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Bezeichnung der Erfindung: System for central reading and registration of  
Title of invention: customers' power consumption  
Titre de l'invention :

Klassifikation / Classification / Classement : G01D4/00; G01R11/32

**ENTSCHEIDUNG / DECISION**

vom / of / du 23 January 1990

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /  
Titulaire du brevet : Karlsson, Björn Gösta Erik and  
Jönsson, Ingvar

Einsprechender / Opponent / Opposant : Siemens Aktiengesellschaft

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Article 56

Schlagwort / Keyword / Mot clé : "Inventive step (No)"

**Leitsatz / Headnote / Sommaire**



Case Number : T 78/89-3.4.1

**D E C I S I O N**  
of the Technical Board of Appeal 3.4.1  
of 23 January 1990

**Appellants :** Karlsson, Björn Gösta Erik  
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**Representative :** Dipl.-Phys. Friedrich R. von  
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**Respondent :** Siemens Aktiengesellschaft  
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**Representative :**

**Decision under appeal :** Decision of the Opposition Division of the European  
Patent Office dated 7 December 1988 revoking  
European patent No. 0 035 025 pursuant to  
Article 102(1) EPC.

**Composition of the Board :**

**Chairman :** K. Lederer

**Members :** J. Roscoe

L. Mancini

**Summary of Facts and Submissions**

I. European patent No. 0 035 025 was granted on the basis of European patent application No. 80 901 671.0.

II. The Respondent filed a notice of opposition against the European patent and requested revocation of the patent in its entirety on the ground that the subject-matter of the only claim was lacking in inventive step having regard to the disclosure in

DE-A-2 645 590 (c) either alone or in combination with  
US-A-3 683 343 (a).

Later in the proceedings the Respondent presented arguments based on another document CH-A-607 472 (b), which had already been considered during the examination proceedings and was referred to in the patent in suit.

III. The Opposition Division revoked the patent on the ground of lack of inventive step in the subject-matter of the claim. The essential reason for its decision was that document (b) disclosed all the technical features in the preamble of the two-part claim and document (c) disclosed all the essential characterising features of the claim, albeit in the context of petrol consumption rather than consumption of electricity.

IV. The Appellants (Patentees) lodged an appeal against the decision.

V. Oral proceedings were held, at the end of which the Appellants requested that the decision under appeal be set aside and that the patent be maintained on the basis of an

amended single claim presented at the oral proceedings,  
which reads as follows:

- "(A) A system for automatically reading and registering at a central location (11) the individual consumption of electricity at a great number of remote addressable consumer locations (12),
- (B) wherein electric signal lines extend from said central to each consumer location,
- (C) said system comprising at each consumer location a microcomputer (13), with its peripheral devices consisting in: modulator-demodulator means (22) connected to said signal lines for receiving first and second control signals and transmitting data signals to said central location via said signal lines,
- (D) said first and second control signals comprising an address code for addressing each consumer location,
- (E) sensor means (17,18,19) for measuring consumption of the electricity quantity at each consumer location,
- (F) accumulator means (15) for accumulating data representing the amount of the electricity quantity measured at said sensor means (17,18,19),
- (G) means responsive to reception of the second control signal at said modulator-demodulator means (22) for transmitting to said central location (11) via said signal lines data signals representing the accumulated data in said accumulator means (15),

(H) at said central location means for selectively transmitting said first and second control signals to each consumer location via said signal lines, and means for receiving the data signals transmitted from each consumer location via said signal lines,

c h a r a c t e r i s e d i n,

- (I) that said signal lines are the electric power distribution lines (R,S,T);
- (K) that storage means (16) for storing from said central location (11) a selectively modifiable current billing rate charged for consumption of the meterable quantity of electricity is arranged at each consumer location (12);
- (L) that said first control signals automatically transmitted by said means for transmitting first and second control signals at said central location include signals automatically representing the current billing rate for said meterable quantity of electricity, which billing rate relates to, i.e. reflects the actual instantaneous electric energy production cost of the system;
- (M) that means responsive to reception of the first control signal at said modulator-demodulator means (22) for changing the current billing rate stored in said storage means (16) is arranged at each consumer location (12);
- (N) that indicator means (23,24) for displaying said instantaneous current billing rate stored in said storage means (16) by the central location and the

individual instantaneous power consumption are arranged at the consumer location (12)."

