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File No.: T 0735/92 - 3.4.2  
Application No.: 85 305 335.3  
Publication No.: 0 171 237  
Classification: G01G 23/37, G01G 23/01, G01G 23/16, G01G 3/14  
Title of invention: Creep-compensated weighing apparatus

**D E C I S I O N**  
of 21 September 1993

Patentee: Mettler-Toledo, Inc.  
Opponent: Hottinger Baldwin Messtechnik GmbH  
Patentabteilung  
Headword:  
**EPC:** Art. 56  
Keyword: "Inventive step (yes, after amendments)"

**Headnote**  
**Catchwords**



**Case Number:** T 0735/92 - 3.4.2

**D E C I S I O N**  
**of the Technical Board of Appeal 3.4.2**  
**of 21 September 1993**

**Appellant:** Hottinger Baldwin Messtechnik GmbH  
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**Representative:** Brandt, Ernst-Ulrich, Dipl. -Phys., Dipl.-Ing  
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**Respondent:** Mettler-Toledo, Inc.  
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**Representative:** Patentanwälte  
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**Decision under appeal:** Interlocutory decision of the Opposition Division  
of the European Patent Office dated 28 April 1992,  
posted on 22 June 1992 concerning maintenance of  
European patent No. 0 171 237 in amended form.

**Composition of the Board:**

**Chairman:** E. Turrini  
**Members:** M. Chomentowski  
M.V.E. Lewenton



## Summary of Facts and Submissions

- I. The Respondent is proprietor of European patent No. 0 171 237, which was granted on the basis of European patent application No.85 305 335.3. D1 = US-A-4 412 298 had been cited in the patent application as the closest prior art.
  
- II. The Appellant (Opponent) filed an opposition against the European patent on the grounds that the subject-matter of the claims of the opposed patent lacked novelty or an inventive step having regard to new prior art documents. D2 = Feingerätetechnik, Volume 25, Number 8, 1976, pages 365 to 370, H.Stein, "Systematische Meßfehler industrieller elektrischer Druckmeßumformer und Wege zu ihrer Verringerung" was cited during the opposition proceedings.
  
- III. The European patent was maintained in amended form. The Opposition Division took the view that, taking into account the amendments provided by the proprietor, the patent was allowable; in particular, the weighing technique with compensation for creep of the opposed patent did not result from an obvious combination of the technique for tracking in particular creep in an electronic scale under load known from D1 with the method of eliminating creep in measurements of pressure transducers known from D2.
  
- IV. The Appellant lodged an appeal against this decision.
  
- V. In the communication annexed to the invitation to oral proceedings which had been requested auxiliarily by the

parties, the Board of Appeal informed them that the main claims as maintained did not appear to be clear and that their subject-matter did not appear to involve an inventive step having regard to D1 and D2.

VI. During the oral proceedings of 21 September 1993, the Respondent filed new Claims 1 to 6 and requested that the patent be maintained in amended form on the basis of these new claims and of a description and drawings to be adapted. Claims 1 and 5 read as follows:

"1. Weighing apparatus comprising a weighing mechanism (11, 12, 14) producing an output signal indicative of an applied weight, electronic means (17) for successively obtaining representations of the output signal with time, means (19) for compensating said weight representations for creep, and means (21) for providing an indication of the weight compensated for creep of said weighing mechanism (11, 12, 14), characterized in that said compensating means (19) comprises means for predictively calculating the increment in the amount of creep between successively obtained weight representations from a mathematical expression for calculating creep increment as a function of said weight representation, the time length between said successively obtained weight representations and the previous amount of creep, said mathematical expression including at least one constant having a value predetermined for the particular weighing mechanism (11, 12, 14) and being stored in means (23) of said compensating means (19), means for combining said calculated creep increment with said previous amount of creep

to provide a new predicted amount of creep, means (23) for storing each new predicted amount of creep and means for combining said new predicted amount of creep with said weight representation to thereby obtain said creep compensated weight representation."

"5. A method of compensating for creep the output of a weighing apparatus comprising a weighing mechanism (11, 12, 14) producing an output signal indicative of an applied weight, electronic means (17) for successively obtaining representations of the output signal with time, means (19) for compensating said weight representations for creep, and means (21) for providing an indication of the weight compensated for creep of said weighing mechanism (11, 12, 14), characterized by the steps of determining and storing a mathematical expression for the increment in the amount of creep between successively obtained weight representations as a function of said weight representation, the time length between successively obtained weight representations and the previous amount of creep, said mathematical expression including at least one constant having a value predetermined for the particular weighing mechanism (11, 12, 14), using said mathematical expression for predictively calculating said creep increment, combining said calculated creep increment with said previous amount of creep to provide a new predicted amount of creep, storing each new predicted amount of creep and combining said new predicted amount of creep with said

weight representation to thereby obtain said creep compensated weight representation."

