(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 014 009**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **80200028.1**

(22) Date of filing: **14.01.80**

(51) Int. Cl.³: **G 08 B 13/12**

(30) Priority: **30.01.79 NL 7900735**

(43) Date of publication of application: **06.08.80 Bulletin 80/16**

(84) Designated Contracting States: **AT BE CH DE FR IT LU NL SE**

(71) Applicant: **N.V. BEKAERT S.A., Leo Bekaertstraat 1, B-8550 Zwevegem (BE)**

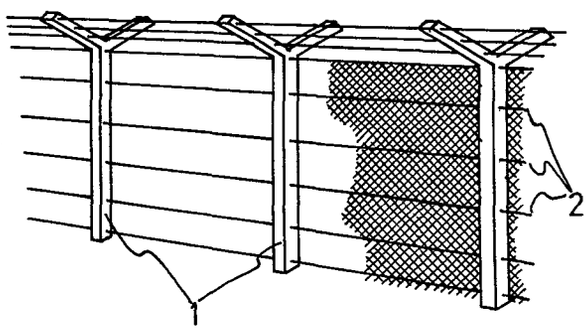
(72) Inventor: **Dewaegheneire, Gabriel, Vredelaan 31, B-8740 Deerlijk (BE)**
Inventor: **Andrijs Leo, Vlaamse Ardennenstraat 9, B-9790 Wotegem-Petegem (BE)**

(74) Representative: **Demeester, Gabriel Leo et al, Bekaertstraat 1, B-8550 Zwevegem (BE)**

(54) Security fence.

(57) This invention relates to a security fence including at least one tensioned wire connected to a detector for sensing movement of the wire. The detector comprises a movable element which sealingly separates two chambers in such a manner that any movement of the sealing element produces a change in volume of at least one of the chambers, which one chamber is connected to a pressure-sensitive switch actuator.

Preferably, the said detector comprises an air cylinder with a piston which constitutes the said sealing element and is connected to the said wire.



EP 0 014 009 A1

Security Fence

The invention relates to a security fence of the kind including a tensioned wire connected to a detector for sensing movement of the wire. Such a security fence and detector are described in United States Patent No. 3.634.638 and Dutch Patent Application No. 74.07588.

As is desirable, the detector disclosed in the prior art just mentioned reacts to sudden movement of the wire, but not to slow movements as for example those arising from temperature changes. This has so far necessitated a complicated arrangement of the detector, which comprises a pin-shaped contact mounted within an annular contact. In mounting such a detector one must be careful that in the rest position the pin contact is substantially in the centre of the annular contact so that its sensitivity is equal in all directions. Otherwise the sensitivity of the switch in one direction will be much greater than in another direction so that minor disturbances which are not intended to be sensed will cause actuation of the alarm system.

Another disadvantage of this known detector is that its operation is based on the properties of a particular silicone paste, which forms the medium through which the movements of an element connected to the fencing wire are transmitted to a switch element, in such manner that sudden movements are transmitted but slow ones are not. However, the properties of this paste depend upon temperature so that the detector is undesirably sensitive to weather (summer compared with winter) and time (day compared with night). Moreover, such detectors are relatively expensive.

According to the present invention there is provided a security fence including a tensioned wire connected to a detector for sensing movement of the wire, the detector comprising a movable element which sealingly separates two chambers in such a manner that any movement of the sealing element produces a change in volume of at least one of the chambers, which one chamber is connected to a pressure-sensitive switch actuator.

Good detection of sudden movements of the wire in both directions is ensured when each of said chambers is connected to a separate switch actuator.

A simple and inexpensive construction is obtained when the detector comprises an air cylinder with a piston which constitutes the said sealing element and is connected to the said wire.

Preferably, the switch actuator comprises a movable membrane dividing a housing into two compartments, each compartment being connected to atmosphere via a restricted aperture, said membrane carrying a movable contact of a switch.

For accurate adjustment of the sensitivity of the system it is advantageous that the spacing between the switch contacts is adjustable, and that the size of the said restricted apertures is adjustable.

In a fencing comprising a plurality of said tensioned wires extending substantially horizontally and each connected to a said detector, the corresponding chambers of a plurality of said detectors are preferably connected in parallel to a common switch actuator.