VI The Appellant argued essentially as follows:

The main problem, as seen against the background of the closest prior art, which was the system disclosed in document (b) on which the preamble of the claim was based, was to find a simple means of educating the consumer to use his electrical appliances in such a way as to even out the load on the supply system as a whole, to the ultimate benefit of all users. The claimed system achieved this by using a variable tariff system in which the tariff was changed so as to directly reflect the current unit cost of producing the supplied electricity and wherein signals representative of the prevailing tariff were substantially continuously transmitted to the consumer location and displayed there in terms of currency units/kilowatt hour. This enabled the consumer, should he so wish, to switch off or turn down appliances the use of which could be delayed or dispensed with when unit cost was high and switch them on again when the cost was low. The corresponding fall in consumption, which was fed back to the central control location was reflected in a beneficial change in tariff, which the display immediately showed, thus making the customer aware of the advantages to him of his action.

Moreover, since in the system known from document (b) connection from the SCUs to the central location was along telephone lines non telephone subscribers were excluded from the system and the lines may be occupied when signals are required to be sent. Furthermore it was not clear that the signals between SCUs to consumer locations were sent along the lines supplying power to them.

In document (a) a small number of fixed tariffs was used, the use of a larger number being discouraged by the statement that this would confuse the average user. Furthermore no indication of the instantaneous unit cost was provided and there was no feedback to the central location of the result of actions of the individual consumer. These actions could therefore have no direct influence on his tariff, which depended solely on the total load on the system. Moreover the consumer had no indication of his own rate of consumption at any given moment.

Neither document (a) nor (b) disclosed:

- (i) a feedback loop between each consumer location and the central location or therefore a system rewarding the customer for his actions;
- (ii) a display of the unit costs of the electricity at the consumer location;
- (iii) communication of signals exclusively along the power-supplying lines along the full distance between the central and consumer locations.

VII. The Respondent contended that the sole difference between the claimed system and that disclosed in document (a) was that instead of an electromechanical meter an electronic meter was used, in association with a microcomputer, for identifying and storing the tariff-representing signal and switching the meter to the new tariff. The use of such a meter instead of an electromechanical one was well known in the art, and a skilled person wishing to do so in the system of document (b) would recognize that it was necessary to employ, instead of the tone signals employed in document (a), digital signals to which the electronic meter and its control circuitry could respond. This would

require a MODEM in association with the microcomputer. He would also use the microcomputer to display the tariff, instead of using indicator lamps, and also to display the instantaneous consumption of electricity.

Thus all the patent contained was an instruction to provide a digital solution to a problem to which an analogue solution already existed and it gave no indication that to follow this instruction involved any particular difficulty to which a solution was provided.

An analogue solution to the first problem referred to at lines 36-45 of col. 1 of the patent was provided by document (a) and the claimed solution to the second problem was disclosed in document (b) which also refers (col. 1, lines 35-43) to enabling the consumer to improve the load factor i.e. adapt his consumption to the prevailing tariff.

Finally, the Respondent denied that the patent in suit disclosed an arrangement for changing the tariff in response to the action of the individual consumer, and argued (i) that the same "educational" effect as the claimed system provided was also provided by the system of document (a), and (ii) that the passage at col. 4 line 55 to col. 5, line 7 of document (b) disclosed a feedback arrangement.

#### Reasons for the Decision

1. The appeal is admissible.
2. The question of the allowability under Article 123(2) and (3) EPC of the amended claim can be left out of



consideration because as set out below the appeal has to be dismissed for other reasons.

3. Novelty

3.1 Document (a) discloses a system for supplying power to consumers at a cost which directly depends on the instantaneous overall demand being made on the supply. Each consumer has an integrating meter the speed of which is proportional to the current being taken and to a scale factor corresponding to a predetermined tariff so that the meter reading represents the cumulative cost of the electricity consumed. One of a number of periodic signals each consisting of a single frequency or combination of frequencies and representative of the prevailing demand is transmitted along a power line 13 extending from the power station 10 to the consumer 12 and is used to set the scale factor at a particular level and to illuminate a display element 52,54 indicating the demand level and hence the operative tariff to the consumer. A meter 50 indicates the consumers current power consumption in terms of cost e.g. dollars/hour.

