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⑤④ **Grate with incorporated alarm system.**

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⑤⑧ References cited:
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DE-A-2 925 624
DE-A-3 006 999
DE-B-2 653 056
DE-C- 367 034
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Description

The present invention relates to a metal grate, usually made of steel, which contains a series of incorporates devices, which, in the case of tampering, will activate the alarm system being connected to them. One is reminded that grates, usually built of steel and in different shapes, are barriers being secured in the openings of walls, such as windows, or transition areas between one room and the next, in order to permanently prevent people from entering into reserved or forbidden rooms, or, as in the case of jails, in order to prevent escapes through the openings being protected by these grates.

The grates are firmly secured in the walls by means of cementing or by means of similar systems and they constitute in themselves a barrier of the passive type, that is, they oppose by means of their structure and their type of anchorage possible tampering or attempted force.

Grates equipped with an electric alarm system which is triggered when the bars constituting the grate are sawn, are also known. For instance, US—A—2,374,139, describes a grate constituted by bars, each consisting of an internal and an external tube being insulated the one from the other and being part of an electric circuit. When the bars are sawn, the saw causes the electric contact between the internal tube and the external one, thereby triggering the alarm signal. In actuality this system is effective only when the bars are sawn, while the alarm may not be activated when the grate undergoes tamperings of a different nature, such as the spreading apart of the bars or the partial tearing of the grate off the wall.

Also, in DE—A—300 6999 a particular disposition of electric connections is described, which are suited for fencing safety systems, where the wires of the network belonging to a Wheatston bridge are connected to more copper wires, so as to avoid the possibility that the alarm may not be triggered if a bridge between the two wires is built.

The object of the present invention is that of realizing a grate, which, besides being a barrier of the passive type, is also an active means which prevents, because of its constitution, any type of tampering, whether represented by the sawing of the bars, which constitute it, by their being forced apart, or by the tearing of the grate away from the anchoring wall.

This object is achieved by a grate having the features defined in claim 1.

Basically, there is provided a grate with an incorporated alarm system and it includes a metal structure consisting in hollow bars being welded to each other; inside said bars and even inside the anchoring of the grate there are electric conductors which run longitudinally and transversally in the structure and are connected to an alarm system. According to the invention, each bar and each anchoring unit is strung with one or more pairs of conductors, one end of which is con-

nected to a load resistance placed inside the structure, while the other end of the conductors is connected to an electronic balancing circuit, which detects any variation of resistance in the circuit. Therefore, whenever there is tampering at any point of the grate — which may consist in the sawing of the bars, in the drilling, in flame cutting, in the tearing from the wall or from the anchoring frame, in the forcing apart — a variation of resistance occurs, which may be due, for example, to a short-circuit or to an interruption of the circuit: this variation, detected by a balancing circuit of the resistance being applied to it, will cause in the circuit itself the opening of a relay which is connected to the burglar alarm station and will, therefore, activate the alarm. In order to increase the reliability of the functioning of the grate circuits, it was deemed advisable to introduce into it two circuits at least, one independent from the other, with equivalent functions and based on the same functional principle and on the same construction method. Particular attention has been paid to the solution of the problem concerning the pulling off of the grate, that is, the complete removal of the same from the anchoring wall or frame. For this reason at least one pair of anchorages and a pivot, preferably in a diagonal position, which goes completely through the wall and is anchored by means of an iron loop or cross on the other side of the grate, have been introduced. The head of this pivot is provided with a loop, through which the wires of the electric circuit or circuits are strung, so that a possible removal from the wall of the anchorage in which the pivot is inserted will also cause the tearing of the electric circuit, with the ensuing activation of the alarm.

Another interesting aspect of the grate being discussed is that, because of the way in which it activates the alarm, false alarms due to accidental causes are practically impossible; in fact, if there is no alteration of the electric circuit in the grate, caused by the above-described causes, there will be no alarm.

