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BURGLAR ALARM SYSTEMS

Filed Feb. 11, 1965

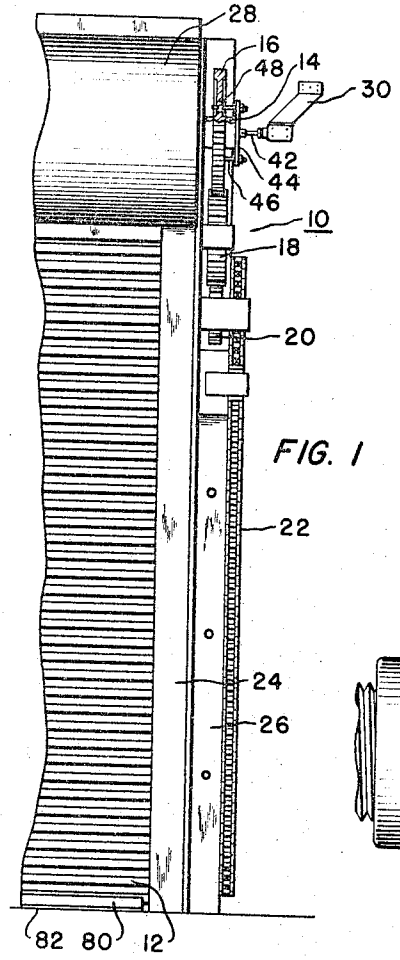


FIG. 1

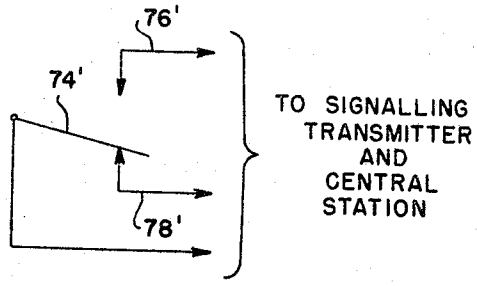


FIG. 4

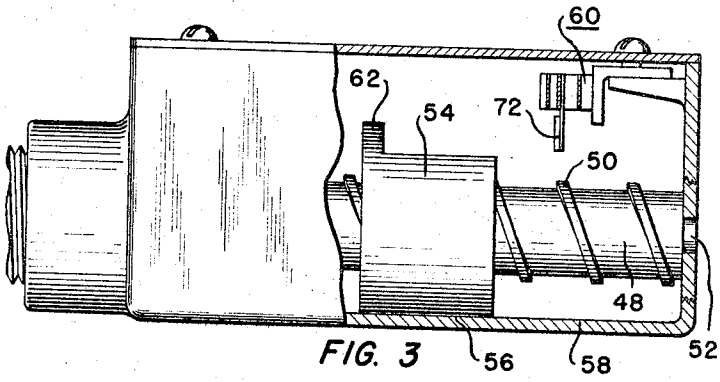


FIG. 3

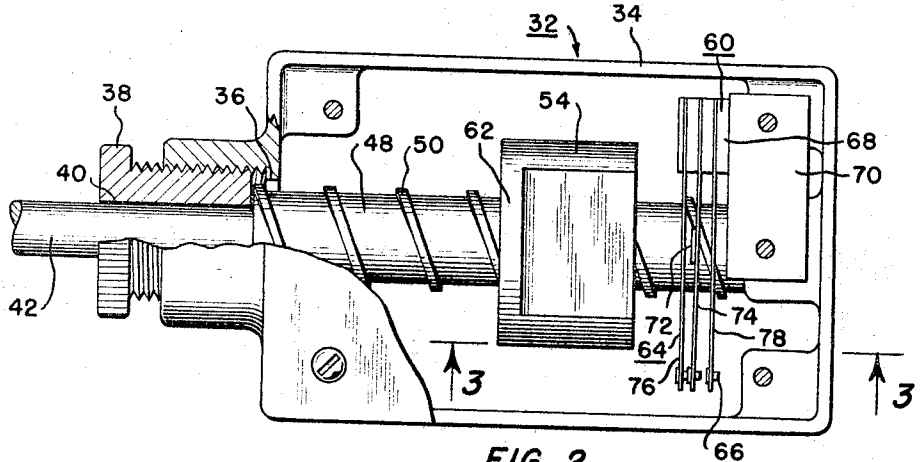


FIG. 2

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BURGLAR ALARM SYSTEMS

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The present invention relates to burgular alarm systems and more particularly to burglar alarm systems that may be used for signaling the opening movement of roll-curtain doors or the like.