On the basis of information transmitted in this way the customer is able to make an informed individual decision on how to make best use of the lower tariff(s) while meeting his own needs and the supplier benefits from the tendency of the average consumers response to level out the demand curve. The use of four or more rate levels is envisaged, the upper-limit being set by a desire not to confuse the average consumer (col. 5, lines 56-62).

This system however makes no provision for directly indicating in cash terms the instantaneous cost per unit consumption or for reading the individual consumption meters from the power station.

3.2 Document (c) is exclusively concerned with a system for controlling the delivery of petrol from the pumps of a filling station. The system however includes the transmission, from a central computer over public telephone or telegraph lines to a filling station, of signals relating to the unit price of petrol, which are used to set a calculator for converting pulses proportional in number to volume so far delivered into pulses proportional in number to the total cost of that volume. Interrogation of the consumption at each station by the computer is also envisaged. The document does not however suggest sending signals along power lines and affords no details of how the information is transferred. Furthermore, it does not state that the changing price is displayed at the station.

3.3 In the system of DE-C-917, 380, document (d), first drawn to the Board's attention by the Respondent during the appeal procedure, in which individual households having high and low priority equipment located in different circuits supplied with power at normal and cheap rates respectively, the circuit 4 supplying the cheap power can be opened and closed from a remote point by signals superimposed on the current supplying power along the line 1 connecting the power station to the household. By this means the high priority equipment can be assured of power at all times and the remaining equipment, such as storage heaters, switched off at peak times to ensure a more balanced loading of the supply.

This system however lacks means for sending information from the household to a central point and affords no indication at the household of the prevailing unit cost of the electrical power supplied.

3.4 In the system described in document (b) the individual consumption of electricity at a large number of consumer locations 20 (Fig. 1) is read and stored at a central location RCC and temporarily stored at section control units (SCU) 16. A number of consumer locations are connected to a respective SCU over the lines supplying power to the consumer (col. 1, lines 54-56) and the SCUs connected over the telephone or telegraph lines, either directly or through the intermediary of amplifying MODEMS, to the RCC. Each consumer location includes means for demodulating and determining the destination of a received signal and for modulating a carrier with coded signals representing the consumption of electricity measured by meters 22 (Fig. 3) and accumulated, prior to transmission, in stores 1084, 1058, 1058A. Control signals serving different functions are transmitted from the RCC to the SCUs, whence those pertaining to metering terminals (MTUs) associated therewith are relayed to them over the power lines. Each signal bears the address code of one or a set of MTUs. Signals of a first type serve to control the current to apparatus at the addressed MTUs and those of a second type cause the MTU to transmit the signals representing the stored consumption data to the RCC via the relevant SCU.

This system thus has all the essential features of the preamble of the claims, as the patentee has admitted. In contrast to the claimed system, however, it makes no provision for sending to consumer locations control signals representing current billing rate and thus has neither storage means for the changeable billing rate nor means for displaying it at each consumer location. Furthermore, none of the signals are transmitted the entire distance from the central location RCC to the consumer locations along the power distribution lines, lines 12, 12A and 14 being exemplified as telephone lines.

3.5 For the above reasons, the subject matter of the claim is novel in the sense of Article 54 EPC.

4. Inventive Step

4.1 In the Board's opinion the closest prior art is the system disclosed in document (b) and the objective problems to be solved have therefore to be established from a consideration of the additional facilities provided by the features I to N of the characterising part of the claim.

4.2 It is convenient to deal first with feature I which, for the purposes of this decision, is taken to mean that the signals pass between the central and the consumer locations exclusively along the power distribution lines supplying the consumers. The Board considers that this feature essentially presupposes the existence of an appropriately arranged power supply system and calls for a realization that it could be used to transmit signals. Its advantage, to which no reference is made in the patent in suit, is that it makes full use of an existing facility which is owned by, or at least under control of, the power supplier. The problem solved by feature I is therefore to simplify the system and to reduce installation costs.

