

TX 2043H

X 2077T

X 2062H

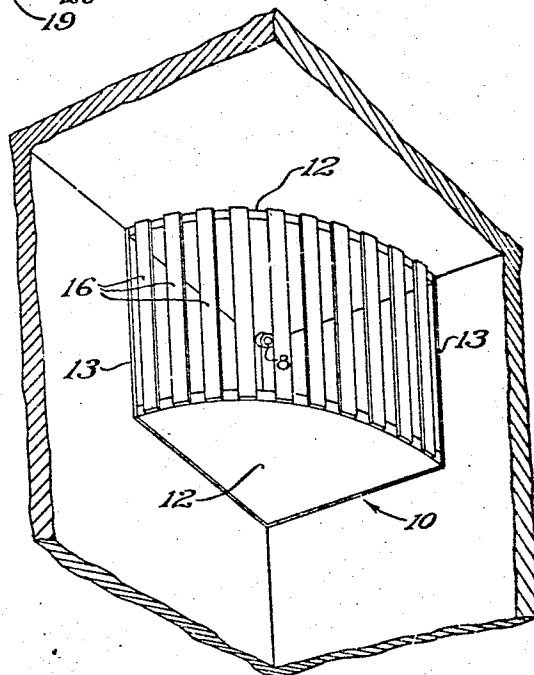
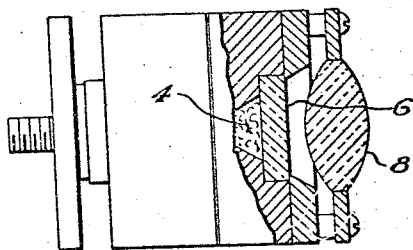
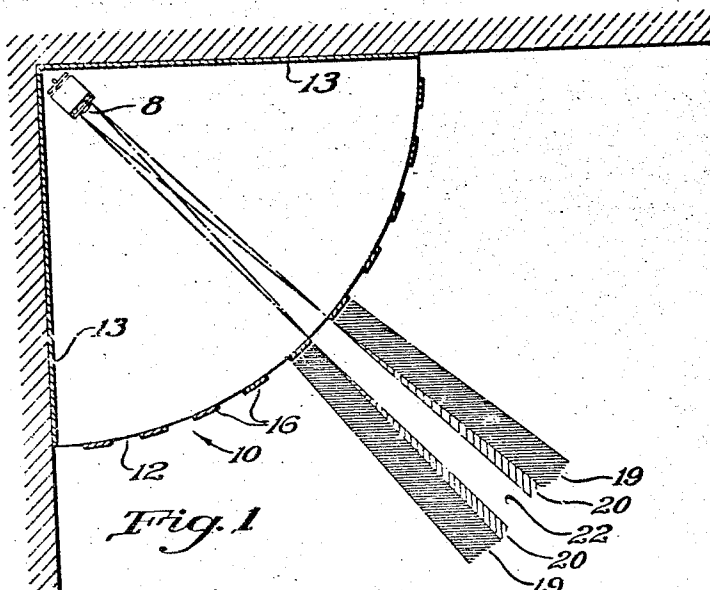
April 30, 1940.

P. N. SMITH

ALARM SYSTEM

Filed Dec. 9, 1937

2,198,725



Witness

Paul F. Bryant

Inventor

Philip N. Smith
by his attorney
Fish Hildreth Campbell

UNITED STATES PATENT OFFICE

2,198,725

ALARM SYSTEM

Philip N. Smith, Melrose Highlands, Mass., as-
signor to Hammond V. Hayes, Boston, Mass.

Application December 9, 1937, Serial No. 178,940

5 Claims. (Cl. 250—83)

The present invention relates to alarm systems, and more particularly to systems of the general type disclosed in my prior application, Serial No. 118,747, filed January 2, 1937.

