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Bezeichnung der Erfindung: Power press arrangement

Title of invention:

Titre de l'invention :

Klassifikation / Classification / Classement : B21D 43/05

ENTSCHEIDUNG / DECISION
vom / of / du 29 August 1990

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent /
Titulaire du brevet : Danly Machine Corporation

Einsprechender / Opponent / Opposant : L. Schuler GmbH

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Articles 54, 56

Schlagwort / Keyword / Mot clé : "Novelty (confirmed)"
"Inventive step (confirmed)"

Leitsatz / Headnote / Sommaire



Case Number : T 583/88 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 29 August 1990

Appellant : Danly Machine Corporation
(Proprietor of the patent) 2100 South Laramie Avenue
Chicago, Illinois 60650 (US)

Representative : Knott, Stephen Gilbert
MATHISEN, MACARA & CO.
The Coach House
6-8 Swakeleys Road
Ickenham
Uxbridge
Middlesex UB10 8BZ
Great Britain

Respondent : L. SCHULER GmbH
(Opponent) Bahnhofstrasse 41
Postfach 1222
D-7320 Göppingen
Germany

Representative :

Decision under appeal : Decision of the Opposition Division of the European
Patent Office dated 13 September 1988 revoking
European patent No. 47056 pursuant to
Article 102(1) EPC.

Composition of the Board :

Chairman : H. Seidenschwarz
Members : M. Noel
M. Aúz Castro

Summary of Facts and Submissions

- I. European patent No. 47 056 concerning a power press arrangement was granted on 2 April 1986 in response to European patent application No. 81 303 240.6 filed on 15 July 1981.
- II. An opposition was filed against the European patent requesting it be revoked on the ground of lack of novelty with respect to the document DE-A-2 218 966 or its equivalent, the document US-A-3 668 498.
- III. The Opposition Division revoked the European patent by its decision dated 13 September 1988. According to this decision, the subject-matter of Claim 1 as granted was not novel in the light of the disclosure of the document DE-A-2 218 966.
- IV. The Appellant (Proprietor of the patent) lodged an appeal against this decision on 14 November 1988, paying the appeal fee on 15 November 1988 and submitting the Statement of Grounds on 17 January 1989. In order to emphasise the differences between the power press arrangement known from the document US-A-3 668 498 and the subject-matter of the patent in suit, he filed two amended Claims 1 (Proposal 1, Proposal 2).

- V. Claim 1 of proposal 1 reads as follows:

"A power press arrangement comprising a power press (11, 12) having a slide (17), a press drive for driving the slide (17) in a press cycle, a working area, a workpiece displacing mechanism having a control unit (30) and an element (21, 22) for moving a workpiece (W) during a press

cycle relative to the working area of the press in response to operation of the control unit (30), means (38) for producing a timing signal representing successive increments of each press cycle, and a monitor (39) for monitoring the motion of the workpiece-moving element (21, 22), a memory which stores data relating to desired successive positions for the workpiece-moving element (21, 22) during a press cycle, characterised in that the control unit (30) includes a calculator for deriving, during each press cycle, from the data stored in the memory, theoretical motion parameters for the workpiece-moving element (21, 22) between successive desired positions, and a comparator compares the theoretical motion derived by the calculator with the motion monitored by the monitor and causes the control unit (30) to move the workpiece-moving element (21, 22) in dependence upon the results produced by the comparator, the memory correlating the output of said stored data relating to desired positions for the workpiece-moving element (21, 22) within a press cycle with different positions of the press drive and its associated slide so as to closely correlate the movement of the workpiece-moving element (21, 22) with the motion of the press drive."

It is followed by dependent Claims 2 to 8.

Independent method Claim 9 as granted has the following wording:

"A method of synchronizing the operation of auxiliary apparatus including loaders, unloaders and conveyors with each of the press drives of a line of successive power presses comprising the steps of deriving a set of auxiliary apparatus position values for a cycle of a press drive, driving the press, continuously monitoring the position of the auxiliary apparatus and displacing the

auxiliary apparatus in theoretical positions based upon the deviation between theoretical and actual auxiliary apparatus position values, characterised in that the position of the press drive is incrementally determined and correlated with the derived auxiliary apparatus positions incrementally to determine the theoretical auxiliary positions, and in that the auxiliary apparatus position values are incremental."

It is followed by dependent Claim 10.

