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**D E C I S I O N**  
of 12 July 1995

**Case Number:** T 0405/94 - 3.4.2

**Application Number:** 88300349.3

**Publication Number:** 0324218

**IPC:** G01G 19/04, G01G 3/14

**Language of the proceedings:** EN

**Title of invention:**  
Weight sensing apparatus

**Patentee:**  
Bolland, George Barry

**Opponent:**  
Carl Schenck AG

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 54(1), 54(2), 56 and 113(1)

**Keyword:**  
"Document with unproved date of publication and of availability  
of its content: no state of the art"  
"Objection in letter of other party: opportunity to comment  
(yes)"  
"Non-enabling document: not citable as novelty destroying"  
"Novelty (yes)"  
"Inventive step (yes)"

**Decisions cited:**  
-

**Headnote:**

A party which, although made aware by at least one letter of another party that the availability to the public of the content of a thesis is objected and which does not react before the oral proceedings at which a decision can be taken, or which only provides at said oral proceedings information which is found to need confirmation, has had sufficient opportunity to comment on said objection so that there is no justification to give him further opportunity for providing such confirmation (cf. point 3).



Case Number: T 0405/94 - 3.4.2

**D E C I S I O N**  
**of the Technical Board of Appeal 3.4.2**  
**of 12 July 1995**

**Appellant:** Carl Schenck AG  
(Opponent) Patentabteilung  
D-64273 Darmstadt (DE)

**Representative:** Sievers, Uwe Dipl.-Phys.  
Carl Schenck AG  
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**Respondent:** Bolland, George Barry  
(Proprietor of the patent) 42 Home Farm Cressent  
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**Representative:** Leach, John Nigel  
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**Decision under appeal:** Interlocutory decision of the Opposition Division  
of the European Patent Office dated 17 February  
1994, sent by post on 10 March 1994 concerning  
maintenance of European patent No. 0 324 218 in  
amended form.

**Composition of the Board:**

**Chairman:** E. Turrini  
**Members:** M. Chomentowski  
B. J. Schachenmann

## Summary of Facts and Submissions

- I. The Appellant (Opponent) filed an opposition against European patent No. 0 324 218 (application No. 88 300 349.3), on the grounds that the subject-matter of the claims lacked novelty or an inventive step having regard to D1 = US-A-3 734 216 or D2 = report "Bericht über das Forschungsprojekt "Störgrößeneliminierung in der Wägetechnik", Erprobung einer Rad- und Achslastwaage für Eisenbahnwaggons", Verfasser: Dipl.-Ing. Jörg Pühler, Berichtszeitraum: Febr. 1984-Nov. 1984".
- II. The patent was maintained in amended form. The Opposition Division took the view that there was no evidence that D2 had been available to the public before the date of filing of the patent, and that the subject-matter of the amended main claims was novel and involved an inventive step having regard to D1 because, in particular, the teaching thereof was either not enabling or insufficient to induce the skilled person to violate the Saint-Venant principle, a well-known and accepted principle of mechanics of solid bodies.
- III. The Appellant (Opponent) lodged an appeal against this decision. A new document was filed, mentioned as "D2", but different from the document D2 mentioned in the Notice of Opposition, whereby this new document "Pühler 2" is part of the thesis "Störeinflüsse bei der Querkraftmessung am Balken", Zur Erlangung des akademischen Grades eines Doktoringenieurs von der Fakultät für Elektrotechnik, Universität Fridericiana Karlsruhe (Technische Hochschule), genehmigte Dissertation von Jörg Pühler aus Karlsruhe, Tag des

Kolloquiums: 27.1.1986, Hauptreferent: Prof. Dr rer.nat. H. Kronmüller, Korreferent: Prof. Dr-Ing. E. Schnack, pages I, II, 1, 88 to 93.