5 The system described in my prior application makes use of a radiant energy detector sensitive to changes of radiant energy at any point within a wide angle field of vision, and capable of operating a suitable alarm upon the occurrence
10 of an abnormal condition, such as the presence of a fire or a burglar within the space to be protected. The detector is responsive, not to the total energy falling thereon, but rather to changes or modulations of energy, and for that
15 reason its usefulness in detecting an abnormal condition depends on the amplitude and rapidity by which a change of energy is produced by the occurrence of the abnormal condition.

Considering burglar detection as a specific example, it is usually impossible for a person to
20 step into the field of vision of the instrument, or even to move about within the field, without causing a sufficient modulation of radiant energy to actuate the signal. It is, however, conceivable
25 that at distances representing substantially the limit of sensitivity of the detector, a burglar who has somehow succeeded in getting himself placed within the field might move about in such a manner that any changes of energy would be insufficient in amplitude, or insufficiently sudden, to
30 actuate the alarm. This condition would not ordinarily arise except in a moderately open space, since if any obstructions, such as furniture, machinery and the like were present, any effective
35 movements into or out of the spaces behind the obstructions would result in sufficient changes in the energy impinging on the receiver.

The principal object of the present invention is to provide improvements in the alarm systems of this general type, with a particular view toward increasing the certainty of operation under
40 such conditions as are mentioned above.

With this object in view, the present invention
45 in conjunction with a radiant energy receiver for insuring that suitable modulation of the energy shall occur upon movements of the "abnormal condition" with the space to be protected. In its preferred form the invention provides a screen
50 or grating whereby the field of vision of the detector is broken up into adjacent zones of relatively small size. Some of the zones, which may be designated insensitive or shadow zones, are blocked off from optical relation with respect to
55 the detector, while the intervening zones are in di-

rect optical communication with the detector. These several zones or bands are of such size that it is impossible for a person to move about effectively without stepping from a shadow zone into a sensitive zone and vice versa, whereby the
5 necessary changes of radiant energy are effected. Although the invention is not limited to any particular form of detector, it is preferred to use the detector described in my prior application, which is of the type described in the patent to Hayes
10 1,954,204, dated April 10, 1934, and the patent to William M. Hall No. 2,115,578, dated April 26, 1938, involving the use of a dark heat-absorbing substance. This detector is advantageous, not
15 only because of its extreme sensitivity, but also because it is actuated by energy emitted from the abnormal condition itself, and is therefore independent of any constant or gradually variable
20 sources of radiant energy (lamps, radiators, etc.) normally existing within the field of vision.

In the accompanying drawing Fig. 1 is a plan view of the apparatus; Fig. 2 is an elevation partly in section of the preferred receiving instrument; and Fig. 3 is a perspective view showing
25 the setting of the apparatus in a corner of the space to be protected.

As shown in Fig. 2, the preferred instrument, which is exactly similar to that shown in my co-
30 pending application, comprises a fluff chamber 4 containing a body of radiant energy absorbing material. The chamber 4 is enclosed by a window 6 and in back of the chamber there is provided a diaphragm which is actuated by any
35 changes in gas pressure occasioned by a sudden variation of radiant energy impinging on the dark substance. In front of the window 6 there is provided a lens system diagrammatically shown
40 as a simple lens 8 to focus radiant energy from any part of the wide-angle field of vision on the dark substance. The window and lens are of rock salt or other material transparent to infra-
45 red, as fully described in my prior application. The diaphragm is included in an electrical circuit associated with a suitable amplifier, as shown in the above-mentioned Hall patent,
50 whereby a deflection of the diaphragm is caused to give a signal or alarm.

The instrument is mounted at the corner of a
55 cage 10 of quadrantal form. The cage is made up of top and bottom walls 12, each in the shape of a quadrant, and side walls 13; the whole being arranged to fit in the upper corner of a room as shown in Fig. 3. The front of the cage comprises a grating consisting of a series of vertical

slats 16 connected between the top and bottom walls.