These and other characteristics and construction details will be better illustrated in the description of a preferred form of execution of the grate, which is given by way of indication, but which is not limiting and which is illustrated in the enclosed drawings, in which:

— Fig. 1 shows the grate strung with the electric circuits;

— Fig. 2 shows the anchorage, in which there is the entrance of the wires of the electric circuits introduced in the grate; Fig. 3 illustrates the anti-tear system of the anchorage with a pivot provided with a loop;

— Fig. 4 shows the type of anchorage in which the wires of the circuit are wound once, in order to continue toward other areas; Fig. 5 shows an anchorage containing the end-of-the-line resistance of one of the circuits;

— Fig. 6 sketches with a circuit in blocks the connection of the grate circuits with the alarm station.

With reference to Fig. 1, grate 1 is built of bars of structural steel, welded and hollow inside, so as to allow the passage of two pairs of electrical wires 2, 3 and 4, 5, each of which constitutes a closed circuit on a resistance, as shown in 6.

Fig. 1 shows the route of the wires, which can be strung in any direction, even going through the same section several times, although it should be kept in mind that no area, including the anchorage, should be left without wiring.

In the case being under examination there are 4 anchorages and each of them contains circuit structures and characteristics, which are different from one another.

With reference to anchorage 7 (Fig. 2), tube 8, made of plastic material, is placed inside of it; this tube goes all the way through the wall and serves as a channel for the introduction in the grate of the conductors being connected to the alarm station. It is blocked inside anchorage 7 by block 9, made of a gummy plastic material, which contacts the inside walls of the above-mentioned anchorage.

In Fig. 3, anchorage 10 holds in its interior pivot 11, made of iron, which goes all the way through the wall and which has a threaded end 12 protruding from the anchorage. Plate 13 is screwed to protruding end 12 and then cemented in the wall. Pivot 11 is provided at the other end with loop 14, through which the electric conductors are strung. Two bolts, 15 and 16, prevent the rotation of pivot 11 while plate 13 is being fixed with screws. The anti-tear function of the pivot is obvious: in fact, in the case of an attempt to tear anchorage 10 from the wall, one also tears the conductors which are strung through the loop.

In Fig. 4, inside anchorage 17, there is a block, made of plastic material, 18, which allows conductors 2, 3 and 4, 5 to wind around and continue to spread themselves in the horizontal and vertical sections of the grate. In Fig. 5, the inside of anchorage 19 also holds a block made of plastic material, for the reversing of the direction of the circuit wires, but inside the anchorage there is also the load resistance of one of the two circuits.

Conductors 2, 3 and 4, 5 are normal, insulated electric conductors, but with a very small section, so that, because of their length, they constitute in themselves a resistive load, in addition to the load resistance. Each circuit is fed with low tension (12 Volts), so that possible contacts between the grate and the conductors can not be dangerous to people.

Fig. 6 is a sketch of the circuit in blocks which connects the conductors contained in the grate to the alarm station. Resistances R1 and R2 represent respectively the resistive load of the two circuits 2, 3 and 4, 5. Each of the two resistances is connected with a balancing circuit of a known type, which includes trimmer 20 having the task of balancing the connected load resistance, so that a transistorized circuit maintains relay 21 normally closed.

Each variation of the value of resistance R1 or R2 is felt by the balancing circuit which, con-

sequently, causes the opening of relay 21, which is connected to alarm station 22. The electric opening of relay 21 will cause the activation of the alarm.

In the specific case being described, two circuits have been foreseen. They are introduced into the grate, are independent from one another and are represented by resistances R1 and R2, but it is obvious that a single circuit is sufficient for the functioning of the alarm system; on the other hand, it is also possible, for security reasons, to increase the number of circuits beyond two.

Claims

1. A grate with an incorporated alarm system, comprising a metal structure consisting of hollow bars welded to one another, the structure being suitable to create a barrier in an opening to be protected, and electrical conductors (2, 3, 4, 5) extending through the structure and connected to an alarm (22), characterized in that said hollow bars extend longitudinally and transversely, and intersect, said structure includes four or more anchorages (7, 10, 17, 19) securing the structure to a wall or to a supporting frame, one or more pairs of insulated electrical conductors (2, 3 and 4, 5) extend through the inside of the entire metal structure, including each of said hollow bars and said anchorages, the or each pair of conductors is connected at one end to a load resistance (6) which is also located inside the structure, and the pair is connected to a balancing electronic circuit, so that any variation in resistance in the circuit causes the opening of a relay (21) connected to an alarm station (22), thereby activating the alarm.