VI. Oral proceedings took place on 29 August 1990.

- (i) The Appellant agreed that the nearest prior art was the power press arrangement disclosed in document US-A-3 668 498. He argued that in this power press arrangement the workpiece-moving element was moved in accordance with required mechanism positions which were stored before a press cycle was executed. Correlation of the movement of the workpiece-moving element with the movement of the press was provided only at a limited number of set points and, intermediate the set points, the workpiece-moving element was moved entirely in accordance with the information in the matrices. This was why the known power press arrangement might require the workpiece-moving element to be halted until the press platen had reached a particular angular position. Furthermore, the document US-A-3 668 498 did not contain any reference to a calculator for calculating theoretical motion parameters from the data stored in the matrices. Consequently, there could also be no comparison of any such theoretical motion with the motion of the workpiece-moving element.

The Appellant considered that document GB-A-2 006 077 did also not disclose a coordination of the movement of workpiece-moving elements with the motion of the press drive. The only relationship between the drives of the workpiece-moving elements and the motion of the press drive consisted in starting the drives of the workpiece-moving elements at a crankshaft angle of 270°. According to the British document, it was clear that in the control system of the known power press arrangement no theoretical motion parameters were produced since only desired points were entered in the known control system. Further details concerning the calculation of intermediate positions, however, could not be derived from document GB-A-2 006 077.

In any case, both documents would suggest correlation of the motion of the workpiece-moving element and the press drive only at a very limited number of points.

- (ii) With respect to the Appellant's submission concerning the close correlation between the two motions of the workpiece-moving element and the press as described in the specification of the patent in suit (cf. column 1, line 17 to column 12, line 25 and column 14, line 58 to column 15, line 18) and especially shown in Figures 9 and 17, the Respondent put forward that the new Claim 1 did not contain any reference to such a control and correlation. Only dependent Claim 3 as granted would state this essential feature. Therefore, the present Claim 1 could not solve the technical problem as submitted by the Appellant.

The Respondent also argued that the document DE-A-2 218 968 or its equivalent document US-A-3 668 498 disclosed an automatic control system which permitted a division of the path of the workpiece-moving elements into "increments" by storing predetermined points on the path in a memory. This system provided a point to point control, which would result in a continuous control of the motion of the workpiece-moving elements (cf. DE-A-2 218 968, page 4, lines 1 to 3; page 54, lines 11 and 12; US-A-3 668 498, column 1, lines 58 to 60; column 17, lines 33 to 35). Furthermore, the document GB-A-2 006 077 concerned a control system for a power press arrangement, which control system would comprise the input of preselected points for the movement of workpiece-moving elements, thus one could select the "type of path" as desired. The control system would also be fed with signals for the operation of the press and would determine the desired positions for the workpiece-moving element. Therefore, the document GB-A-2 006 077 in its entirety also disclosed an interpolation between the different points of the path of the workpiece-moving element in accordance with the press operation.

The subject-matter of the new Claim 1, therefore, did not involve an inventive step in the light of the teachings known from the aforementioned documents.

Finally, the subject-matter of independent Claim 9 also would not involve an inventive step, since the method of synchronising the operation of auxiliary apparatus according to the precharacterising portion was only performed "incrementally".

VII. The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of Claim 1 according to Proposal 1, filed on 17 January 1989.

The Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.
2. New Claim 1 was filed with the Statement of Grounds. It is based on Claim 1 as granted and complemented by all functions of the control unit being performed "during a press cycle", which can be unequivocally deduced from the description as granted (cf. column 4, line 52 to column 5, line 18; column 10, line 59 to column 12, line 25 and column 14, line 58 to column 15, line 19) and as originally filed (page 6, line 14 to page 7, line 19; page 15, line 8 to page 18, line 30 and page 22, line 34 to page 23, line 20). The amendment of Claim 1 proposed by the Appellant emphasises clearly the differences between the subject-matter of the patent in suit and the prior art cited by the Respondent in his notice of opposition.

The amendments in the description deal with the state of the art from which the invention starts (cf. Rule 27(1)(c) EPC), and refer to the amendment in Claim 1.

The patent, therefore, complies with Article 123(2) and the claims with Article 123(3) EPC.

3. With respect to the Respondent's objection that the teaching of Claim 1 does not solve the technical problem

underlying the subject-matter of said claim, the following is set forth:

The Respondent has failed to provide any evidence as to why the subject-matter of Claim 1 could not solve the technical problem without further detailed information drawn from the description of the patent. Furthermore, the present Claim 1 is phrased in functional terms. These must be understood as referring to the technical means necessary for carrying out the functions (including an appropriate program). Therefore, no objections can be made against such a claim so long as the person skilled in the art can understand from the description and/or from his general knowledge in the field which means are required (cf. also decisions in cases T 68/85 (OJ EPO 1987, 228-236) and T 208/84 (OJ EPO 1987, 14-23)).

