H. S. TURNER.

THERMALLY OPERATED MEANS FOR AUTOMATICALLY DISRUPTING ELECTRIC ALARM CIRCUITS, &c.

APPLICATION FILED SEPT. 18, 1914.

1,171,564. Patented Feb. 15, 1916.

Fig. 1.

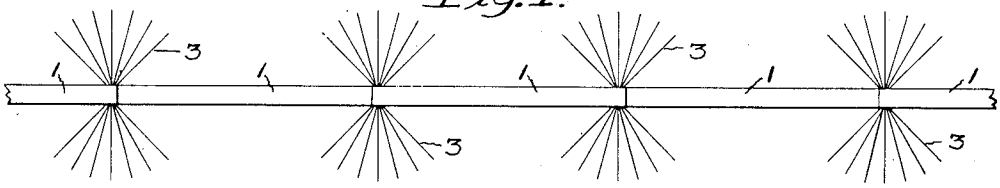


Fig. 2.

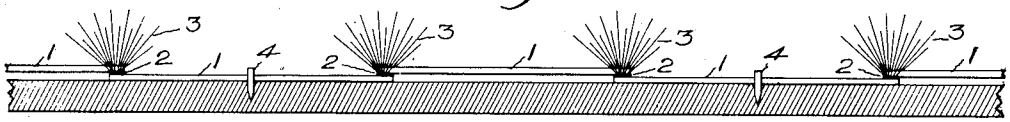


Fig. 3.

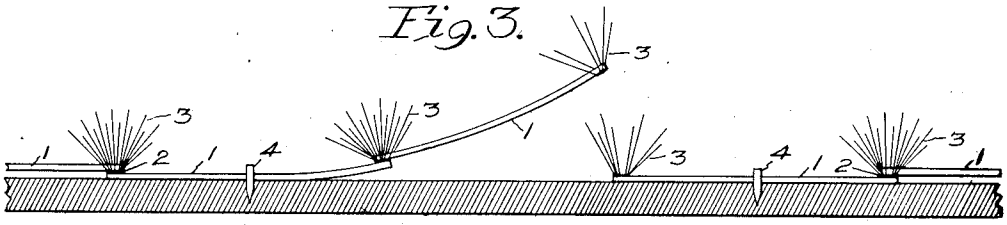


Fig. 4.

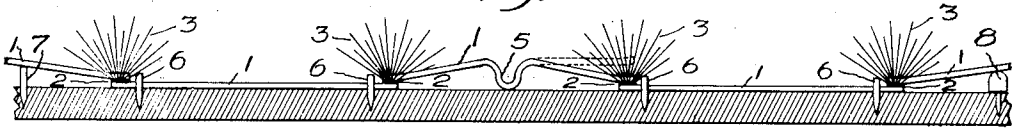
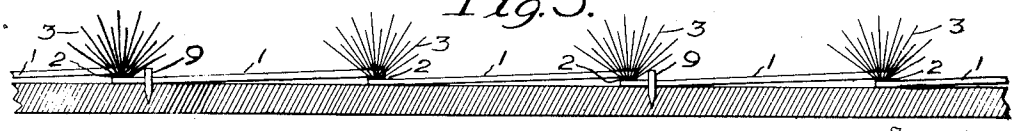


Fig. 5.



Inventor

H. S. Turner,

Witnesses

E. J. Marshall.

Arthur C. Probey.

By John H. Holt

his Attorney

UNITED STATES PATENT OFFICE.

HUBERT S. TURNER, OF SAN DIEGO, CALIFORNIA.

THERMALLY-OPERATED MEANS FOR AUTOMATICALLY DISRUPTING ELECTRIC ALARM-CIRCUITS, &c.

1,171,564. Specification of Letters Patent. Patented Feb. 15, 1916.

Application filed September 18, 1914. Serial No. 862,337.

To all whom it may concern:

Be it known that I, HUBERT S. TURNER, a citizen of the United States, residing at San Diego, in the county of San Diego and State of California, have invented certain new and useful Improvements in Thermally-Operated Means for Automatically Disrupting Electric Alarm-Circuits, &c., of which the following is a specification.