2. A grate according to claim 1), characterized by the fact that one or more anchorages (10) are provided with a pivot (11) going through the entire wall and secured to it on the opposite side, such pivot being provided with a ring (14), through which the electric conductors are strung, such that any action tending to tear the anchorage from the wall will cause the breaking of the conductors and, therefore, a variation of resistance in the circuit, which, as a consequence, activates the alarm.

3. A grate according to claims 1) and 2), characterized by the fact that inside each anchorage there are pairs of electric conductors, so that any action breaking these anchorages causes, as a consequence, the breaking of the conductors contained therein and, therefore, the activation of the alarm.

Revendications

1. Une grille avec un système d'alarme incorporé, comprenant une structure en métal, qui consiste en barres vides à l'intérieur et soudées entre elles, ladite structure étant apte à créer une barrière dans une ouverture qui doit être protégée, et des conducteurs électriques (2, 3, 4, 5) qui s'étendent à travers la structure et sont connectés à une alarme (22), caractérisée en ce que lesdites

barres vides à l'intérieur s'étendent longitudinalement et transversalement et s'entrecroisent, ladite structure comprenant quatre ou plus ancrages (7, 10, 17, 19) qui fixent la structure à un mur ou à un châssis de support, une ou plus paires de conducteurs électriques isolés (2, 3 et 4, 5) s'étendant à travers l'intérieur de l'entière structure en métal, chacune desdites barres vides à l'intérieur et chacun ancrage comprenant une paire de conducteurs étant connectée à une extrémité à une résistance de charge (6) qui se trouve aussi à l'intérieur de la structure, et la paire étant connectée à un circuit électronique d'équilibrage, ainsi que toute variation de résistance dans le circuit provoque l'ouverture d'un relais (21) connecté à une station d'alarme (22), mettant en action l'alarme.

2. Une grille selon la revendication 1, caractérisée en ce que un ou plus ancrages (10) sont pourvus d'un pivot (11) passant à travers le mure entier et étant fixé de l'autre côté, ledit pivot étant pourvu d'une bague (14), à travers laquelle les conducteurs électriques sont faits passer, de façon que n'importe quelle action, tendant à arracher l'ancrage du mur, provoque la rupture des conducteurs et, par conséquent, une variation de résistance dans le circuit, qui, par conséquent, met en action l'alarme.

3. Une grille selon les revendications 1. et 2., caractérisée en ce qu'à l'intérieur de chacun ancrage il y a des paires de conducteurs électriques, ainsi que n'importe quelle action de rupture de ces ancrages provoque par conséquent la rupture des conducteurs y contenus et, par conséquent, la mise en action de l'alarme.

Patentansprüche

1. Gitter mit eingebautem Alarmsystem, bestehend aus einer Metalstruktur, die aus zusammen-

geschweissten Hohlstangen besteht und dazu geeignet ist, in einer zuschützenden Oeffnung ein Schranke zu schaffen, und elektrischen Leitern (2, 3, 4, 5), die durch die Struktur ausgestreckt und mit einem Alarm (22) verbunden sind, dadurch gekennzeichnet, daß die genannten Hohlstangen in der waagerechten sowie in der senkrechten Richtung ausgestreckt sind und sich kreuzen, daß die genannte Struktur vier oder mehr Anker (7, 10, 17, 19), die die Struktur an einer Wand oder an einem Stützrahmen festhalten, sowie ein oder mehrere Paare elektrischer und isolierter Leiter (2, 3 und 4, 5) enthält, die durch die ganze Metalstruktur ausgestreckt sind, indem jede der genannten Hohlstangen und jeder Anker ein Paar Leiter, die an einem Ende mit einem sich auch innerhalb der Struktur befindlichen Richtwiderstand (6) verbunden ist, enthalten; daß das Paar Leiter mit einem elektronischen Ausgleichsstromkreis verbunden ist, so daß jede Widerstandsänderung im Stromkreis die Oeffnung eines mit einer Alarmstation (22) verbundenen Relais verursacht, das damit den Alarm betätigt.