A roll-curtain type door is a flexible door that is often used to close existing openings in warehouses and other type storage areas that are subject to burglaries. The flexible door or roll-curtain is moved to open or close the openings by being rolled on a rotating shaft similar to a window shade. The roll-curtain, when in the retracted or rolled up position, is concentrically wound around the shaft and resides within a housing. In this position only the bottom member or plate of the roll-curtain is left exposed. When in the extended position the roll-curtain usually slides down between longitudinal guide plates that are attached to the wall of the opening, and the bottom plate rests on the floor or is close to the floor. Thus in using the roll-curtain door the flexible roll-curtain is rolled up on a rotating axle at the top of the door construction with the flexible cover being retracted into or extended from the housing.

In the past it has been the practice in this field to use any of several types of protective devices to signal a burglar type entry attempt through roll-curtain doors. Some of these protective devices have been mechanically operated, some magnetically operated and some even utilize a radioactive source as the actuating element in an "electric eye" type detection system. However, all of the aforesaid devices cause difficulties both in installation and in maintenance that would be very advantageous to correct. These difficulties arise for may reasons, one being the physical location where it is necessary to place the protective devices. Normally the protective device actuating element is placed on the bottom plate of the roll-curtain and the cooperative protective device is secured to the bottom portion of the door's longitudinal guide plates. Installing protective devices on the bottom portion of the roll-curtain door construction subjects the protective devices or their actuating elements to mechanical damage or disablement from dust, dirt, water, or product spillage.

For example, in magnetic type alarm systems for roll-curtain doors, the magnetic actuating elements and the cooperative protective devices must be in alignment and closely positioned. Separation or misalignment of the two members signals the burglar alarm. The two members are usually mounted, because of necessity, on the bottom or bottom side of the roll-curtain type door. The bottom of the flexible roll-curtain in most installations can be moved sideways by wind or other causes, not arising because of an attempted burglary. The spacing between the edge of the roll-curtain and the frame members permit this movement, which movement can cause the burglar alarm to be signaled, giving a false alarm. The bottom of the roll-curtain can even be moved vertically by wind or the like, causing an alarm. Further, the door is metal and this, over a period of time, reduces or disrupts the effective magnetic power of the system. In other type

burglar alarm systems such as, for example, the one that uses radioactive material in the manner of an electric eye, such systems are also plagued with the same type of end play or side play of the roll-curtain that causes misalignment of the path or extension of its length, thereby reducing the amount of radioactivity passing from the actuating member to the protective device. The occurrence of such misalignments that are of sufficient nature to energize the burglar alarm but are not caused by attempted burglaries, eventually cause lack of faith in the system.

In addition, in older roll-curtain enclosures, the roll-curtain and its casings are often not fitted for a burglar alarm system. Thus to install the prior art systems, it is necessary to cut out portions of the wall or floor around the flexible door and make physical alterations to the door. Even with these expensive changes, the protective devices still project from the wall or floor, or from the roll-curtain, and are subject to being knocked off or damaged by vehicles and the like that pass through the door. Accordingly, it may be seen that because of problems resulting from the elements, from the amount of installation expense, and from physical damage, the prior art devices have serious limitations.

It is therefore an object of this invention to provide a novel and improved burgular alarm protective device for use with roll-curtain type doors or the like that overcomes many of the difficulties involved in using other burglar alarm protective devices.

It is another object of this invention to provide a novel and improved burglar alarm protective device that may be installed on roll-curtain type doors or the like without alteration to the door, the door casing, or interfering with the normal operation of the door.

It is another object of this invention to provide a novel and improved burglar alarm protective device for a roll-curtain door or the like that may be readily and easily adjusted to provide burglar alarm protection for any of an infinite number of selective extensions of the roll-curtain door or the like.

It is another object of this invention to provide a novel and improved burglar alarm protective device for roll-curtain doors or the like, which device is located entirely within the building in which it is installed, and is removed from possible contact with vehicles in their normal movement through the door.