The suitability of such lines for signalling emerges from their use for that purpose not only in part of the system of document (b) but also in document (a) where the signals pass exclusively along them. Under these circumstances the Board finds it obvious to use them for signals in any system where the lines have the required layout e.g. where the source of supply and the central point coincide or where the latter and the remote locations are supplied by the same source.

- 4.3 The remaining features K to N provide a solution to the general problem of providing the individual consumer with up to the minute information concerning the unit cost of the electricity being supplied, which in a multi-tariff system can change on a regular or irregular basis, thus enabling him to operate the appliances at his disposal in the most cost-effective way.
- 4.4 This problem has already been addressed by document (a). There, as explained in 3.1 above, the consumer is supplied not only with an indication of the prevailing load level, to which the relative unit cost is directly related, but also with an indication of his own power consumption rate in terms of cost. He is thus able to switch off non-essential apparatus at peak demand periods thus saving money (col. 10, lines 10-17) and helping to spread the load on the system for the benefit of others. Furthermore in a period of constant unit cost he is enabled by reading the cost per unit time of his own consumption to determine the effects on this of various actions he may take such as switching off or on a particular appliance (col. 10, lines 17-24). These are essentially the same facilities as provided by the billing rate and instantaneous power consumption indicator means of Claim 1 of the patent in suit (col. 3, lines 18-43).
- 4.5 The Board is satisfied that it would not be beyond the capabilities of the normal skilled person aware of documents (a) and (b) to decide to incorporate the functional features of document (a) which are designed to overcome the stated problem into a system as disclosed in document (b) and to implement this decision. In document (a) the appropriate level indicating signal appears to be maintained throughout the period in which that level prevails. However, it is considered that in a digital system such as used in document (b) the skilled person

would, as a matter of course, and so as to reduce occupation of the signal path to a minimum, arrange for a level signal to be transmitted at the start of each such period and held in a memory at the consumer location to provide for continuous display of the demand (and hence tariff) level and for resetting of the accumulated cost meter. Transmission of digital representations of numerical information and their subsequent storage is already used in the system of document (b), i.e. in the storage of meter readings transmitted from the SCUs in the MTUs. Moreover in the communications field it is well known for information transmitted to a remote point for display to be stored there.

4.6 Since it is known practice to provide consumers with their own instantaneous power consumption meters it cannot be considered inventive to do so also in the system of document (b). Thus, the combination of features K to M with those cited in the preamble of the claim, independently of the presence of feature I, cannot be considered to involve an inventive step.

4.7 The substitution of a visual display of the actual cost per unit for that of the relative cost as in document (a) or the additional provision of such a display cannot be seen to further assist the consumer in taking the decisions on the use of appliances referred to above. The Board therefore regards it merely as substitution of a functional equivalent which the skilled person could readily provide should there be a call for this different information on the part of the consumer. Therefore the provision of the additional feature N cannot render the claimed system inventive.

4.8 With regard to the Appellant's contention that the claimed system involves a feedback loop between the individual

consumer location and the central location enabling the consumer to be rewarded for his individual response to changes in tariff rates, the Board can find neither a requirement for this in the claim nor any suggestion in the description of the use of such a loop. Furthermore, the claim is committed to provision of a billing rate reflecting the actual instantaneous part of production for the system as a whole and not to the consumption by the individual. Thus the reward for the consumer resides solely in minimising his use of electricity in high cost periods, just as in document (a).

In the passages of the description relating to the system of charging there is in the Board's opinion nothing to suggest that the unit cost indication is changed more frequently or in a more sophisticated manner than in document (a) so that the word "instantaneous" used in connection with unit cost cannot be construed as meaning that even small reductions in production costs are passed on to the individual consumer.

- 4.9 For the above reasons the subject-matter of the claim does not involve an inventive step within the meaning of Article 56 EPC.

**Order**

For these reasons, it is decided that:  
The appeal is dismissed.

The Registrar:

The Chairman:

J. Rückerl

K. Lederer