2. Gitter nach Anspruch 1., dadurch gekennzeichnet, daß ein oder mehrere Anker (10) mit einem Zapfen versehen sind, der durch die ganze Wand durchdringt und an der anderen Seite befestigt ist, daß der genannte Zapfen mit einem Ring (14) versehen ist, wodurch die elektrischen Leiter ausgestreckt sind, so daß jegliche Tätigkeit zum Ausreissen des Ankers aus der Wand den Bruch der Leiter und dadurch ein Aenderung des Widerstandes im Stromkreis verursacht, der infolgedessen den Alarm betätigt.

3. Gitter nach Ansprüchen 1. und 2., dadurch gekennzeichnet, daß einige Paare elektrischer Leiter sich innerhalb jedes Ankers befinden, so daß jegliche Tätigkeit zum Brechen dieser Anker den Bruch der sich darin befindlichen Leiter und infolgedessen die Betätigung des Alarms zur Folge bringt.

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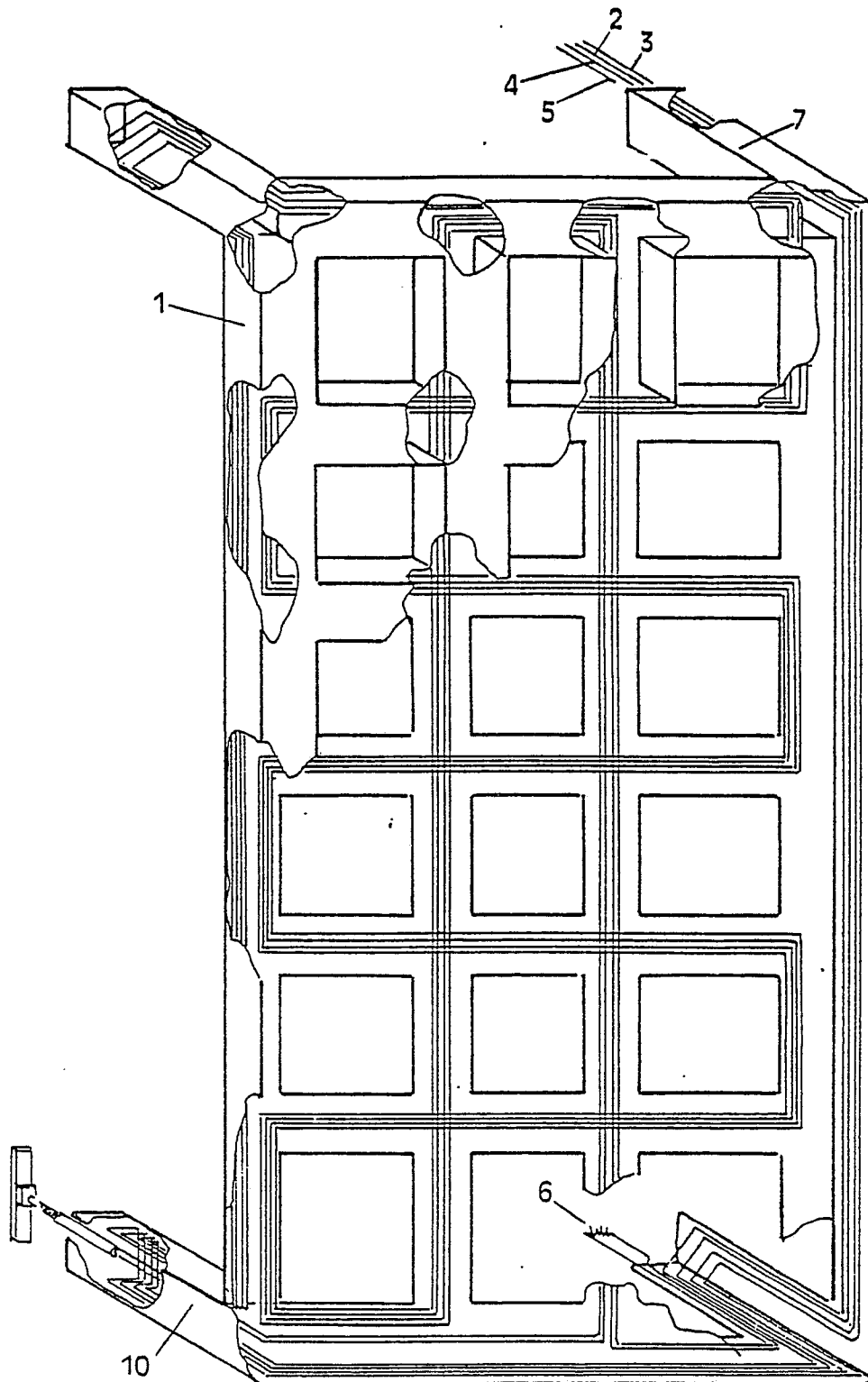


