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File Number: T 497/91 - 3.2.2
Application No.: 84 904 175.1
Publication No.: 0 164 419
Title of invention: Mold clamping apparatus

Classification: B29C 45/66

D E C I S I O N
of 30 June 1992

Proprietor of the patent: FANUC LTD.
Opponent: BATTENFELD GmbH

Headword:
EPC Articles 54, 56, 88(3), 89, 114(1)
Keyword: "Inventive step (yes)"



Case Number : T 497/91 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 30 June 1992

Appellant :
(Opponent)

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Respondent :
(Proprietor of the patent)

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Representative :

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Decision under appeal :

Decision of Opposition Division of the European
Patent Office dated 9 April 1991, notified on
2 May 1991, rejecting the opposition filed
against European patent No. 0 164 419 pursuant to
Article 102(2) EPC.

Composition of the Board :

Chairman : P. Dropmann
Members : J. du Pouget de Nadaillac
G. Davies

Summary of Facts and Submissions

I. The appeal is directed against the decision of the Opposition Division dated 9 April 1991, notified on 2 May 1991, rejecting the opposition filed on 8 December 1989 against European patent No. 0 164 419 (patent application No. 84 904 175.1) and based on the ground that the subject-matter of the granted Claim 1 does not involve an inventive step in view of the following documents:

D1: JP-A-59-187 826	E5: DE-C-3 020 181
E1: DE-C-518 347	E6: DE-B-1 558 281
E2: JP-A-38-7488	E7: DE-A-3 103 737
E3: JP-A-44-5101	E8: "Elektrische Vorschubantriebe für Werkzeugmaschinen", 1981, SIEMENS AKTIENGESELLSCHAFT, Vorwort.
E4: US-A-3 292 214	

II. Claim 1, as granted, reads as follows:

"A lock for locking molds (14,15; 31,32) of an injection moulding apparatus comprising a servo motor (1,20) and a transmission mechanism (2,3,4,5; 21,22) having a screw (5,22) and a nut mechanism (4,21) for converting a rotational force of said servo motor (1,20) to a linear force, characterised in that:

the lock further comprises a toggle mechanism (7,8,9,7',8',9'; 24,25) operable by the transmission mechanism (2,3,4,5; 21,22) to lock the molds (14,15; 31,32);

and in that when links (7,8,7',8'; 24,25) of said toggle mechanism are in a straightened state thereby locking the molds (14,15; 31,32), said servo motor (1,20) is operable under a current less than a normal operating current to hold the links in the straightened state."

- III. The appeal was lodged on 4 July 1991 and the corresponding fee was paid the same day. The statement of grounds of appeal was received on 7 September 1991.
- IV. Oral proceedings took place on 30 June 1992. The arguments of the Appellant (Opponent) submitted in writing and orally may be summarised as follows:

The closest prior art, disclosed in the introductory part of the description of the contested patent, shows that the first feature of the characterising part of Claim 1 is not new, so that the improvement brought about by the present invention lies only in the last feature of this claim. According to the contested patent, one object of the present invention is to avoid the disadvantages of the complicated and cumbersome hydraulic driving means of the prior art, since such means require valves, a pump and so on. The use of an electrical motor attains this object. However, this solution is only a part of the last feature of Claim 1 and the other part of this feature, namely the holding of the links by means of the motor supplied with a low current, has nothing to do with it. According to the Respondent, the second improvement should prevent the moulds from being moved by vibrations, but this aim is, in fact, not solved by the solution mentioned in Claim 1, since the skilled person is unable to hold the links in position with a motor supplied with a low current. Normally, even if a low current is applied, the motor will still continue to rotate. Other necessary information, such as the level of this current when it is applied, an abutment or any mechanical means, for example a brake, which could stop the links in their straightened state, is missing. The solutions mentioned in Claim 1, therefore, are insufficient to solve the aims of the present invention.

Regarding the question of inventive step, the first problem and its solution are found in document E1. This prior art, indeed, concerns a press for plastic products and not a plastic injection moulding apparatus. The person skilled in the art is, nevertheless, the same, dealing with all kinds of plastic working machines. There is a continuous bridge between presses and injection moulding machines in this technical field and the skilled person, when looking for a solution which simplifies the locking step of the clamping moulds and ameliorates their control, will not be unaware of known solutions to the same problems in the presses for plastic products, which further show identical locking steps in the die. Document E1 aims, as does the present invention, to avoid the use of hydraulic means for locking the die of the press, and teaches the use of a toggle mechanism driven by an electrical motor. The first solution of Claim 1 is consequently obvious.