IV. During the oral proceedings of 12 July 1995, which had been requested auxiliarily by both parties, the Respondent filed new Claims 1 to 10 and requested that the decision under appeal be set aside and that, as a main request, the patent be maintained in amended form on the basis of said new claims with description and drawings to be adapted. The only independent claims, Claims 1 and 6, corrected for adopting a uniform terminology "(d max.)" for the rail thickness, read as follows:

Main request

"1. A weight sensing apparatus comprising a rail, of a track (20) for a railway guided vehicle, which spans continuously between and is supported on at least four consecutive support means (S), a sensing portion (P) of the rail (20) being disposed between intermediate first and second of said support means (23, 24) and further portions (F) of the rail extending away from said sensing portion (P) beyond an adjacent one of said first and second support means (23, 24) and being supported by at least one further support means (S), the rail (20) being of constant or substantially constant thickness (d max.) throughout its length, a load receiving part (D-E) provided on said sensing portion (P), and first and second strain gauges (25, 26), positioned on the sensing portion (P) to sense strain in said rail, whereby said first strain gauge (25) is positioned between the first support means (23) and the second support means (24) at a distance from the first support means (23) which is not greater than a distance (d max.) and not closer than 0.35 (d max.) and the second strain gauge (26) is

positioned between the first support means (23) and the second support means (24) at a distance from the second support means (24) which is not greater than a distance (d max.) and not closer than 0.35 (d max.) whereby said load receiving part comprises an elongate load receiving region (D-E) which extends between a first position which is at a distance from the first strain gauge (25) which is not greater than (d max.) and not closer than 0.35 (d max.) and a second position which is at a distance from the second strain gauge (26) which is not greater than (d max.) and not closer than 0.35 (d max.) where (d max.) is the maximum thickness of the member between the first and second support means in the direction in which the load is to be applied, and the strain gauges being positioned between the top and bottom of the rail at a depth where the shear strain is substantially constant and arranged to sense shear strain in the rail."

"6. A method of sensing the weight to be imposed by a railway guided vehicle on a rail, of a track (20) for a railway guided vehicle, which spans continuously between and is supported on at least four consecutive support means (S), a sensing portion (P) of the rail (20) being disposed between intermediate first and second of said support means (23, 24) and further portions (F) of the rail extending away from said sensing portion (P) beyond an adjacent one of said first and second support means (23, 24) and being supported by at least one further support means (S), the rail (20) being of constant or substantially constant thickness (d max.) throughout its length, and a load receiving part (D-E) provided on said sensing portion (P), and first and second strain gauges (25, 26), positioned on the sensing portion (P) to sense strain in said rail, comprising the steps of determining the maximum thickness, (d max.), in the direction in which load is to be applied of the rail (20) between the

support means (23, 24), measuring a distance from said first support means (23) which is not greater than the distance (d max.) and not closer than 0.35 (d max.), and positioning the first strain gauge (25) on said rail (20) at said measured distance whilst said rail (20) remains in situ, measuring a distance from said second support means (24) which is not greater than the distance (d max.) and not closer than 0.35 (d max.) and positioning the second strain gauge (26) on said rail (20) at said measured distance whilst said rail (20) remains in situ whereby said load receiving part comprises an elongate load receiving region which extends between a position which is at a distance not greater than the distance (d max.) and not closer than 0.35 (d max.) from the first strain gauge (25) and a position which is at a distance not greater than the distance d.max and not closer than 0.35 (d max.) from the second strain gauge (26) the strain gauges being positioned between the top and bottom of the rail at a depth where the shear strain is substantially constant and arranged to sense shear strain in the rail and providing means to connect the strain gauges (25, 26) in an electrical circuit (31) whereby, in use, the weight of a load, applied to said elongate load receiving region (D-E), may be determined."

- V. The Appellant requested that the decision under appeal be set aside and that the patent be revoked, and submitted the following arguments in support of this request: Pühler 2 concerns a thesis at the University of Karlsruhe, and the information from said University is that all theses are published, usually less than one year after the date of public presentation, i.e., in any case, long before the filing date of the patent in suit; with this information, and since the Board of Appeal had not expressed any objection about Pühler 2, further evidence was not considered necessary for proving its