It is another object of this invention to provide a novel and improved burglar alarm protective device for roll-curtain doors and the like that does not signal the burglar alarm when the roll-curtain or the like is moved or shaken by wind.

It is another object of this invention to provide a novel and improved burglar alarm protection device for roll-curtain doors or the like that may be moved from door to door in an easy, quick, and inexpensive manner.

It is another object of this invention to provide a novel and improved burgular alarm protective device for roll-curtain doors and the like that is simple and inexpensive in construction and requires no special technical knowledge to install, adjust, or maintain.

It is another object of this invention to provide a novel and improved burglar alarm protective device for roll-curtain doors and the like that is not effected in operation by the proximity of metal or other substances, and that does not require any additional source of electrical power for operation.

It is another object of this invention to provide a novel and improved switch actuating mechanism.

This invention generally comprises a switching mechanism that may be removably attached to or fixed to the axle shaft on which a roll-curtain door or the like is rolled up or down to open and closed positions. The switching mechanism includes a rotatable threaded member that is fixed to or attached to the axle shaft and rotated therewith. A follower member having internal threads corresponding to the threads on the threaded member is screwed into the threaded member and in installation is prevented from movement around the threaded member when the threaded member is rotated by the axle shaft of the roll-curtain door. Thus the follower member is moved linearly along the longitudinal axis of the threaded member in response to rotation of the latter. Linear movement of the follower member corresponds with vertical movement of the roll-curtain. So, upon a given movement of the roll-curtain, the follower member activates a switch to open or closed position as may be desired to reflect the position of the roll-curtain door. In roll-curtain door installations the switching curcuit actuates the burgular alarm. Thus a given movement of the roll-curtain and the follower member will actuate the burgular alarm.

After the roll-curtain door is installed, the burglar alarm system of this invention may be attached to the wall of the building with the threaded member secured to the axle shaft of the roll-curtain door. The follower member is then adjusted so that the follower member will open the burglar alarm circuit at that point of rotation of the threaded member that corresponds to the bottom of the roll-curtain door coming in contact with or close to the bottom of the opening to be closed. The relative positions of the switch and the follower member may be selectively varied to correspond with the burglar alarm actuation at selected positions of the roll-curtain. This installation has a high location and thus avoids many of the disadvantages in having burglar alarm protection devices at a low level. Dust, dirt, and water no longer pose problems when using this invention. Also malicious tampering is impractical at its high level location and guards and shields for mechanical protection are not necessary. Further, no additional electrical power is required for the operation of this protective device as it derives all of its rotational power from the axle shaft. Still further, no permanent installations are necessary for the use of this system.

Other objects, features, and advantages of the invention will appear more fully from the following description that is described in detail with reference to the appending drawing wherein like reference numerals designate like parts throughout, and in which:

FIGURE 1 is an elevation view of one side of a roll-curtain door that shows the location of installation of the invention thereon.

FIGURE 2 is a sectional view taken along one side of the switch actuating mechanism of this invention.

FIGURE 3 is a part sectional view taken along line 3—3 of FIGURE 2.

FIGURE 4 is a schematic diagram illustrating the electrical circuit of the switch actuating mechanism of this invention.

Referring now to the drawing and to FIGURE 1, there is shown a roll-curtain door, **10**, with only a side portion illustrated. The other side of the door would, of course, follow the same type of construction as is well known in the art. In roll-curtain doors of this type the door proper, **12**, is made of metal sections that are flexibly secured, one to the other, and may be rolled up around an axle shaft, **14**, shown in section. This function is similar to rolling up a window shade. The axle shaft is rotated by a gear, **16**, that is rotated by following gear **18** that is driven by driving gear **20**. Driving gear **20** is rotated by a pull chain **22** in the well known manner. The flexible door, in passing from its closed to open positions and then back to the closed position, is guided by having its edges inbetween metal frame members **24** that are secured to a wall by metal bracket members **26**.

The roll-curtain door is rolled up into housing **28** and around axle shaft **14**. The drive mechanism **22**, housing **28**, and axle shaft **14**, are all within the building to which the roll-curtain door closes the opening. Thus there is easy straight forward access to the axle shaft **14** within the building. The burglar alarm protective device of this invention is mounted by bracket **30** to the inner side of the building wall and is attached directly to the axle shaft **14**. Rod **42** may be fixed to shaft **14** permanently such as by welding, or it may be removably secured to shaft **14** by brackets. The attachment shown in FIGURE 1 is by brackets. Rod **42** is secured to plate **44** by a collar having a normal locking screw. Plate **44** is secured to gear **16** and shaft **14** by hook members **46** that are pulled against the spokes of gear **16** by a normal threaded nut arrangement.