As indicated in Fig. 1, the slats block off portions of the field of vision of the detector, thus breaking up the whole field of vision into a succession of radiating zones: first, "shadow" zones 19 from which the detector is completely obscured; next "penumbras" 20 from which the detector is partially obscured; and finally, "light" zones 22, in which any radiant energy source is in direct optical communication with the detector. A person in the field is unable to move effectively either across the zones or toward or away from the instrument without bringing a part of his body from a light zone to a shadow zone, or vice versa, whereupon the detector is sufficiently influenced by the resulting change of energy to actuate the alarm.

In order that changes of radiant energy may be as sudden as possible upon the movement of a person through the field of vision, the penumbra zones should be as narrow as possible with relation to the shadow and sensitive zones. For this purpose it is desirable that the slats should be somewhat wider than the diameter of the lens. As an example of a construction which has been found satisfactory, the radius of the quadrant cage is approximately ten inches, the lens diameter is one-half inch, and the slats are seven-eighths of an inch wide, the spaces between the slats being also about seven-eighths of an inch.

Furthermore, the width of the shadow zone at the distance corresponding to the limit of sensitivity should not be so wide that a person could remain entirely therein. The dimensions given in the above example have been found suitable for detection at distances up to 20 or 30 feet from the instrument. For greater coverage, two or more instruments may be used; in fact, even for small spaces, the use of two instruments at opposite corners is desirable, not only for coverage of the spaces directly beneath the cages, but also to give an overlapping of the light and shadow zones of the separate instruments.

The material of which the slats are made is not ordinarily of importance, so long as they are opaque to infra-red energy. They may be of wood or metal, or even glass, since the latter is opaque to the longer infra-red and hence serves to divide the field of vision into zones, some of which are in optical communication with the receiver and some of which are obscured therefrom. In fact, the use of glass, which is transparent to visible light but opaque to the longer infra-red, is advantageous in a system for more complete protection; the receiver, which is responsive to visible light, as well as to infra-red, will then be actuated by any change of visible light at any point within the whole field, as by the breaking out of a fire or the turning on of a flashlight, and will also be actuated by the modulated infra-red energy caused by the movement

of a low temperature source (a burglar, for example) through the zones formed by the slats.

Although a specific embodiment has been shown and described, it will be understood that the invention is not thus limited, but may be considerably varied. For example, it is not necessary that the slats should be vertical, although they should preferably be arranged so that a person would be more likely to move across, rather than along, the zones formed thereby; in some instances, as in the protection of stairways, the slats might advantageously be horizontal.

Having thus described the invention, I claim:

1. An alarm device comprising a receiver sensitive to changes of radiant energy and having a window, and a stationary grating in front of the receiver and having slats of greater width than the window to form within the field of vision zones from which the receiver is obscured.

2. An alarm device comprising a receiver sensitive to changes of radiant energy, and a stationary grating in front of the receiver and having slats of material transparent to visible light and substantially opaque to infra-red energy, forming zones which for infra-red are in optical communication with and obscured from the receiver.

3. An alarm device comprising a receiver responsive to changes in infra-red energy impinging thereon and adapted to receive energy radiated indiscriminately from sources within a space to be protected, and stationary screening means in front of the receiver to divide the field of vision of the receiver into zones which are respectively in communication with the receiver and obscured therefrom to insure modulation of energy impinging on the receiver from a source moving within said space.

4. An alarm device comprising a receiver responsive to changes in visible and infra-red energy impinging thereon and adapted to receive energy radiated indiscriminately from sources within a space to be protected, and stationary screening means having members of material transparent to visible light and substantially opaque to portions of the infra-red spectrum, said members being placed in front of the receiver to form zones which for infra-red are respectively in communication with the receiver and obscured therefrom to insure modulation of infra-red energy impinging on the receiver from a source moving within said space.

5. An alarm device having a body of material sensitive to changes in radiant energy, and stationary screening means in front of the window having members with dimensions at least as great as those of the body of sensitive material to form within the field of vision zones which are respectively in communication with and obscured from the receiver.

PHILIP N. SMITH.