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# D E C I S I O N
## of 17 October 2000

**Case Number:** T 0145/99 - 3.2.1

**Application Number:** 93309256.1

**Publication Number:** 0598630

**IPC:** F16P 3/14, G01V 8/00

**Language of the proceedings:** EN

**Title of invention:**
Light curtain system with individual beam indicators and method of operation

**Patentee:**
SCIENTIFIC TECHNOLOGIES INCORPORATED

**Opponent:**
Sick AG

**Headword:**
-

**Relevant legal provisions:**
EPC Art. 54, 56

**Keyword:**
"Novelty (yes)"
"Inventive step (yes)"

**Decisions cited:**
-

**Catchword:**
-

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**Case Number:** T 0145/99 - 3.2.1

**D E C I S I O N**
**of the Technical Board of Appeal 3.2.1**
**of 17 October 2000**

**Appellant:** (Opponent)
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**Respondent:** (Proprietor of the patent)
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**Decision under appeal:** **Interlocutory decision of the Opposition Division of the European Patent Office posted 15 December 1998 concerning maintenance of European patent No. 0 598 630 in amended form.**

**Composition of the Board:**

**Chairman:** F. A. Gumbel
**Members:** S. Crane
C. Rennie-Smith

## Summary of Facts and Submissions

I. European patent No. 0 598 630 was granted on 26 March 1997 on the basis of European patent application No. 93 309 256.1.

II. The granted patent was opposed by the present appellants on the grounds that its subject-matter lacked novelty or inventive step (Article 100(a) EPC).

Of the prior art documents relied upon in the opposition proceedings only the following have played any significant role on appeal:

(E1) DE-C-2 824 311,

(E2) DE-A-3 013 967.

III. With its decision posted on 15 December 1998 the Opposition Division held that the patent could be maintained in amended form on the basis of a set of claims 1 to 3 and revised description submitted at the oral proceedings on 18 November 1998 as a second auxiliary request, claim 1 of which reads as follows:

"1. A method of detecting the movement or intrusion of objects into a guard zone along a machine which is controlled by a human operator by using a light curtain system (10), the system having a transmitter (11) which sequentially transmits beams of light along parallel channels (18) across at least a portion of the guard zone to a receiver (12) having a plurality of light sensors (19), and in which each light sensor detects and indicates the presence or absence of light beams in the channels, the method comprising the steps of

generating a control signal responsive to the detection of an absence of a light beam in any channel, generating responsive to the control signal a visible light signal, positioning the visible light signal adjacent each channel in which the absence of a light beam is detected with the light signal being in view by the operator so that the operator can be alerted to the position and movement of objects which penetrate the light curtain by observing the light."

Dependent claims 2 and 3 relate to preferred embodiments of the method of claim 1.

IV. A notice of appeal against this decision was filed on 2 February 1999 and the fee for appeal paid at the same time.

The statement of grounds of appeal was filed on 26 April 1999. With this statement the appellants submitted a new document (E8), namely the cover sheet and pages 3, 6, 7 and 9 of the operating instructions of the "GV 140 Gittervorhang", a light curtain system allegedly sold by the appellants before the priority date of the contested patent. On 17 June 1999 the appellants filed further evidence concerning the sale of a number of units of the "GV 140 Gittervorhang" and of the printing date of document E8.

V. Oral proceedings before the Board were held on 17 October 2000.

The appellants requested that the decision under appeal be set aside and the patent revoked in its entirety.

The respondents (proprietors of the patent) requested

that the appeal be dismissed.

VI. In support of their request the appellants put forward essentially the following arguments:

Document E2 disclosed a light curtain system of the basic well-known configuration set out in claim 1 wherein in addition, in order to facilitate the initial setting up and adjustment of the system, each light channel was associated with a respective indicator lamp which was preferably positioned adjacent the channel involved. A control circuit was provided which was operative to illuminate each of the lamps when the associated light sensor was properly aligned with the corresponding transmitter. Once the system was set up and was in normal operation it would be an inevitable consequence of an object moving into the light curtain that one or more of the indicator lamps associated with blocked light channels would be extinguished. The extinction of an illuminated lamp constituted a visible signal within the meaning of claim 1 and was observable by the operator of the machine which was guarded by the light curtain system in the same way as when lamps were illuminated as was the case in the preferred embodiments of the claimed invention. The result of these considerations was that the performance of the method set out in claim 1 would be the automatic result of putting the light curtain system of document E2 into the service it was intended for. Thus the claimed method lacked novelty.

The contentions of the respondents that in the system of document E2 the indicator lamps would either be switched off once the system was set up or in any case not be visible to the operator lacked any objective

basis. If there were any doubt on this then it would be removed by reference to document E8, which related to a practical embodiment of the light curtain system involved and from which it was apparent, see in particular Figure 12 and the table on page 9, that the indicator lamps of the adjustment arrangement remained illuminated in normal service, unless there was blockage of the associated light beam, and that they were intended to be visible to the operator. Thus having regard to the teachings of document E8 it was at the least obvious to put the teachings of document E2 into practice in this way.