Referring now to FIGURE 2, there is shown an embodiment of the burglar alarm switch of this invention, **32**, that comprises a box, **34**, that may be of rigid and water proof construction and made of metal, plastic, or the like. The box, **34**, is closed except for an opening, **36**, at one end that receives an externally threaded plug member **38** having a bearing aperture **40** that passes therethrough. Passing through bearing **40** is connecting rod **42** that is fixed to the roll-curtain axle shaft **14**, as previously described.

A threaded member, **48**, having a coarse thread, **50**, is integral with rod **42** at one end and at the other end is held by bearing member **52** to the back side of box **34**. Bearings **40** and **52** maintain rotational alignment of the threaded member **48**. Threaded on member **48** is a follower member **54** that has internal coarse threads cut therein corresponding with the coarse threads **50** on threaded member **48**. The follower member **54** has a flat lower surface **56** that slideably contacts the flat lower surface **58** of the box **34**. This cooperation of surfaces prevents rotational movement by follower member **54**. Upon rotational movement of the roll-curtain axle shaft **14**, rod **42** is rotated, thereby rotating the threaded rod **48**. This causes follower member **54** to move linearly along the length of the threaded member **48**.

A switch mechanism, **60**, is mounted on the end of the box **34** and adjacent to the threaded member **48**. In this position, it may be contacted by the projection **62** on the follower member **54**. As may be seen, the switching mechanism shown in the specific embodiment of the invention, comprises leaf springs **64** with electrical connections **66** on the ends thereof. The leaf springs, **64**, are rigidly held by insulating blocks **68** and secured to the attaching member **70**. The center leaf spring, **74**, has a downwardly projecting contact member **72** that, when moved linearly by projection **62**, causes one electrical connection to break and another electrical connection to make in the electrical circuit of the burglar alarm. Referring to FIGURE 4, the particular electrical circuit is shown wherein leaf member **74** corresponds with movable contact member **74'** of FIGURE 4, and leaf members **76** and **78** correspond to electrical connections **76'** and **78'**. The electrical circuit of FIGURE 4 functions to switch electricity in a well known manner in a central station to actuate a bulglar alarm in an appropriate and well known manner.

Operation

In operation, this invention may be installed on existing roll-curtain doors or may be installed at the time the roll-curtain door is installed. The switching box, **32**, is mounted onto a wall adjacent the roll-curtain door and connecting rod **42** is secured to the axle shaft **14**. The roll-curtain door is then rolled to a closed position with the bottom member, **80**, in contact with, or very close to, the floor surface **82**. In this position the location of the fol-

lower member **54** is adjusted along threaded member **48** so that projection **62** contacts the actuating member **72** of the leaf spring **74** and forces contact **66** of leaf spring **27** away from the contact **66** on leaf spring switch **64** and into contact with connection **78**. With this positioning of the follower member **54**, upon any upward movement of the roll-curtain door **12**, there will be a corresponding and necessary rotation of the axle shaft **14** that in turn rotates rod **42** and threaded member **48**, thereby moving follower member **54** away from the spring contact member **72**, and allowing the spring contact member **74** to make electrical contact with the spring member **76**, actuating the burglar alarm. The exact positioning of the follower member **54** may be varied relative to the position of the roll-curtain by varying the connection between the axle shaft **14** and rod **42**.

While the switching system of this invention has specific novel and unique application to burglar alarm systems used on roll-curtain doors and the like, it also has general application.

The features and principles of the invention described herein in connection with the specific exemplification thereof will suggest to those skilled in the art other ways for designing and arranging protective systems in accordance with the invention. It is acordingly desired that the appended claims be given a construction commensurate with the scope of the invention within the art.

I claim:

1. A switching system in a burglar alarm system for signaling opening movement of a roll-curtain door or the like upon opening or closing an electrical circuit in response to given rotational movement of the roll-curtain door shaft, comprising;

a threaded member having internal threads that are capable of being rotated by said shaft,

a follower member having external threads that is mounted on said threaded member,

means for preventing rotation of said follower member around said threaded member,

and switch means in said electrical circuit being positioned adjacent said threaded member for being actuated through contact with said follower member.