FIG.1

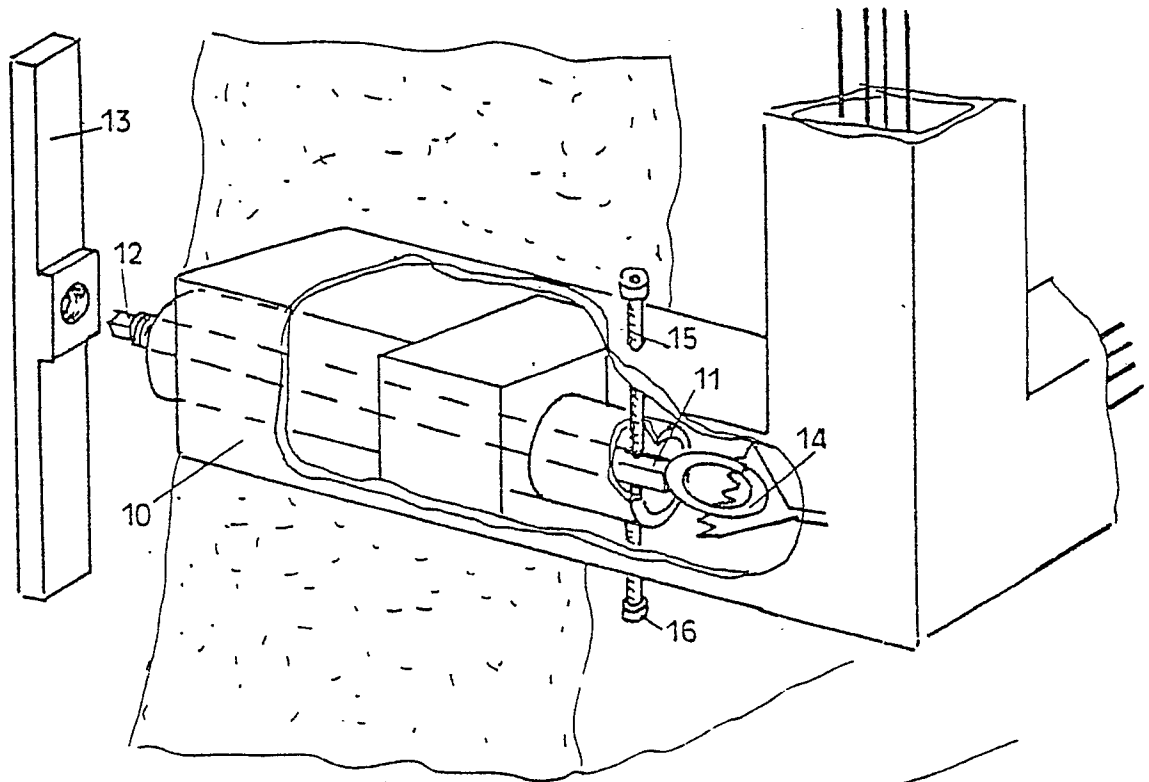


FIG.3

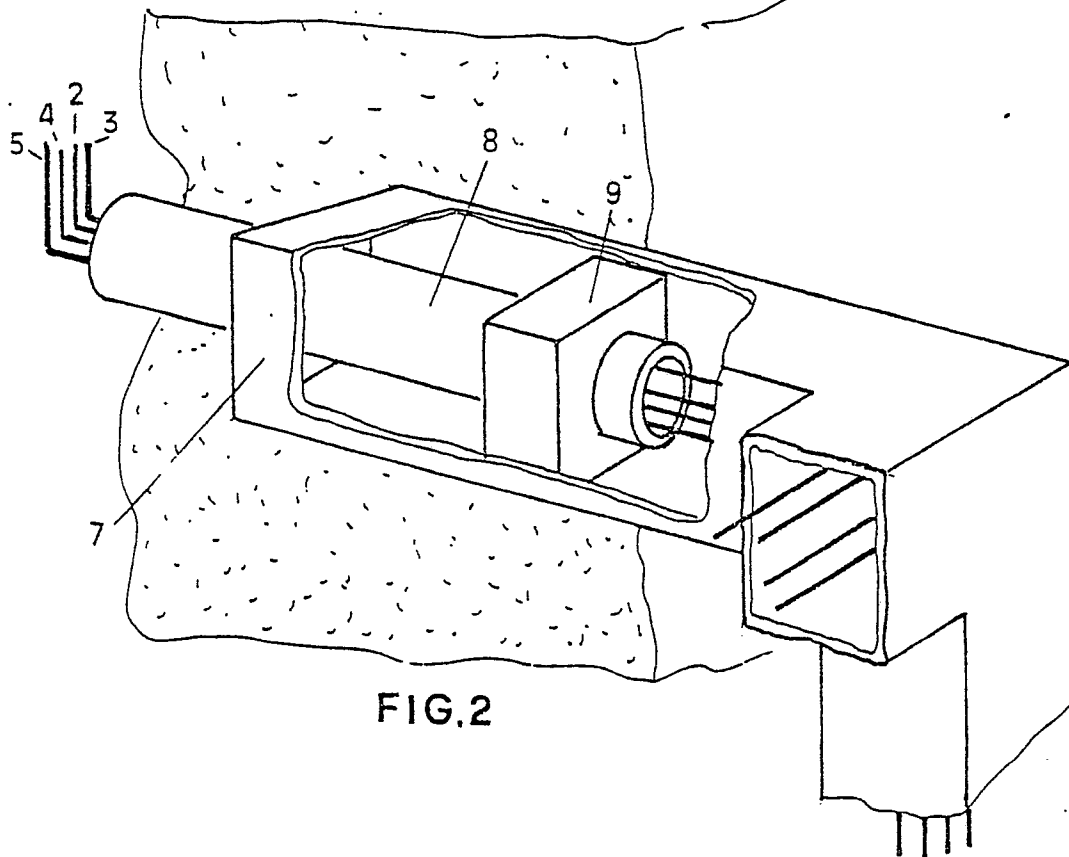