An embodiment of the invention will now be described by way of example and with reference to the accompanying drawings, in which :

Figure 1 is a perspective view of part of a security fence according to the invention ;

Figure 2 is a perspective view of part of a post of such a fence, housing movement-responsive detectors ; and

Figure 3 is a diagrammatic view of the manner of connection of a number of such detectors to pressure-sensitive switch actuators.

Figure 1 shows part of a security fence. This fence comprises, inter alia, switch-carrying posts 1 and tensioned fencing wires 2. Ordinary posts may be placed between the switch-carrying posts 1. The fencing wires may be of the type described in Dutch patent application No. 76.10679 and may be woven into a netting or be horizontally tensioned. The fencing wires may alternatively be normal fencing wires such as for example barbed wire. In the illustrated embodiment, horizontally tensioned wires 2 are used.

Figure 2 shows a switch-carrying post 1 equipped with the elements necessary to detect sudden movements of the horizontally tensioned wires 2, but which are not sensitive to slow movements. This post 1 comprises two sections 3 and 4, which fit together in a sealing manner. Moving away section 4 from section 3 will actuate the safety switch 5 will then sound an alarm. This means that it is not possible to sabotage the operation of the elements within the post without raising the alarm via the switch 5.

The horizontally tensioned wires 2 extend via apertures through the section 3 of the post 1. The post 1 is provided with a number of detectors in the form of air cylinders 6

whose number equals the number of tensioned wires 2. Such air cylinders 6 are commercially available, for example Martonair type M/6010-M/6020. These air cylinders are double-acting cylinders with a chamber at each side of the piston 7. Each cylinder 6 is fixed to the section 3 of the post 1, and the rod 8 of the piston 7 is fixed to a respective wire 2. The cylinders 6 have for example a bore diameter of 10 - 20 mm and a length of stroke of 50 mm.

Figure 3 is a schematic view of how the cylinders 6 are connected with each other and with two air-pressure-sensitive switch actuators 9 and 10. The cylinders 6 are connected in parallel by means of pipes 11. Ports 12a, 12b and 13a, 13b are connected to the lower and upper actuators 9 and 10 respectively, via connections 12 and 13. The actuators 9 and 10, which are available on the market, for example type DW 10 of Bircher, Shaffhausen, Switzerland, convert a low-pressure air signal into an electrical signal. Normally they are in open position with their switch contacts 14, 15 located at a small distance from each other. The required control pressure can be adjusted by placing the contacts 14, 15 closer to or further away from each other and this can be done by adjusting the contact 15 which has the form of a control screw. The contact 14 is supported by a membrane 16 which divides the switch into two compartments. Each compartment is provided with a small adjusting screw 17 which determines the size of a restricted aperture to atmosphere. The size of the restricted aperture can be changed by moving this adjusting screw 17, whose function will be clarified hereafter.

The operation of the illustrated system is as follows : When an intruder moves or cuts any of the wires 2 in order to enter the fenced area, the movement of the wire 2 shifts the rod 8 and the piston 7 connected to it in at least one

direction. Assume that the piston 8 of the upper cylinder 6 in Figure 3 is moved from right to left. This movement compresses the air in the left-hand chamber of cylinder 6 and an air pulse is exerted on the membrane 16 of the switch 9 via the pipe 11, so that the switch 9 is closed, contacts 14 and 15 touching each other. By means of the adjusting screw 15 it is possible to render the switch 9 so sensitive that it functions at a control pressure of 2 mm water column (1 mm water column = 9,807 Pa). This sensitivity allows the switch to react to very slight sudden movements of the piston 7 and the wire 2 connected to it. After the switch has been closed and the alarm has been actuated, the switch opens again since the air escapes through restricted aperture. In other words, to close the switch and thus to actuate the alarm an air pulse is necessary, caused by the movement of the piston by means of the wire. When the piston 7 is in its condition of rest then so is the switch. The switch never stays for long in the closed or alarm position. After having actuated the alarm the switch automatically returns to its condition of rest and then immediately reacts again to a next sudden movement of the piston. Temperature changes, for example caused by the day-night transition, which cause a very slow movement of the piston rod by shortening or lengthening the wires 2, have no influence on the switches 9 and 10 because the slowly displaced air escapes through the leakage aperture without moving the diaphragm 16.