This invention has for its principal object the elimination of special thermostatic devices inserted at intervals in electrical alarm circuits, for the reason that such electric alarm circuits are only broken when one of said devices is directly affected by a high temperature, and if said device should happen to be located at some distance from said high temperature (as is often the case in practice) it does not operate until the area of high temperature has spread sufficiently to directly affect it. I accomplish this object by means of an electrically continuous strip or strand, formed of comparatively short sections of a metal of preferably low heat conductivity and connected together at their ends by means of a fusible alloy having a preferably low melting point. This continuous strand is fastened to the walls, ceilings or other convenient portions of the premises protected by an electric alarm circuit controlled by such a strand, the location of the same being such that a high temperature developed at any given point will soften the fusible alloy at the nearest connecting point of said sections of said strand and cause the continuity of the same to be broken, thus operating the alarm. In this manner, not only does every connecting point of said sections act as a substitute for the special thermostatic devices usually inserted at intervals in an electric alarm circuit, but the strand as a whole acts as a substitute for the wire ordinarily used to connect said devices. The cost of installing said strand is also less than the cost of installing said wire and thermostatic devices. It will be understood, however, that if desired, thermostatic circuit breakers of any known type may be inserted in the circuit formed by said strand.

The strand of my invention provides a new and useful device that is adapted to be arranged or included in any suitable fire alarm circuit that will provide for giving an alarm when the same is broken, and to this end the present invention contemplates a strand that provides for a normally closed circuit and which while extremely simple, inexpensive and easy to install, at the same time is sufficiently sensitive to heat as to provide for quickly opening the circuit and giving an alarm when subjected to a high temperature which may develop in the vicinity of any part of said strand.

With these and other objects in view which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter fully described, illustrated and claimed.

This strand is preferably extremely narrow and thin, its width and thickness depending on the location where it is to be used and the risks of mechanical injury to which it may be subject. For purposes of clearness, in the drawing the longitudinal views purposely show an exaggerated thickness of the sections of said strand. The sections are also shown extremely short for purposes of illustrating a plurality of sections in a small space, in practice, however, said sections vary in length according to the sensitiveness desired, the location where said strand is to be used or the distance between sustaining points are attaching said strand in the protected premises.

In the accompanying drawing, Figure 1 is a plan view of a portion of a strand constructed in accordance with this invention; Fig. 2, a longitudinal view of the same showing the strand as normally positioned to close the electrical circuit, and as installed on a wall or partition; Fig. 3, a similar view showing one section of the strand released at one end from the section with which it is normally engaged, when the fusible alloy which connected them has been softened by heat; and Figs. 4 and 5, alternative forms of said strand.

Referring to the accompanying drawings, 1 designates sections of said strand, which overlap at their ends a short distance as shown where they are joined together by said fusible alloy 2 as indicated by means of the heavy line between the overlapping ends of the connected sections. Extending into

said fusible alloy are what I designate "heat conducting antennæ," consisting of a plurality of fine wires or strips of metal 3 of a preferably high heat conductivity and of a length varying according to the location of said strand and the degree of operating sensitiveness desired. Preferably, said antennæ are placed at their centers between the ends of said sections when the latter are joined together by means of said fusible alloy and therefore the center of said antennæ are embedded in said fusible alloy. The ends of said antennæ are preferably separated in a fan shape as shown or may be bent in other forms according to the location of the strand. The purpose of said antennæ is to absorb heat from the air in the vicinity of the connected ends of said strand and conduct the same to, and distribute it through the fusible alloy used to connect said ends. In this manner the fusible alloy is softened quicker than it would otherwise be if no such antennæ were used, as the heated air from a large area is thus led to act on said fusible alloy, instead of the same being acted upon solely by the heated air which might come in contact with the connected ends of the sections alone. The softening of the fusible alloy is materially hastened if the sections of the strand are made of a metal of low heat conductivity, such as zinc or brass, and the antennæ made of a metal of high heat conductivity, such as copper, as in this case the heat absorbed from the air by the antennæ is concentrated in the fusible alloy and is not dissipated more or less throughout the length of the section, as would be the case if the sections were composed of a metal of a high heat conductivity. However, I do not wish to be limited to such combination of metals. While I have shown in the drawings seven wires or strips comprising the antennæ, it will be understood that I do not limit myself to any particular number.