In this document, several terms such as "Höchstdruck", "Einknicken", show clearly that, when the die is locked, the links of the toggle mechanism are straightened. This fact is quite usual with a toggle mechanism, and the German word "Strecklage" (used in several prior art documents in order to describe this position) has the same meaning as "in a straightened state". If necessary, a technical book could be filed to put forward evidence on this point. The motor described in document E1 also works with detectors, so that it is a servo motor in the sense of the patent in suit, although this term "servo motor" normally has no clear meaning. Therefore, the only difference between the solution of the contested Claim 1 and the teaching of document E1 resides in the low current supplied to the motor in the locking position of the moulds. This difference, however, is not inventive for the following reasons: when the die reaches the locking

position in document E1, the motor is stopped and, since the die must remain a certain time under pressure, the transmission mechanism (spindle and nut) together with the motor keeps it in position. Thus, this document gives a clear teaching that, when the locking position is reached, mechanical means are necessary to maintain the links of the toggle mechanism. This teaching is further emphasized by the passage on page 2, right-hand column, lines 55-57, of document E1. In view of this teaching, to stop a motor or to supply it with a low current is equivalent for the skilled person. Induction motors, which do not rotate but maintain a given position when supplied with a current lower than usual, are well-known.

For all these reasons, the subject-matter of Claim 1 does not involve an inventive step.

- V. The Appellant requested that the impugned decision be set aside and that the European patent be revoked.

The Respondent requested that the appeal be dismissed and the patent maintained as granted.

Reasons for the Decision

1. The appeal is admissible.
2. The novelty of the claimed lock for moulds was not disputed by the Appellant and is recognised by the Board; no further argument is necessary, therefore, in this respect (Article 54 EPC).
3. The prior art portion of Claim 1 is based upon document D1, which was considered as the starting point of the invention in the previous proceedings. However, this

document was published on 25 October 1984, that is to say after the priority date of the present patent. In order to see if this priority date is still valid for the whole subject-matter of Claim 1, as required by Article 88(3) EPC, the Board has examined whether all the features of the contested Claim 1 could be found in the English translation of the Japanese priority document relating to the present invention. The last feature of Claim 1 is not found in any of the claims of this priority document, but an implicit disclosure of it appears on page 4, lines 18-22. Thus, in the opinion of the Board, the claimed priority date of the present invention is still valid for Claim 1, and, consequently, document D1 does not constitute state of the art as defined in Article 54 EPC combined with Article 89 EPC.

4. During the oral proceedings, it was agreed that the closest prior art is described in the description of the patent in suit, column 1, lines 5-11. An example of this closest prior art is described in document E7.

According to this closest prior art, a lock for locking the moulds of an injection moulding apparatus comprises motor means and a transmission mechanism. The transmission mechanism operates a toggle mechanism, the links of which are brought into a straightened state, thereby locking the moulds. A hydraulic mechanism is used as the driving motor.

The Board agrees with the Appellant that, when a toggle mechanism is used, it is to be assumed that the links of this mechanism, when they are completely extended, are "in a straightened state". The Board has considered the Appellant's offer to file additional evidence as to the meaning of the term "Strecklage", which is currently used in the German documents, but has concluded that such

evidence is not necessary, since this expression corresponds to the term "straightened state". In the closest prior art, therefore, it is also to be assumed that the links are in a straightened state when the moulds are closed.

5. In the light of this closest prior art, the technical problem underlying the patent in suit is to be seen in providing a similar lock, which overcomes the disadvantages of hydraulic means and which, in the locking position, prevents the moulds and the links of the toggle mechanism from being moved by means of a low energy consumption, when, for example, vibrations occur.

According to the disputed patent, this technical problem is solved by providing an electrical servo motor as driving means and by supplying this motor with a current lower than the normal operating current, when the moulds are locked, so that the links are kept in the straightened state.