2. A burglar alarm system for signaling opening movement of a roll-curtain door or the like, comprising;

a switch for opening and closing an electrical circuit in response to given rotational movement of the shaft of said roll-curtain door,

said switch having a threaded member with a threaded external surface which member is capable of being rotated by said shaft,

a follower member having a flat surface on one of its sides and being mounted on said threaded member and having internal threads corresponding to and co-acting with said external thread on said threaded member,

flat sruface means being positioned adjacent said follower member and co-acting with said flat surface on said follower member to prevent rotation of said follower member upon rotation of said threaded member,

and switch means in said electrical circuit being positioned adjacent said threaded member and being actuated through contact with said follower member when said follower member is moved linearly by rotation of said threaded member.

3. A burglar alarm system for signaling opening movement of a roll-curtain door or the like, comprising;

a threaded member having an external thread, said threaded member being capable of being secured to the shaft on which said roll-curtain door or the like is rolled upon and being rotated by said shaft,

a follower member having an internal thread and being mounted on said threaded member,

means for preventing rotation of said follower member upon rotation of said threaded member,

circuit means for actuating said burglar alarm system, and said circuit means being capable of being actuated by said follower member in response to said threaded member being rotated by said shaft.

4. A burglar alarm system for signaling opening movement of a roll-curtain door or the like that is rolled up or down on a rotatable shaft, comprising;

a box like member having an opening in one end and an internal relatively flat surface on one side,

a threaded member extending through said opening in said box like member and being capable of being rotated by said rotational movement of said shaft,

a follower member having a coarse internal thread that is mounted on said threaded member and is moved along the axis of said threaded member upon rotation of said threaded member,

said follower member having a flat surface on one side thereof for co-acting with said flat surface of said box like member,

switch means located in said box like member adjacent the path of movement of said follower member for being actuated by said follower member, and signaling said burglar alarm,

and said follower member actuating said switch means upon said closed roll-curtain door being opened a given amount.

5. A burglar alarm system for signaling opening movement of a roll-curtain door or the like that is rolled up or down on a rotatable shaft, comprising;

a box like member secured to a fixed part of the building on which said door is mounted at a location adjacent said door,

said box like member having an internal flat side and an opening in the end adjacent said roll-curtain door,

a threaded member for being connected to said shaft and be rotated therewith,

said threaded member being located in said box like member and having a coarse external thread,

a follower member having a coarse internal thread and being mounted on said threaded member,

said follower member having a substantially flat surface on one side for co-acting with said flat side of said box like member which co-action prevents rotation of said follower member around said threaded member,

and switch means in said box like member being capable of being contacted by said follower member for controlling said burglar alarm.

6. A burglar alarm system for signaling opening movement of a roll-curtain door or the like that is rolled up or down on a rotatable shaft, comprising;

a box like member being secured to the building on which said door is mounted at a location adjacent said door and in substantial alignment with said shaft,

one of the sides of said box like member being substantially flat,

said box like member having an opening in the end thereof adjacent said shaft with a connecting rod projecting therethrough that is releasably connected to said shaft,

said connecting rod being integral with a threaded member having a coarse external thread,

a follower member having a coarse internal thread that is mounted on said rod member,

said follower member having a projection on one side and having on another side a substantially flat surface for co-acting with said one side of said box like member which co-action prevents rotation of said follower member around said threaded member,

switch means located in said box like member opposite said opening and adjacent said threaded member,

said switch means being capable of being contacted by said projection from said follower member,

said follower member being positioned on said threaded member at a point adjacent said opening when said

roll-curtain door is in the open or rolled up position, said threaded member being rotated by said shaft upon said roll-curtain door being lowered to the closed position,

in the closed position, said follower member actuating said switch member to a position of not signaling said burglar alarm,

upon said roll-curtain door being opened a given amount, said shaft being capable of rotating said threaded member and thereby moving said follower member linearly away from said switching member, causing said switching member to actuate signaling of said burglar alarm system,

and said switch means comprising a plurality of leaf springs that are held at adjacent edges and which have electrical contacts on their opposite ends.

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