The Board of Appeal is, therefore, also of the opinion that the new Claim 1 states all those technical features which are necessary for the person skilled in the art to understand the solution.

4. The examination as to whether the subject-matter of Claim 1 and Claim 9 is novel results in the following:
 - 4.1 According to the findings of the Board, which are in accordance with the opinion of the parties, a power press arrangement as disclosed by the document DE-A-2 218 966 or its equivalent US-A-3 668 498 is actually the closest prior art with respect to the subject-matter of Claim 1.

The known power press arrangement has a slide, a press drive for driving the slide in a press cycle and a working area. The workpiece displacing mechanism has a control unit and an element for moving a workpiece during a press cycle relative to the working area of the press in

response to operation of the control unit. Means (rotary pulse generator 216) produces a timing signal representing successive increments of each press cycle and a monitor (position counters 282, 302, 324) monitors the motion of the workpiece-moving element. A memory (matrices 186, 308, 330) is provided which stores data relating to desired successive positions for the workpiece-moving element during a press cycle. These matrices produce output signals in response to an input signal from a matrix driver (258). The output signals represent the y, x and z axis coordinates of the next destination point on the transfer path and are applied to compare circuits (286, 306, 328). The compare circuits compare said destination point of the workpiece-moving element with the actual position point on the three axes, which is monitored by the position counter, and produce true output signals until the input signals from the matrices and position counters become equal to each other, at which time the outputs of the compare circuits become false or zero. These signals are used to control the motors, which move the workpiece-moving element, and which are applied to a NOR gate (366) (column 10, line 14 to column 11, line 40).

Said NOR gate controls the output signals produced by the matrices. It outputs a signal to the matrix driver which, in receipt of that signal, advances reading means of the matrices for readout of the data corresponding to the next destination point (cf. DE-A-2 218 966, page 39, lines 11 to 15, US-A-3 668 498, column 12, lines 61 to 65).

The NOR gate is only operative to produce an output signal to the matrix driver when all the inputs from the above-mentioned compare circuits and from a set point control circuit (340) comprising the rotary pulse generator are false or zero. The timing signal produced by said

generator is supplied to the input of a position counter (344). The position signal taken from the output of the position counter is applied to one input of each of four compare circuits (346, 348, 350, 352). The other input of each of the four compare circuits is set by counters (220, 222, 224, 226) as set points numbers one to four. By these set point circuits angular positions of the press platen are set at which a control function is to be performed in connection with the workpiece-moving element (load and unload transfer units 16, 18).

A particular control function performed by the set point circuits is that of causing interruption of the movement of the workpiece moving element until the press platen has reached the angular position set in the set point circuit. When the destination point is reached on all axes the input from the set point circuit to the NOR gate becomes also false or zero (cf. DE-A-2 218 966, page 35, line 11 to page 39, line 1; US-A-3 668 498, column 11, line 41 to column 12, line 52).

From the above, it follows that in the known control unit

- the actual position of the workpiece-moving element is only compared with the desired position of said element;
- the correlation between the motion of the workpiece-moving element and the press motion takes place only at a limited number of set points, and
- intermediate the set points, the workpiece-moving element is moved entirely in accordance with the information in the matrices.

The known control unit does not include a calculator, which derives from the data stored in the matrices theoretical motion parameters, and a comparator, which compares the theoretical motion derived by the calculator with the motion monitored by the position counters. This was no longer contested by the Respondent during the oral proceedings.

Furthermore, the matrices according to the known control unit do not correlate the stored data within a press cycle with different positions of the press drive so as to closely correlate the movement of the workpiece-moving element with the motion of the press drive, since the correlation is not solely between the positions of the workpiece-moving element and the press drive, the positions of the workpiece-moving element rather depend on the position of other workpiece-moving elements via the NOR gate (cf. Figure 8).

4.2 None of the documents cited in the search report discloses a power press arrangement according to Claim 1 and a method according to Claim 9. To give reasons in detail is unnecessary since also the Respondent no longer disputed the novelty with respect to this state of the art.

4.3 Hence, the subject-matter of Claims 1 and 9 is novel within the meaning of Article 54 EPC.

5. On the question of whether or not the state of the art could suggest the power press arrangement and method according to the independent claims, the following is to be observed:

5.1 It follows from the submissions of the Appellant that in the control unit of the power press arrangement according to the closest prior art (cf. above point 3.1) the motion

of the workpiece-moving element between successive desired positions of the element is not monitored and a system is provided which ensures that the workpiece-moving element is at a desired position before issuing a signal moving the element to the next successive position. Therefore, there is no further synchronisation of the workpiece-moving element with the press.