availability. However, if needed, such further evidence could be provided. In any case, from Figures 1(a) to 1(d) of D1 there is known a weight sensing apparatus comprising a rail (1) which spans continuously between and is supported on consecutive support means (3); taking into account typical values of dimensions in rail systems, the apparatus of Figures 1(a) to 1(d) of D1 could be read in Claim 1 in dispute. The indications in D1 concerning said apparatus of Figures 1(a) to 1(d) that the strain gages could, in principle, be positioned anywhere between the load application point and the supporting means (3), would also result in the apparatus in dispute. Therefore, for any of said reasons, the subject-matter of Claim 1 in dispute lacks novelty. In any case the teaching in D1 that the strain gauges could be positioned anywhere between the point of application of the load and the support means would be an incentive for modifying the known apparatus, if necessary, and would lead, in an obvious way, to the apparatus in dispute, which also does not satisfy totally the principle of Saint-Venant.

VI. The Respondent substantially argued as follows in support of his main request: Pühler 2 does not show any date of publication and is not accompanied by any other indication concerning the date of availability of its content to the public, so that it is not part of the state of the art. The weight sensing apparatus shown in Figures 1(a) to 1(d) of D1 is schematic; any intent to transpose into said known apparatus typical values of dimensions of rail systems is irrelevant because, as derivable from D11 = Jane's World Railways, Sixteenth Edition, Edited by Henry Sampson, 1973-1974, Sampson Low, Marston & Co. Ltd, London, page 206, there are no such directly and unambiguously derivable typical dimensions, but dimensions which differ even within the same country; moreover, said dimensions differ from



country to country and, in each country, from one technical field, e.g. mining, to another, e.g. railways. It is also to be noted that, taking into account the principle of Saint-Venant, which is generally known, for instance from D10 = Aircraft Structures for Engineering Students, T. H. G. Megson, Edward Arnold, 1972, Bristol, pages 38, 39, 52 and 313, the skilled person would not consider the teaching of D1 concerning Figures 1(a) to 1(d) and the statement that the strain gages could, in principle, be positioned anywhere between the load application point and the supporting means (3), as being an enabling teaching or as an incentive for any modification of the known apparatus. Therefore, the subject-matter of Claim 1 in dispute is novel and involves an inventive step.

#### Reasons for the Decision

1. The appeal is admissible.
2. *Formal requirements*

It is to be noted that, since as will be discussed below Figures 1(a) to 1(d) of D1 is the nearest prior art but is only a schematic teaching with some of its features, for instance the thickness of the rail (1), needing interpretation, the form of the main claims in two parts with the first part relating to the prior art is considered as inappropriate, so that the main claims in dispute in the one-part form are acceptable (Rule 29(1) EPC). Formal objections mentioned in the invitation to oral proceedings with respect to previous Respondent's requests have been met by corresponding amendments. The Appellant has not put forward any objection in this

respect. Therefore, the formal requirements for the text of the patent in suit are satisfied (Articles 123(3), 123(2) and 84 EPC).

3. *State of the art*

3.1 Pühler 2 shows a date of colloquy ("Tag des Kolloquiums") of 27 January 1986, but no date of publication, and is not accompanied by any other indication concerning the date of availability of its content to the public. During the oral proceedings, the Appellant was asked about evidence for establishing the date of availability to the public of Pühler 2; he declared that Pühler 2 concerns a thesis at the University of Karlsruhe and that he had been informed by said University that all theses were published, usually less than one year after the date of the colloquy, i.e., in any case, long before the filing date of the patent in suit, i.e. 15 January 1988. However, these comments of the Appellant only consist in an oral declaration by himself about information which is not confirmed by any piece of evidence and which concerns only "usual" or "normal" practice of the University of Karlsruhe for making available the content of theses; specific comments or evidence allowing to establish which content of the thesis reported in Pühler 2 has effectively been available to the public, and at which date, have not been provided by the Appellant. Therefore, the Appellant's comments are not convincing in that there is not sufficient evidence that, specifically, the content of Pühler 2 has been made available to the public by means of a written or oral description, by use, or in any other way, before the date of filing of the European patent application (Article 54(2) EPC).

