

# PATENT SPECIFICATION

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- (21) Application No. 4089/77 (22) Filed 1 Feb. 1977  
 (61) Patent of Addition to No. 1 517 424 dated 3 March 1976  
 (31) Convention Application No. 7 602 816 (32) Filed 2 Feb. 1976 in  
 (33) France (FR)  
 (44) Complete Specification published 29 Oct. 1980  
 (51) INT. CL.<sup>3</sup> G08B 21/00  
 (52) Index at acceptance  
 G1A D10 G9 MQ P14 P16 P17 P6 R7 T27 T3



## (54) OPTICAL DEVICE FOR AN OPTICAL SAFETY BARRIER

(71) We, JAY ELECTRONIQUE, a French joint stock company, of Route de Chartreuse, Corenc, Isere, France, do hereby declare the invention, for which we pray  
 5 that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to an optical device for an optical safety barrier, and is a modification of the invention disclosed in our co-opending Patent No. 1,517,424 hereinafter referred to as the Parent Patent. In the Specification of the Parent Patent  
 15 there is disclosed and claimed in Claim 1, an optical device for an optical safety barrier wherein it comprises a light source, an optical system with two elements producing respective beams of light, at least one reflecting member for reflecting the beam or  
 20 beams produced by one of the optical elements onto the other optical element and vice versa, and two photoelectrical detectors for detecting the presence or absence of the beams reflected through respective optical  
 25 elements. That Specification also includes the case where at least one of the optical elements is a prism or a mirror.

According to the present invention there  
 30 is provided an optical device for an optical safety barrier, said device comprising a light source, an optical system with two semi-transparent mirrors for producing two beams of light, at least one reflecting member for reflecting the beams back, and two  
 35 corresponding photoelectric detectors for detecting the presence or absence of a beam passing through its corresponding semi-transparent mirror.

In a preferred embodiment of the invention there are two reflecting members for reflecting the beams back and the optical device includes two of said reflecting members.  
 40 One embodiment of the invention will

now be described by way of example with reference to the accompanying illustrative drawing.

Referring to the drawing, one optical device of the invention includes a light source S, two semi-transparent mirrors T1, T2, and a plano-convex lens L. By "semi-transparent" is meant that when a light beam strikes the mirror surface part of the beam passes through the mirror, while the remainder of the beam is reflected by the mirror. Consequently when light beams from the source S strike the mirrors T1 and T2, a part of each beam passes through its respective mirror, and the remainder of each beam is reflected. The aforementioned components of the device are arranged so that light from the source S is reflected by the mirrors T1 and T2 at an angle  $\alpha$  onto the central portion of the lens L which constitutes an optical gate. These two reflected light beams passing through the lens L are directed onto respective reflecting members R1 and R2 which are catadioptric members.  
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As the fundamental characteristic of a catadioptric member is to reflect the light back to its source, the two beams incident on the members R1 and R2 are reflected back through the optical gate of the lens L from which they emerge at the same angle  $\alpha$  and strike the mirrors T1 and T2. Then each beam is divided into two parts; one part is reflected by its mirror onto the source S, and the other part passes through its mirror without being deviated, and strikes its respective photo-sensitive element C1 or C2, each element constituting a photoelectric detector.  
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As shown in the drawing, the lens L is a distance l1 and l2 from the mirrors T1 and T2 respectively. The source S is at a distance d2 and d3 from the mirrors T1 and T2 respectively which are themselves at distances d1 and d4 from the photo sensitive  
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elements C1 and C2 respectively. The only restriction on the location of the source S is that the distance d1 equals d2, d3 equals d4, and l1 plus d2, equals l2 plus d3.

- 5 The photo sensitive elements C1 and C2 are connected to an AND logic element, in such a way that both elements have to receive light beams in order to produce an electrical condition different from that in  
10 which either one element or none of the two elements is illuminated. Consequently the elements C1 and C2 will produce a first electrical condition when the light beams from the source S to the elements C1 and  
15 C2 are unobstructed and will produce a second electrical condition when one or both of these light beams is obstructed.

WHAT WE CLAIM IS:—

- 20 1. An optical device for an optical safety barrier, said device comprising a light source, an optical system with two semi-transparent mirrors for producing two beams of light, at least one reflecting member for reflecting the beams back, and two  
25 corresponding photoelectric detectors for detecting the presence or absence of a beam passing through its corresponding semi-transparent mirror.

2. A device as claimed in Claim 1, 30 wherein there are two reflecting members for reflecting the beams back.

3. A device as claimed in any preceding Claim including a lens located in the light path between the semi-transparent mirrors 35 and the or each reflecting member.

4. An optical device as claimed in any preceding Claim, where the or each reflecting member is a catadioptric member.

5. An optical device substantially as 40 herein described and shown in the accompanying drawing.

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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of  
the Original on a reduced scale*