Lastly, if there were held to be some form of technical distinction between the extinction of an indicator lamp and the generation of a visible light signal as specified in claim 1 then it could not involve an inventive step to make a minor modification of the control circuit of the system of document E2 in such a way that the lamps extinguished when the system was correctly set up and lit up if the associated light channels were blocked in the course of normal service. A corresponding example of such a mode of operation could be seen with respect to the red control lamp of document E8.

VII. The respondents replied substantially as follows:

It was important when considering the objection of lack of novelty with respect to document E2 that its teachings were not confounded with those of document E8. As far as the question of novelty was concerned, document E2 stood on its own. It was clearly impermissible to refer to document E8, published almost a decade later, to fill in any gaps in the disclosure

of document E2. That document was wholly silent as to whether the indicator lamps used when adjusting the set-up of light curtain system remained illuminated in normal service of the system or whether the adjusting arrangement and hence the indicator lamps were switched off once the correct set-up had been obtained. Given that the document was specifically directed to the adjusting arrangement and not to normal service of the system, the latter assumption was the one which it would be reasonable for the person skilled in the art. The document was also silent as to whether the indicator lamps would be visible to the operator of a machine associated with the light curtain system. In any case the wording of claim 1 when considered as a whole clearly excluded the possibility of the extinction of an indicator lamp being the generation of a visible light signal within the meaning of the claim. Furthermore, document E2 contained no clear and unambiguous disclosure of there being a respective indicator lamp associated with and positioned adjacent to each light channel. The passage of the document relied upon by the appellants in this respect could equally well be understood as meaning that each indicator lamp was associated with a plurality of channels. For these reasons the subject-matter of claim 1 was clearly novel with respect to document E2.

The appellants had sought to rely on document E8 as showing that in practice the adjustment (yellow) indicator lamps were normally illuminated in day-to-day operation of the light curtain system and that they would be visible to the operator. The opposite was true as it was stated specifically on page 3 that the yellow indicator lamps served only for aligning the transmitter and the receiver. Figure 12, part of the

section entitled "putting into operation and adjustment", clearly related to a test procedure to see whether the system had been set up properly and the table on page 9 was concerned with trouble-shooting. Neither could be understood, as argued by the appellants, as disclosing that the yellow indicator lamps were illuminated in normal service and that they would be visible to the operator of a machine with which the light curtain system was associated. Thus the attempt to argue lack of inventive step on the basis of documents E2 and E8 also failed.

## Reasons for the Decision

1. The appeal complies with the formal requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC. It is therefore admissible.

2. As indicated in the introductory description of the patent specification light curtain systems which provide protection to human operators of industrial machinery are well known. Typically a transmitter element comprising a plurality of spaced apart light sources (eg LEDs) is arranged at one side of a guard zone and transmits light beams along a plurality of channels to a receiver element with a corresponding plurality of light sensors at the other side of the guard zone. If an object, such as the operator's arm, blocks one of the beams then a control circuit shuts the machinery down, prevents it cycling or otherwise safeguards the area.

   The claimed invention sets out to provide a method of operating a light curtain system which gives the machine operator continuous visual feedback of conditions in the guard zone. To this end the system is

arranged to generate a visible light signal adjacent each channel in which an absence of the light beam is detected, these light signals being in the view of the operator so that he can be alerted to the position and movement of objects which penetrate the light curtain by observing the light.

3. Although in the statement of grounds of appeal lack of novelty of the subject-matter of claim 1 was alleged with respect to each of the documents E1, E2 and E8, the appellants conceded at the oral proceedings that this attack could only realistically be pursued with respect to document E2.

This document, which is a patent of addition to document E1, relates to means for adjusting the set-up of a light curtain system. According to the terms of claim 1 of the document the system comprises groups of cyclically switched light sources or light sensors associated respectively with a number of single light sensors or light sources to form a light curtain. In the preferred embodiment disclosed the light sources comprise respective groups of LEDs cyclically switched in a single sequence and the single light sensors comprise respective mirrors which focus the light beams from the corresponding group of LEDs onto as photocell. Having regard to the last paragraph of page 4 of the document it is apparent however that arrangements departing from the wording of the claim, namely with a group of cyclically switched light sources associated with a corresponding number of light sensors, as required by claim 1 of the contested patent, are also envisaged.

In order to facilitate the relative spatial adjustment

of the light sources with respect to the light sensors on setting-up the system a control circuit is arranged to supply a signal to a plurality of indicator lamps when it is detected that light from respective ones of the corresponding number of light sources is reaching the associated light sensor. When all of these indicator lamps are illuminated (in the preferred embodiment it is four such lamps for 20 light channels) then the technician setting-up the system knows that the light sources and light sensors are correctly positioned with respect to each other. According to claim 7 it is proposed that the indicator lamps should be placed directly adjacent the associated light source or light sensor. In the last sentence of the description it is indicated that each light source can be associated with an indicator lamp, in order to make the correct adjustment very easy. The respondents have queried whether that passage should be understood as meaning that each light channel has a respective indicator lamp directly associated with it. On a strict view of the wording involved considered in isolation there may indeed be some room for doubt but taken in its full context the Board is satisfied that this in indeed how the person skilled in the art would understand it.