3.2 Asked further about the reasons why, although in the contested decision the related D2, from the same author, had been found not available to the public, and although the Respondent had contested during the appeal procedure in at least one letter the availability of Pühler 2, no evidence confirming the date of availability to the public of the technical content of Pühler 2 had been provided, the Appellant argued that, in view of the information he had received from the University and which he considered as sufficient, Pühler 2 was better than D2 in respect of the question of availability and could be relied on, and that, moreover, since the Board in its invitation to the oral proceedings or later on had not raised any objection regarding this issue, it could be concluded that there was no problem in this respect.

However, these arguments of the Appellant, as well as his readiness to look for relevant evidence at such late stage of the proceedings, cannot be accepted for the following reasons: First, although the observations of the Respondent concerning the statement of grounds of appeal, contained in the letter dated 31 January 1995, did not raise any objection concerning the availability of Pühler 2 and provided a plurality of arguments about the technical content of Pühler 2, and although, then, the invitation of the Board, issued 18 April 1995, expressed objections concerning only formal requirements and the patentability of the submitted text of the patent having regard to D1, this cannot be understood as meaning that the availability of Pühler 2 could not be questioned at a later stage of the appeal procedure; incidentally, as already mentioned here above, in the contested decision, the related D2, also provided by the Appellant, had been found not to be made available to the public. In any case, with letter dated 19 April 1995 (see first to third paragraphs of the only page),

transmitted as a copy to the Appellant on 28 April 1995, the Respondent expressed an objection about the availability of the content of Pühler 2; incidentally, it is to be noted that, then, in the first of two letters of the Respondent dated 12 June 1995 (see page 8, third paragraph) and transmitted as a copy to the Appellant on 19 June 1995, the same objection was raised again. Therefore, although the invitation to the oral proceedings, issued before the objection had been put forward by the Respondent, did not mention said objection and although no further communication of the Board containing a reasoned statement exposing questions to be answered was issued thereafter, the Appellant had been given sufficient opportunity to present his proofs and comments about the contested availability of Pühler 2, either by mail or, if he wished, during the oral proceedings of 12 July 1995. Indeed, it was only at the oral proceedings and as an answer to questions that the Appellant has presented comments in this respect. However, although the Appellant had been made aware that the availability of Pühler 2 would be contested at least by the Respondent and thus could prepare himself to react adequately, i.e. to provide relevant evidence about said question, he has not submitted specific evidence in this respect. The reasons the Appellant has given for not having provided more adequate, for instance more specific evidence, and which could have been taken into account for postponing a decision, are not convincing for the following reason: the information from the University of Karlsruhe about usual practice there, reported at the oral proceedings, has been found by the Board to need confirmation; since the Appellant has not presented this information at an early stage of the appeal procedure, for instance with the statement of grounds of appeal, or after receiving the Respondent's letters containing objections about availability, but has waited until the oral proceedings, he has accepted

the risk of missing the opportunity to look for supplementary evidence on this issue, if considered necessary by the Board; by doing so, he is deemed to have also accepted the risk of having the document Pühler 2 as such found not made available to the public without any further opportunity for him to look for complementary evidence. Therefore, there is no justification in the sense of Article 113(1) EPC for postponing a decision and it is concluded that, as mentioned here above, Pühler 2 cannot be considered to be part of the state of the art in the sense of Article 54(2).

4. Novelty

- 4.1 A weight sensing apparatus comprising several of the claimed features is known from D1 (see column 1, lines 1 to 4; column 2, lines 15 to 58; column 3, line 14 to column 4, line 18; column 6, line 17 to 22; Figures 1(a) to 1(d)); in particular, the apparatus comprises a rail (1) which spans continuously between and is supported on consecutive support means (3); a sensing portion of the rail (1) is disposed between said first, left-hand and second, right-hand support means (3) and further portions of the rail extend away from said sensing portion beyond an adjacent one of said first and second support means (3); the rail (1) is derivable as being of constant or substantially constant thickness throughout its length; a load receiving part is provided, between the support means, on said sensing portion; first and second strain gauges (10) are positioned on the sensing portion to sense strain in said rail, whereby said first strain gauge, i.e. the left-hand gauge (10) is positioned between the first support means (3) and the second support means (3) at a distance  $L/4$  from the first support means (3) and the second strain gauge (10) is positioned between the first support means (3) and

the second support means (3) at a distance  $L/4$  from the second support means (3); said load receiving part comprises an elongate load receiving region; the strain gauges (10) are positioned between the top and bottom of the rail (1) at a depth (on the neutral axis of the rail) where the shear strain is substantially constant and arranged to sense shear strain in the rail.