It is clear that the illustrated arrangement according to the invention offers several advantages, as follows :

The whole system functions at atmospheric pressure and ambient temperature. The air pulse for the operation of the switch is produced by the movement of the piston itself, but no extra compressed air tank is necessary. The

elements employed, viz. the cylinders 6 and the switches 9 and 10 are substantially non-responsive to temperature changes. The installation requires almost no maintenance and it is reliable in operation.

The sensitivity of the installation is great, but does not depend on the position of the piston. Starting from a cylinder with a length of stroke of 50 mm, if the piston when first secured to a certain wire 2 is substantially in the center of the cylinder, then the piston has over 20 mm of free stroke in both directions. If the wire 2 shows an elongation or shrinkage of 10 mm in a given direction, for example when retensioning a wire, and the piston is returned to the condition of rest, then such a transposition of the piston has no influence at all on the good operation or the sensitivity of the system. Any small sudden movement of the piston, for example of 3 mm, is immediately sensed since the piston still has a free stroke of over 10 mm in one direction and over 30 mm in the others. The sensitivity of the system is very great ; it has been found that the switch 9 or 10 may be closed simply by squeezing one of the pipes 11 suddenly.

Slow or normally occurring temperature changes, for example night temperature versus day temperature, whereby a slow shrinkage or elongation of the wires 2 takes place, has no influence on the switch, because of escape of air through the restricted aperture.

The sensitivity of the system is easily adjustable by means of the regulating screws 17 and the adjusting screws 15.

In practice it has been shown that the illustrated arrangement offers ample sensitivity to sudden movements,

combined with insensitivity to slow movements, which makes for trouble-free operation of the system. Moreover, the system is protected against unauthorised interference or attempts at destruction since interference with the connecting pipes causes the pressure-responsive actuator to react and actuate the switch.

Thus the invention at least in its illustrated embodiment provides a security fence of particularly simple and inexpensive design and high reliability in operation, which moreover can be built up from commercially available standard elements.

CLAIMS :

1. A security fence including a tensioned wire connected to a detector for sensing movement of the wire, the detector comprising a movable element which sealingly separates two chambers in such a manner that any movement of the sealing element produces a change in volume of at least one of the chambers, which one chamber is connected to a pressure-sensitive switch actuator.

2. A fence as claimed in claim 1, wherein each of the said chambers is connected to a separate switch actuator.

3. A fence as claimed in claim 1 or 2, wherein the said detector comprises an air cylinder with a piston which constitutes the said sealing element and is connected to the said wire.

4. A fence as claimed in any of claims 1 to 3, wherein the or each said switch actuator comprises a movable membrane dividing a housing into two compartments, each compartment being connected to atmosphere via a restricted aperture, said membrane carrying a movable contact of a switch.

5. A fence as claimed in claim 4, wherein the spacing between the switch contacts is adjustable.

6. A fence as claimed in claim 4 or 5, wherein the size of the said restricted apertures is adjustable.

7. A fence as claimed in any of the preceding claims, comprising a plurality of said tensioned wires extending substantially horizontally and each connected to a said

detector, the corresponding chambers of a plurality of said detectors being connected in parallel to a common switch actuator.