It is thus apparent that document E2 discloses, at least in general terms, the basic technical elements of the light curtain system which finds use in the method of claim 1 under consideration. In particular by means of the indicator lamps and the associated control circuit a visible light signal can be generated adjacent each light channel. What the appellants in effect argue is that in view of these analogous technical features of the light curtain system then the

method set out in claim 1 will result as the inevitable consequence of putting the known light curtain system into normal service.

This argument relies initially on two assumptions. The first is that the illuminated indicator lamps of the adjustment means stay switched on once the setting-up of the system is completed and normal service begins; the second is that the indicator lamps are visible to the operator of the machine with which the light curtain system is associated. Given that the relevant part of the control circuit is shown as permanently connected to the part for detecting penetration of the light curtain in normal use and in the absence of any *prima facie* technical reasons for disconnecting the indicator lamps the Board accepts that the first assumption is reasonable in the circumstances. However, that is not the case with respect to the second assumption. Whether or not the indicator lamps are visible to the operator when the light curtain system is in normal operation is left completely open by document E2 so that there is no disclosure there of this essential element of the subject-matter of claim 1.

Furthermore, the argument of lack of novelty with regard to document E2 relies on the contention that the extinction of an illuminated indicator lamp, which is what will happen when an object penetrates the associated light beam, is the generation of a visible light signal within the meaning of the claim. Now, at a very general level, the Board can agree that both the appearance and disappearance of a visible light signal are capable of conveying information to an observer. But this is not the same as saying that such appearance

and disappearance are technically the same thing. In the opinion of the Board claim 1 when read as a whole unambiguously requires that when an object penetrates a light beam a signal in the form of visible light is generated at a position adjacent the associated channel. The extinction of an indicator lamp, which would be the case with the system of document E2, cannot be subsumed under this requirement.

The Board therefore comes to the conclusion that the subject-matter of claim 1 is novel (Article 54 EPC).

4. With regard to the issue of inventive step the appellants based their arguments at the oral proceedings solely on a combination of the teachings of documents E2 and E8. In the main they relied on document E8 as providing a clear indication to the person skilled in the art, if he should need one, that in a practical embodiment of the light curtain system disclosed in document E2 the adjustment indicator lamps should be left illuminated when the system was in normal service after having been correctly adjusted on set-up and to place these indicator lamps in a position where they would be visible to the operator of the machine guarded by the light curtain system.

Since the Board has in any case already found in favour of the appellants on the question of whether the indicator lamps are still illuminated in normal service with the light curtain system of document E2 there is no need to go into this further here. With regard to the positioning of the adjustment indicator lamps the Board finds it difficult to accept that document E8 teaches that these should be readily observable by the operator of the machine when the light curtain system

is in normal service. In fact, having regard to the actual physical embodiment of the system portrayed in the document and in particular to the schematic drawing in Figure 2, it would appear that the indicator lamps are located at the base of a longitudinal recess in the light source unit and would thus not normally be visible to someone located behind the light curtain. Furthermore, when account is taken of the fact that the adjustment indicator lamps are described in both documents E2 and E8 solely within the context of initial adjustment of the system or of eliminating faults if such were to arise, then the person skilled in the art would attach no importance to having them readily observable by the machine operator. Generally, this person would not be the one who was responsible for setting up or maintaining the light curtain system. The appellants have referred to a red control lamp which illuminates when the light curtain is penetrated and is located between the (yellow) adjustment indicator lamps and argued that since the red control lamp must be visible to the machine operator then so will be the indicator lamps. Again, the Board does not find this persuasive since it would not appear that the illumination state of the red control light is something which the machine operator would need to keep under constant observation; penetration of the light curtain would in any case normally lead to shut down of the associated machine, page 3, right-hand column, of document E8.

Lastly, the appellants have argued that document E8, in particular the red control lamp mentioned above, would encourage the person skilled in the art to modify the light curtain system of document E2 in such a manner that the adjustment indicator lamps would be

illuminated when the system is incorrectly adjusted, would extinguish when correct adjustment is achieved and would thus illuminate again when the light curtain is penetrated. That contention is one which the Board can only see as being based solely on hindsight knowledge of the present invention where visible light signals are provided adjacent each light channel primarily for allowing the operator to observe the position and movements of objects penetrating the light curtain and not for adjusting the system on initial set-up. Clearly, there is a qualitative difference for a technician setting up a system in whether a lamp illuminates or extinguishes to tell him that a desired state is reached and it is unrealistic to argue that it would be obvious within the meaning of Article 56 EPC to reverse the clear teachings of document E2 in this respect. The fact that such a modification might not involve any technical difficulty is irrelevant in this context.

Accordingly the subject-matter of claim 1 involves an inventive step (Article 56 EPC).

## Order

## For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

S. Fabiani F. Gumbel