving means so as to enable it to receive said signals, and an alarm device responsive to a de-energization of said receiving means.

9. System as claimed in claim 6 further comprising receiving means disposed outside of and at an alarm station distant from said housing for receiving signals emitted by said signalling device and an alarm device in said station connected to said receiving means to be responsive to the receipt of said signals, and means for keeping said alarm device in operation after the reception of said signals so that said alarm device cannot be put out of function by a willful destruction of said self-contained unit or of said receiving means.

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