The technical problem to be solved by the invention is as specified by the Appellant during the oral proceedings, to coordinate closely the motion of the transfer elements with the movement of the press platen.

5.2 According to the teaching of the independent claims, this problem is solved by a control system which constantly compares the actual and theoretical positions of the workpiece-moving element throughout the press cycle including between successive predetermined set positions, and which constantly controls the workpiece-moving element in accordance with that comparison.

5.3 Since no calculator is disclosed in the document US-A-3 668 498, no theoretical motion parameters can be derived from the data stored in its matrices. It follows that a constant comparison of the actual position and any theoretical position, and, consequently, a constant control of the workpiece-moving element throughout a press cycle is impossible. Therefore, said document does not suggest to the person skilled in the art the device of Claim 1 or the method of Claim 9.

5.4 The document GB-A-2 066 077 concerns a workpiece conveyor device for moving workpieces between two presses of an automated press line. A programme control means (Figure 3) employs a CNC control system incorporating a process control computer and memory units which controls the

operation of the conveyor device. This CNC control system (31) generates required positions for a conveyor slide (14), gripper elements (19) and a positioning repository (22) and receives from incremental pulse generators (44, 45, 46), the actual positions of said elements. From these two signals, the required position and the actual position, a resulting signal is passed to controllable converters (38, 39, 40). They process this signal in conjunction with a speed signal from tachogenerators (41, 42, 43) and provide a signal to actuating drives (35, 36, 37) to move the conveyor slide, the gripper elements and the positioning repository (cf. page 2, lines 60 to 87). A calculation of theoretical motion parameters on the basis of the data stored in the memory is not performed in this control system, and consequently, a comparison of the theoretical motion with the actual motion is not possible.

The only interaction of the actuating drives with the press itself is by means of a release stage (58), which is set by a signal from a specific crankshaft angle of the press. The release stage starts the actuating drives, and an end position limiting stage (59) prevents the conveyor slide from passing beyond the proper end positions and thus causing damage or breakdown (cf. page 2, line 107 to 125; page 3, lines 20 to 23).

By means of a coordinate input stage (61), the points to which the actuating drives are to run can be determined. With the aid of an interpolation input stage (66) one can determine in which way the preselected points will be reached; thus one can select the type of path (cf. page 3, lines 6 to 15). There is, however, no reference in the description and in the block circuit of the programme control means according to Figure 3 that said selection is performed in accordance with the press drive.

From the above results, only a comparison of the position of the conveyor slide with the position of the press is made and that at only two points.

Consequently, the document GB-A-2 006 077 does not give any hint to the person skilled in the art to exercise continuous control over the positions of the workpiece-moving element between successive preset positions as stored in the memory and to improve this control by constantly comparing the actual and theoretical positions of the workpiece-moving element throughout the press cycle, including between successive predetermined set positions, and controlling the workpiece-moving element in accordance with that comparison.

The control units disclosed in the documents US-A-3 668 498 and GB-A-2 006 077 operate in similar ways and do not contain any suggestions for calculating theoretical motion parameters and comparing this motion with an actual motion. Therefore, the person skilled in the art would not be led to combine these documents.

- 5.5 The documents cited in the search report likewise give no hint of the subject-matter of Claim 1. This teaching could not, either alone or in combination with the teachings of the documents discussed in the foregoing paragraphs, lead the person skilled in the art to the power press arrangement according to Claim 1 and a method according to Claim 9.
- 5.6 The subject-matter of Claim 1 and Claim 9 thus also involves an inventive step within the meaning of Article 56 EPC.

6. In view of the above, the patent can be maintained with Claim 1 as amended, together with the Claims 2 to 10 as granted, the dependent Claims 2 to 8 and 10 concerning particular embodiments of the invention, and with the modified description as well as the drawings as granted.

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 with the following documents:

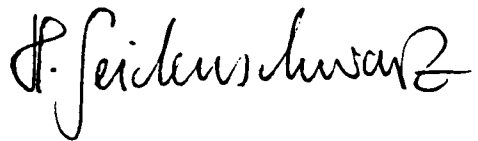
Claim 1 according to Proposal 1 filed on 17 January 1989;
Claims 2 to 10 as granted;
columns 1 and 2 of the description filed during the oral proceedings;
columns 3 to 15 of the description as granted, and
drawings as granted.

The Registrar:



N. Maslin

The Chairman:



H. Seidenschwarz

R. N. Maslin
H. Seidenschwarz 1/10/90
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