Claims 2 to 4 and 6 are dependent claims.

VII. The Appellant requested that the decision under appeal be set aside and that the patent in suit be revoked. He submitted the following arguments in support of his requests:

The method known from D1 has a drawback in that it is necessary to wait some time before the creep increment is determined. The person skilled in the art of D1 knows D2 because it belongs to a closely related technical field and he can use equation (4) of D2 or its more adapted equivalent form equation (5) for immediately calculating the creep. A mathematical comparison of these equations of D2 with the equations of the patent in suit shows that the method and apparatus in dispute result indeed from the combination of the teachings of D1 and D2. Therefore, the skilled person arrives in an obvious way at the less time consuming technique in dispute and solves his problem.

VIII. The Respondent argued as follows in support of his request:

In the method in dispute, a creep increment is calculated from the most recent creep state of the apparatus, the magnitude and the duration of the forces applied to the apparatus, this operation being repeated each time the weight is measured. Starting from D1 and its iterative method of measuring the weight of a load and of compensating the measured gross weight for the

creep effect, a problem arises because of the arbitrary determination of said gross weight. The skilled person would not be incited to take into account the equations for approximation of the creep effect known from D2, which belong to a different technical field and, if he would anyway do so, he would not arrive by a combination of D1 and D2 at the method in dispute, which contains features derivable from neither of these documents.

### **Reasons for the Decision**

1. The appeal is admissible.
2. *Allowability of the amendments*
  - 2.1 The allowability of the amendments resulting in the claims in dispute has not been contested (Article 123(2) and (3) EPC).
3. *Clarity*
  - 3.1 The method in dispute comprises in particular steps of determining and storing a mathematical expression for the increment in the amount of creep between successively obtained weight representations as a function of (a) said weight representation, (b) the time length between successively obtained weight representations and (c) the previous amount of creep. Moreover, said mathematical expression includes at least one constant having a value predetermined for the particular weighing mechanism. Thus, said mathematical expression as well as the parameters which are used are

well defined and, therefore, Claim 5 in dispute and the corresponding apparatus Claim 1 in dispute are clear in the sense of Article 84 EPC.

4. *Novelty*

4.1 The novelty of the claims has not been contested (Article 54 EPC).

5. *Inventive step*

5.1 A method of compensating for creep the output of a weighing apparatus is known from D1 (see column 1, lines 33 to 60; column 2, lines 1 and 2; column 8, line 60 to column 9, line 14; Claim 2, Figure 1, 2 and 4); the known method is applied to an apparatus comprising a weighing mechanism (10) producing an output signal indicative of an applied weight, electronic means (14, 26) for successively obtaining representations of the output signal with time, means (14) for compensating said weight representations for creep, and means (26) for providing an indication of the weight compensated for creep of said weighing mechanism (10).

However, the known method does not comprise the steps of the characterising portion of Claim 5 in dispute. In particular, no step of determining and storing a mathematical expression for the increment in the amount of creep between successively obtained weight representations as a function of (a) said weight representation, (b) the time between two successive measurements and (c) the previous amount of creep, for predictively calculating said creep increment, is

derivable from D1. Indeed, as can be seen from Figure 4 of D1, a mathematical representation, i.e. a graph of the measurement by a scale of gross weight and net weight as a function of time, is determined; in said graph the gross weight indication is shown increasing in particular as a result of creep; thus, creep is shown as a function of time for said weighing apparatus; using said mathematical representation, by subtracting values of said graph, the creep error can be calculated and combined with the indicated weight representation to provide an indication of the weight on the weighing mechanism compensated for creep. However, there is no indication in D1 that said graph is used during the method as a means of said method.

5.2 The Respondent has convincingly argued as follows:

In the method known from D1 (see column 8, line 60 to column 9, line 14; Figure 4), successive values of the weight are obtained over a period of time; for instance, (A), (B) and (C) represent the tare weight before the load is placed on the pan, the gross weight after the load has been placed on the pan, and the increase of said gross weight after the load has remained on the pan for some time, respectively; when (C) exceeds a predetermined value, the value of (B and C) will be stored as the new gross weight; the microcomputer system can determine whether the scale has crept or drifted substantially, i.e., beyond an arbitrary predetermined band, and then an adjustment is made to nullify the effects of such creep and drift. The difference ( $C=B-B'$ ) between the current representation ( $B'$ ) of the gross weight and the stored previous representation (B) thereof is calculated and

used for updating the value of the tare or zero of the weighing apparatus. However, it is necessary for the system to decide whether (C) is due:

(i) to a creep effect and is therefore to be compensated for, or whether it is caused

(ii) by a movement of the weighing pan, or

(iii) by an actual change of the weight on the pan, i.e. a new load. In order to enable the system to perform this discrimination, three arbitrarily chosen thresholds, namely a motion threshold in step (38), a change of weight threshold in step (68) and a creep threshold in step (54) of the process of D1 (see column 2, line 43 to column 5, line 49; Figure) are needed. Thereby, in the method described in D1 attempting creep compensation on the basis of two subsequent weight representations (B) and (B') arises a problem due to the arbitrariness introduced by the selection of these thresholds and on the resulting arbitrary selection of the particular value determined for the gross weight (B) and could thus lead to erroneous compensations.