FIG.2

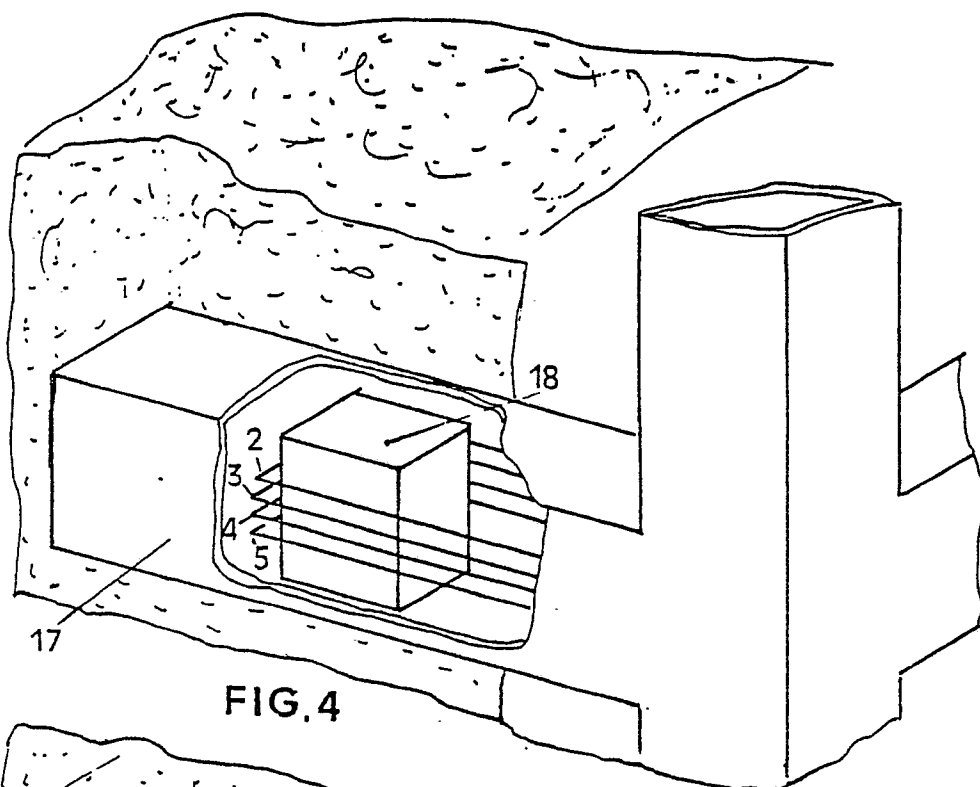


FIG. 4