No special mounting for the strand is shown as the same is intended to be mounted directly on the walls, ceilings, partitions or other convenient portions of the protected premises. However, in attaching said strip in damp places or where it crosses other electric conductors, pipes or metallic objects which might short-circuit a section of the strand, an insulating backing of any desired form can be used, or if preferred, an insulating backing can be used for the full length of the strand.

In fastening the strand to its sustaining means, it may be bent outwardly in such a manner that the elasticity or springiness of the metal will cause the overlapping end of a section to spring away from the section to which it is fastened, when heat has softened the fusible alloy used for connecting said sections. By utilizing this elasticity or springiness of the sections, the continuity of the strand is broken much quicker than it would otherwise be, as the fusible alloy will not need to be softened so much before the mechanical strain, caused by said elasticity or springiness, will separate the connected ends.

In Fig. 3 I have shown the appearance of a portion of the strand when one of the overlapping ends of a section of the same has been disconnected from the section to which it was joined, by means of the softening of the fusible alloy used to connect them. A part of the antennæ may remain attached to the end of one section and a part to the end of the other section, as shown in the drawing (Fig. 3), or a part or all may be entirely detached from either or both ends, according to circumstances.

In Figs. 2 and 3 I have also shown a preferred manner of attaching the strand to its sustaining means; the sections, the ends of which outwardly overlap the ends of the other sections, being left entirely free from any attachment to the sustaining means, while the underlying sections are each attached thereto by means of staples, as shown at 4, or in any other convenient manner. While I have shown in the drawing but one such fastener for each section attached to the sustaining means, it will be understood that more may be used if the length of the sections requires it. This preferred form of attaching the strand is purely a precautionary measure to avoid the possibility of the elasticity or springiness of an overlapping section not being sufficient to free its end when the softening of the fusible alloy takes place; as should this happen, as soon as the fusible alloy at the other end of said overlapping section is softened, gravity would cause the entire section to fall, thereby breaking the continuity of said strand and opening the electrical alarm circuit controlled by it. On this account the strand is also preferably mounted in such a manner that gravity will always act on said overlapping sections when the fusible alloy connecting their ends is sufficiently softened. However, it will be found in practice that if properly installed, the elasticity or springiness of the sections can be relied upon to break the connection of the sections, even if gravity is opposed thereto.

Fig. 4 shows alternative ways of forming and installing the strand. At 5 is shown how a projecting stud may be formed in an overlapping spring section of said strand so that when the ends of the adjacent underlying sections are fastened to the supporting means as shown at 6, said overlapping spring section is outwardly bowed, producing a mechanical strain at the ends of the same, which assures the prompt disconnection of

the ends when the fusible alloy which connects them to the underlying sections is softened. The dotted lines in Fig. 4 show the form assumed by said section when the fusible alloy is softened. At 7 and 8, Fig. 4, is shown how mechanical supports may be substituted for said projecting stud. It will also be understood that one of such studs or supports may be used near each end of an overlapping section, if the same are so long that one such would not be sufficient to obtain the desired mechanical strain at the ends of said section.

Fig. 5 is a longitudinal view showing a modified way of overlapping the ends of the sections of the strand, wherein one end of each section overlaps and one end underlies adjacent sections. A preferred manner of attaching the strand to its sustaining means is shown at 9, one section being left free from fasteners between the fastened sections, thus allowing gravity to assist in breaking the continuity of the strand, as hereinbefore described in relation to the other forms of the strand.

While in each figure I have shown the "heat conducting antennæ" 2, it should be understood said antennæ may or may not be used as desired and I do not limit my invention, in all of its aspects, to the use of said antennæ.

From the above it will be seen that the strand of my invention, while very simple in form, is extremely sensitive in operation and that there are no parts capable of being affected by dust or dirt and no special devices to install, inspect and maintain.