5.3 In the method in dispute the increment of the amount of creep is calculated at each successive step of obtaining a weight representation, as a function of said weight representation, the time length between successively obtained weight representations and the previous amount of creep, said function being predetermined for the particular weighing apparatus. Thus, the increment of creep being determined, it is possible to compute and predict the increase of the

amount of creep and so the gross weight of the load without the arbitrary selection of a starting point for the determination of the creep effect. Therefore, the method in dispute credibly solves the above-mentioned problem.

5.4 The above-mentioned problem is not derivable from D1. Indeed, the skilled person could become aware of the problem; however, an obvious solution which he could deduce from D1 and from his general technical skill would be an adjustment of the three above-mentioned thresholds for more precisely determining the starting value (B) of the gross weight at which a difference (C) corresponding to creep can be detected.

5.5 As argued by the Appellant, people skilled in the art of D1, i.e. of measuring with weighing apparatuses, know from D2 (see page 366, right column, paragraph 2, first section; page 369, paragraph 5 to page 370, paragraph 6 "Zusammenfassung"; Figure 7 and 8), which also belongs to the field of measuring, that either a mathematical representation such as the equation (4) of page 369 or one such as the graph of Figure 7, which includes measurement time intervals as a parameter, can be used for calculating the creep or a component thereof as a function of time. Thus, the skilled person could be incited to take into account the teaching of D2 and in particular the equation (4) or the related equation (5), which is more adapted for use with a computer, and substitute it for the graph of Figure 4 of D1 thereby "predictively" calculating with a computer the creep error during measurement.

5.6 However, as convincingly submitted by the Respondent, there would be no incitation for the skilled person to modify the method known from D1, wherein the net value of the weight is calculated by an iterative method with successive gross weight measurements, subtracting and subsequent corresponding updating of the tare or zero of the weighing apparatus, and take into account the equation (4) of D2. Indeed, in the method known from D1 (see column 1, line 58 to 60), the storing of the adjusted tare weight when a load is on the pan will result in a constant net weight being obtained. On the contrary, for using the equation (4) of D2, a precise determination of the point at which creep begins is necessary. Moreover, since in the method of D1 (see Figure 2) there are steps (38, 68) for determining whether a load has been placed on the pan or not, said combination of the teaching of D1 with the approximation equation (4) of D2 would not result in the method in dispute wherein the creep increment is continually and successively calculated without such further determination steps.

5.7 The Appellant has submitted that a drawback of the method of D1 is that it is time consuming, since the creep effect can be determined only some time after the load is placed on the pan of the scale; the person skilled in the art would become aware of this problem and would be incited to look for means providing approximations of the creep effect, such as the equations (4) and (5) of D2. However, this argument is not convincing because, even if the skilled person had considered the problem and had taken into account D2, the combination of D1 and D2 does not result in the method in dispute for the reasons mentioned above. In

this respect, the Appellant's arguments based on the mathematical comparison between the equations (4) and (5) of D2 and the equations of the patent in dispute are not relevant for the same reasons.

- 5.8 The Appellant has also submitted that, except for the application to a weighing apparatus, the method in dispute is known from D2. However, D2 (see the title) pertains to the related, but different technical field of electrical pressure transducers and, therefore, the Board is of the opinion that, although correcting techniques for taking into account creep effect in measurements are known from D2, it is a more remote document and taking it into account as a starting point in assessing an inventive step of a method intended for weighing apparatuses is based only on *ex-post facto* considerations.
- 5.9 Therefore, the subject-matter of Claim 5 in dispute involves an inventive step in the sense of Article 56 EPC.
- 5.10 Thus, Claim 5 in dispute is allowable (Article 52(1) EPC).
- 5.11 Claim 1 in dispute, which consists in an apparatus with calculating means for implementing the method of Claim 5 in dispute, is also allowable for the same reasons.
6. Taking into consideration the amendments made by the proprietor of the patent, the patent and the invention to which it relates meet the requirements of the

Convention and the patent can be maintained  
(Article 102(3) EPC).

## Order

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

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent in amended form on the basis of the request made by the Respondent in the oral proceedings of 21 September 1993, i.e. on the basis of Claims 1 to 6 as presented in the oral proceedings and on the basis of a description and drawings to be adapted.

The Registrar:

The Chairman:

P. Martorana

E. Turrini