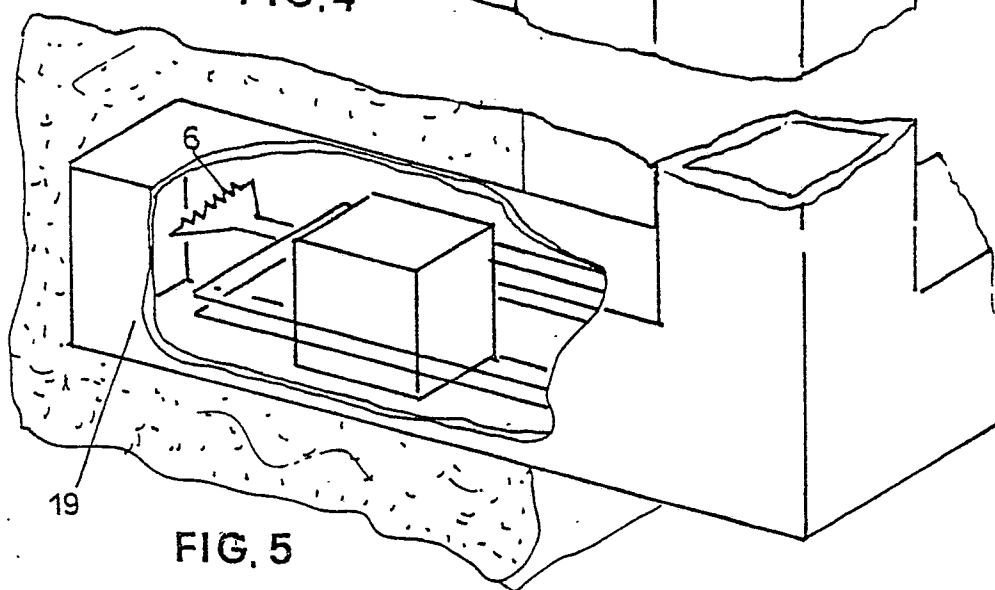


FIG. 5

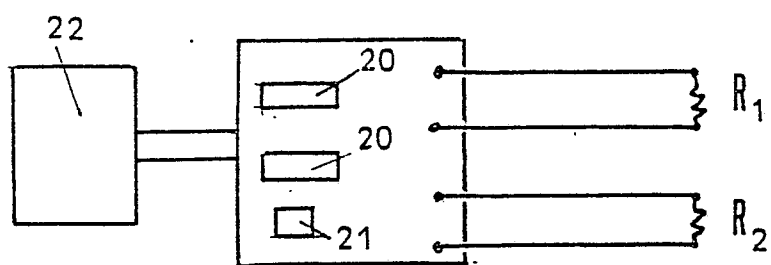


FIG. 6