8. A security fence substantially as hereinbefore described with reference to the accompanying drawings.

0014009

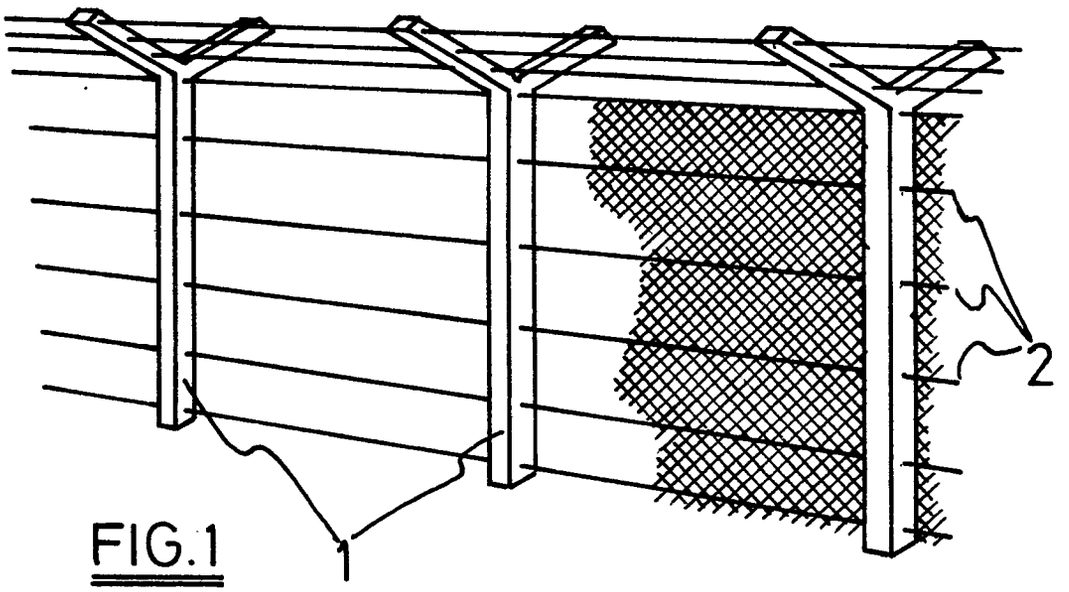


FIG.1

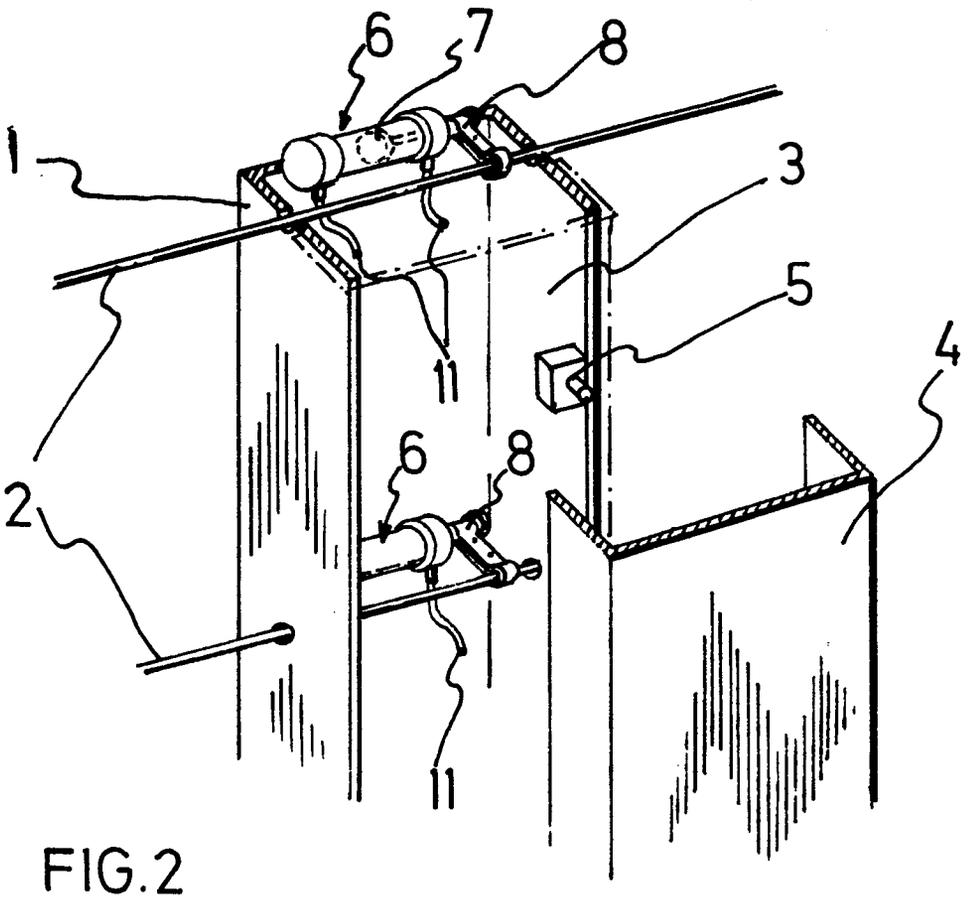


FIG.2

0014009

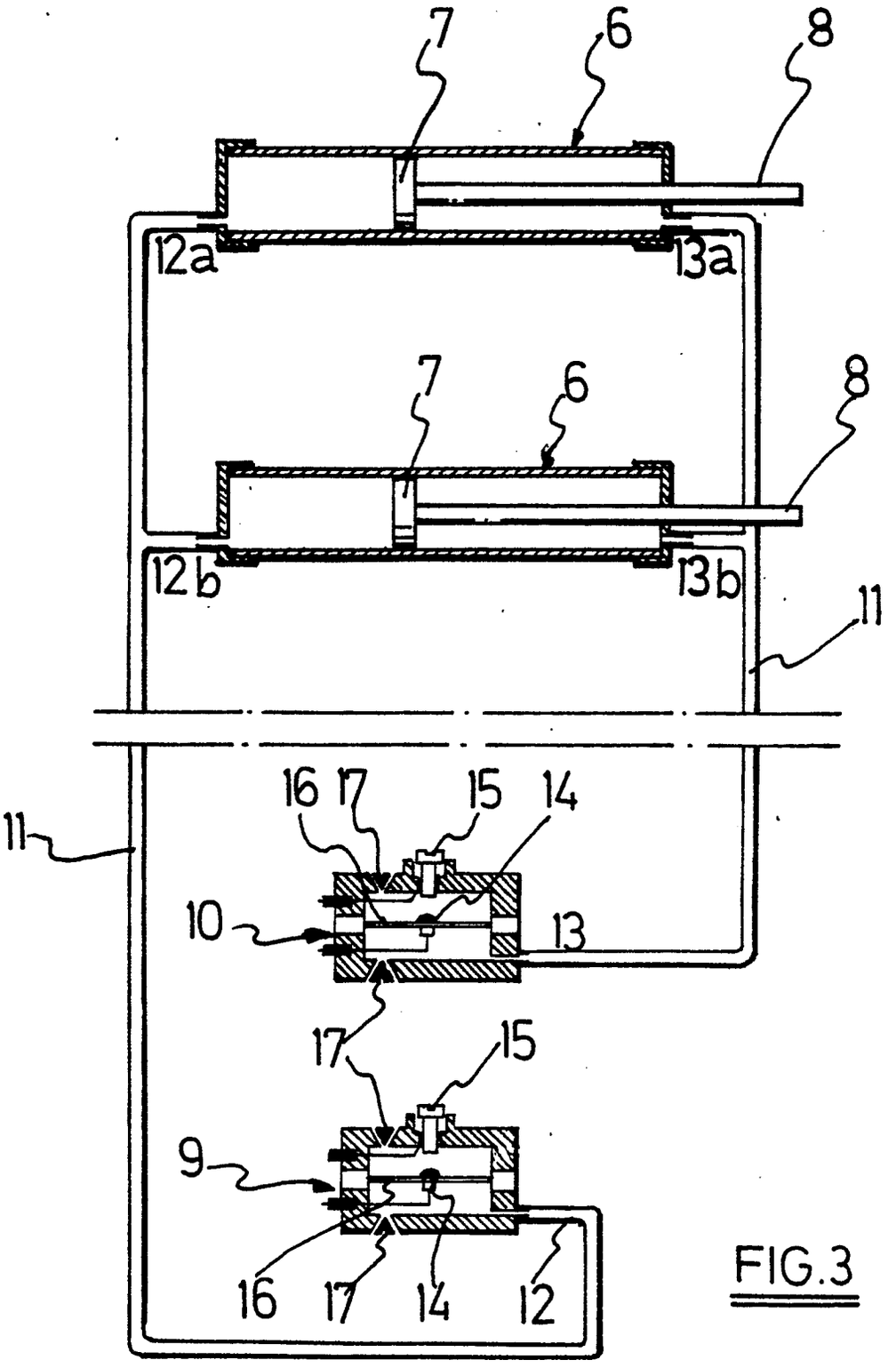


FIG.3

European Patent Office

EUROPEAN SEARCH REPORT

0014009
Application number
EP 80 20 0028

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	FR - A - 344 983 (ERNDT) * Page 1, line 1 - page 2, line 2 *	1
A	FR - A - 2 296 890 (DESNEUX) * Page 1, lines 1,2,17-30; page 1, line 35 - page 2, line 16 *	1
D,A	US - A - 3 634 638 (ORI EVEN-TOV et al.) * Whole document *	1

CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

G 08 B 13/12

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

G 08 B 13/12
13/20
H 05 C 1/04
E 04 H 17/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12-05-1980	ORNELIS

EPO Form 1503.1 06.78