4.2 It is to be noted that the relation between the thickness of the rail (1), on the one hand, and the distance  $L$  between the support means (3), on the other hand, is not derivable from D1. The Appellant has first argued that, taking into account the typical geometrical values of rail installations, which are also given in the introduction of the patent in suit (see column 2, line 49 to column 3, line 3; see also column 5, line 10 to column 6, line 50; Figure 3), according to which the thickness of the rails is 150 mm and the distance from middle of the sleepers to the middle of the next sleeper is 600 mm, this would result, with an usual width of the sleepers of 150 mm, in a distance between sleepers of 450 mm and thus in a distance  $L/4$  of 112,5 mm, which is comprised in the range in dispute of 150 mm (d max.) and 52.5 mm (0.35 d max.).

However, as convincingly argued by the Respondent, contrary to the apparatus in dispute, which uses conventional rails, there is no indication that the rail used in D1 is a conventional rail; indeed, D1 stresses that it is a primary object of its technique to provide a weigh system in which a weigh rail replaces a portion of the normal rail system; thus, since it is not derivable from D1 whether the "replacing portion" of the rail system is of a conventional type with the above-mentioned dimensions, the Appellant's conclusions cannot be verified. Moreover, it is to be noted that, even if the "replacing portion" of the rail system were

made of the same type of rail system as the "normal rail system" mentioned in D1, it is derivable from D11 (see page 206) that, for instance for Germany, there are different types of rails, of sleepers and of spacing rail fastenings, for instance from 650 to 800 mm; it is also generally known to people skilled in the art that in different countries, but also in different technical fields, such as mining and railways, different dimensions of the rail systems can be found; therefore, as convincingly argued by the Respondent, the skilled person reading D1 will not get directly aware of only one set of dimensions, but would take into consideration different sets of dimensions, with no indications that all of them would satisfy the mathematical relation in dispute so that, for completing the teaching of D1, there cannot be a direct transposition from the general knowledge of the skilled person of only one type of rail system. Therefore, the Appellant's argument that the subject-matter of Claim 1 in dispute can be read into Figure 1 of D1 cannot be accepted.

- 4.3 The Appellant has submitted as a second argument that it is derivable from D1 (see column 3, lines 37 to 44) that, according to the graphic presentation in Figures (a) to 1(d) of the forces acting on the weigh rail, by utilizing strain gages arranged to sense the shear forces acting on the rail, the strain gages could, in principle, be positioned anywhere between the load application point, i.e. in the middle of the system of rails (1), supporting means (3) and strain gauges (10), on the one hand, and the reaction points Ra, Rb, i.e. at the internal edges of the supporting means (3), on the other hand; there, the strain gauge would still experience a total resistance change proportional to the applied force; thus, the skilled person, taking into account this text location, could read into D1 an apparatus having a configuration with dimensions

satisfying the mathematical relation of Claim 1 in dispute. However, as credibly argued in the decision under appeal and in the letters of the Respondent, such teaching of D1 would not be enabling at least for two reasons:

- 4.3.1 First, since the reaction points Ra and Rb are at the internal edges of the supporting means (3), the skilled person would be directly and unambiguously aware that, by positioning the strain gauges at said edges, i.e. at a location where the supporting means directly react on the rail following the application of a load on another part of the rail, because of the principle of Saint-Venant, asymmetric effects would arise; indeed, according to this principle, which is generally known, for instance from D10 (see page 38, last paragraph to page 39, third paragraph; Figure 2.3), while statically equivalent systems of forces acting on a body produce substantially different local effects, the stresses at sections distant from the surface of loading are essentially the same; thus, the skilled person would be inclined to doubt about the technical teaching of this part of D1. As convincingly argued by the Respondent, the further parts of D1 would not help to change his opinion in that sense that the examples shown by the other Figures of D1 (see column 2, line 60 to column 3, line 8; Figures 2 to 6) all concern rail systems which are modified forms of the rail system of Figures 1(a) to 1(d). Incidentally, it is to be noted that the patent in suit (see column 1, line 48 to column 2, line 6) specifies that, although it is established in theory that to measure strain in a beam the strain gauge needs to be positioned further from the applied load and the support means than the thickness of the beam, however, it has been found that a practical weight sensing apparatus can use a strain gauge at or closer than said thickness to the support means or the load; however,



there is no comparable affirmative technical reasoning derivable from the schematic teaching of Figures 1(a) to 1(d) of D1.

4.3.2 Moreover, the teaching of Figures 1(a) to 1(d) is further considered as not enabling in that sense that, directly after having mentioned that the strain gauges can be positioned anywhere, D1 (see column 3, lines 44 to 51) specifies that, moreover, if the strain gauges are centered on the inflection points (6, 8) along the neutral axis of the rail, the accuracy is, in principle, not affected by the end moments or some other moments acting in the same plane; it is also to be noted that the determination of said inflection points, which are shown in Figure 1(c) of D1 (see also column 3, line 55 to column 4, line 23) as being located substantially in the rail in the middle between the point of application of the load and the edges of the supporting means, is mentioned as being difficult because of varying end effects, so that the modifications according to Figures 2 to 6 are proposed; however, these modifications of Figures 2 to 6 concern slots or reinforcing parts at the rail system, and not only positioning the strain gauges anywhere. It can also be noted that, taking into account the independent claims of D1 to interpret the teaching of this prior art document, almost all, Claims 1, 14 and 18, mention positioning the strain gauges at the inflection points and the last one, Claim 19, which does not mention said feature, concerns devices with slots in the rails, i.e. rails of a thickness which is not constant. For all these reasons, it can be accepted that the skilled person, reading the isolated text location according to which the strain gauges could, in principle, be positioned anywhere between the load application point and the edges of the supporting means, would not consider this as an enabling teaching.

4.4 Therefore, since in particular no apparatus having the features with the same relative disposition as the apparatus in dispute is directly and unambiguously derivable from Figures 1(a) to 1(d) of D1, and since the other prior art documents are less relevant, the subject-matter of Claim 1 in dispute is novel in the sense of Article 54 EPC.

5. *Inventive step*

The Appellant has argued that, starting from the apparatus derivable from Figures 1(a) to 1(d) of D1, even when the strain gauges are not positioned exactly to satisfy the mathematical relation concerning the relative distances of the different means of the apparatus in dispute, the skilled person would be at least induced, in particular by the teaching of D1 that the strain gauges could, in principle, be positioned anywhere between the load application point and the supporting means (3), to modify the known apparatus in this sense, thereby arriving at an apparatus having a longer elongate load receiving region. However, since as already mentioned here above this text location related to Figures 1(a) to 1(d) of D1 cannot be considered as providing an enabling teaching and since the examples illustrated by Figures 2 to 6 of D1 lead to other forms of rails, which are not of constant thickness, this argument is not convincing. The further prior art documents are less relevant. Therefore, the subject-matter of Claim 1 in dispute does not result from an obvious modification of the known apparatus and, thus, it involves an inventive step in the sense of Article 56 EPC.

Thus, Claim 1 in dispute is allowable (Article 52(1) EPC). Claim 6 in dispute is a method claim with related features and is also allowable for the same reasons.

6. Since the Respondent's main request is allowable and thus the European patent may be maintained in amended form, there is no need to take his subsidiary requests into consideration.

**Order**

**For these reasons it is decided that:**

1. The appealed decision is set aside.
2. The case is remitted to the Opposition Division with the order to maintain the patent in amended form as follows: Claims 1 to 10 according to the Respondent's main request presented at the oral proceedings of 12 July 1995, with the description and drawings to be adapted.

The Registrar:

The Chairman:

E. Görgmaier

E. Turrini