Changes in form, proportion and minor details of construction, other than those mentioned, may be resorted to without departing from the principles involved or sacrificing any of the advantages of this invention.

The combination of metallic members joined together by means of a fusible alloy or binding means having a lower fusing point than said members and "heat conducting antennæ" as described and shown in the drawings, is claimed broadly as such combination is adaptable to increase the sensitiveness in operation of any means relying on heat to soften or melt said fusible alloy or binding means. It should also be understood that while I have herein used the expression fusible alloy to describe the highly fusible binding medium, joining the conductor sections of the strand together, any suitable alloy, metal or fusible metallic binding agent may be employed within the scope of my invention as herein claimed.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent the following:—

1. Thermally operated means, comprising metallic members joined together by binding means having a lower fusing point than said members, in combination with metallic heat conducting antennæ extending into said binding means and adapted to conduct heat thereto from the surrounding medium.

2. Thermally operated means, comprising metallic members of low heat conductivity joined together by binding means having a lower fusing point than said members, in combination with metallic heat conducting antennæ of high heat conductivity extending into said binding means and adapted to conduct heat thereto from the surrounding medium.

3. Thermally operated means, comprising metallic members of low heat conductivity joined together by binding means having a lower fusing point than said members, in combination with fanned out metallic antennæ of high heat conductivity extending into said binding means and adapted to conduct heat thereto from the surrounding medium.

4. A thermostatic conducting strand for electrical alarm circuits, comprising an electrically continuous strand formed of spring metal sections joined together at their ends by metallic binding means having a lower fusing point than said sections, projecting studs formed in sections of said strand to outwardly bow such sections when said strand is attached to supporting means, said sections outwardly bowed serving to break the electrical continuity of said strand when said binding means is softened.

5. A thermostatic conducting strand for electrical alarm circuits, comprising an electrically continuous strand formed of metal sections joined together at their ends by binding means having a lower fusing point than said sections, in combination with metallic heat conducting antennæ extending into said binding means and adapted to conduct heat thereto from the surrounding medium.

6. A thermostatic conducting strand for electrical alarm circuits, comprising an electrically continuous strand formed of metal sections of low heat conductivity joined together at their ends by metallic binding means having a lower fusing point than said sections, in combination with metallic antennæ of high heat conductivity extending into said binding means and adapted to conduct heat thereto from the surrounding medium.

7. A thermostatic conducting strand for electrical alarm circuits, comprising an electrically continuous strand formed of spring metal sections joined together at their ends by a binding means having a lower fusing point than said sections, supports to outwardly bow sections of said strand when it is attached to supporting means, in combination with metallic heat conducting an-

tennæ extending into said binding means and adapted to conduct heat thereto from the surrounding medium.

8. A thermostatic conducting strand for electrical alarm circuits, comprising an electrically continuous strand formed of spring metal sections of low heat conductivity joined together at their ends by metallic binding means having a lower fusing point than said sections, supports to outwardly bow sections of said strand when it is attached to supporting means, in combination with metallic antennæ of high heat conductivity extending into said binding means and adapted to conduct heat thereto from the surrounding medium.

9. A thermostatic conducting strand for electrical alarm circuits, comprising an electrically continuous strand formed of spring metal sections joined together at their ends by a binding means having a lower fusing point than said sections, projecting studs formed in sections of said strand to outwardly bow such sections when said strand is attached to supporting means, in combination with metallic heat conducting antennæ extending into said binding means and adapted to conduct heat thereto from the surrounding medium.

10. A thermostatic conducting strand for electrical alarm circuits, comprising an electrically continuous strand formed of spring metal sections of low heat conductivity joined together at their ends by metallic binding means having a lower fusing point than said sections, projecting studs formed in sections of said strand to outwardly bow such sections when said strand is attached to supporting means, in combination with metallic antennæ of high heat conductivity extending into said binding means and adapted to conduct heat thereto from the surrounding medium.

In witness whereof, I hereunto subscribe my name this 18th day of September A. D., 1914.

HUBERT S. TURNER.

Witnesses:
E. G. MARSHALL,
G. M. COPENHAVER.