6. The Board is satisfied that this problem is effectively solved. Although the opposition and the appeal were not based on the ground that there was insufficiency of disclosure (Article 100(b) EPC), the Appellant argued several times that features, such as the level of the low current, the moment of its application, or the means of stopping the links, were missing and that it was not possible to solve the problem on the basis of the disclosed features. The Board has considered of its own motion under Article 114(1) EPC the Appellant's arguments concerning insufficiency, but has found however that these arguments are not convincing and that, in the opinion of the Board, the features of Claim 1 adequately disclose the solution of the invention. The Board does not see any reason to unduly limit the scope of the claim by giving

the level of the low current and the moment it is applied. A person skilled in the art, receiving the teaching of applying a lower current as soon as the links are "in the straightened state", is able to determine the kind of electrical motor which can fulfil the claimed requirements, that is to say, with a normal current, move the links towards the locking position, the motor being then "stopped" (see the description), meaning that it no longer rotates, and supplied with a low current, which is sufficient "to hold" the links in position. No stopping means for the links are needed, since there is already a physical abutment because of the moulds, which are closed.

7. Document E1 is an old document, filed in 1929. It concerns a simple press for plastic products, having a die moving up and down to press into a given shape a plastic material lying on the working surface of the press. Once the die has reached its lower pressing position, it must be maintained under pressure for a certain time. The object of this prior art is to avoid the disadvantages of hydraulic driving means and, to this end, an electrical motor is used, rotating a spindle by means of a gear transmission, thus moving a nut in a longitudinal direction to displace the joint point of a toggle mechanism, thereby moving the die. Switching means are provided on the path of the nut to stop the motor at both extreme positions of the die. This document teaches that, as soon as the die has reached its lower position which corresponds to the higher pressure, the current is switched off and that the die remains in its locking position, since the motor is quickly stopped by means of a brake.
8. As seen, a brake is mentioned in this prior art, but its only function is to bring the motor to a standstill as

quickly as possible. That it moreover helps to hold the links in position is not disclosed in this document. Therefore, the assertion of the Appellant that this prior art teaches the need for mechanical means to hold the links in position is not supported by the provision of a brake, which in this prior art has in fact another function. Lines 55-57 in the right-hand column of page 2, mentioned by the Appellant as a further basis for his assertion, indicate only that, when driving belts are used, instead of an electrical motor, the switches are replaced by mechanical means, which disconnect the belts. Such an indication is quite remote from a hint to provide mechanical means for holding the links or for providing the electrical motor of the invention with a low current.

9. The problem of holding the links when the die has reached its end position in order to press the plastic material is not even envisaged in document E1. It is only stated that this position is held because of the quick stopping of the motor, and nothing more. The man skilled in the art, reading this document, does not receive any suggestion for providing means to keep the links in position, when vibrations or the like occur. There is not even a teaching that there could be a problem with controlling the locking position of the die. Faced with the problem of the present invention, the man skilled in the art therefore has no reason to turn his attention to this prior art.

10. If he does so nevertheless, this document also gives him no suggestion for the solution itself, since it teaches to switch the motor off. The solution of the contested invention is based moreover on the observation that a little power is needed to hold the links when they are in a straightened state, and it is only for this main reason that a motor with a low current can be used. Document E1 gives absolutely no hint in this direction, so that the

skilled person has no reason from this prior art to continue to supply current to the motor when the links have reached their straightened position, since it would be wasteful. The solution of the present invention must be regarded as a consequence of the above-mentioned observation. Of course, it is well-known that the links of a toggle mechanism, when they are in a straightened state, need little power to be held in position, but the use of this knowledge to solve the problem underlying the present invention is not suggested. Because of this link between the particular solution of the present invention and the said observation, which is the basis for this solution, the Board considers that an inventive step would be recognised in the corresponding feature of Claim 1, even if the teaching of mechanical means for holding the links, such as a brake, had been given by the prior art, because with such mechanical means a particular position of the links is not needed.

11. Since no other document among those mentioned during the proceedings suggests this solution, and since the Appellant has given no other reason why it should occur to the skilled man to operate the motor under a low current when the moulds are locked instead of switching the current off, this particular feature of Claim 1 implies an inventive step, so that the whole granted claim meets the requirements of Articles 52 and 56 EPC. Claim 1 being the only independent claim, the granted patent, therefore, is to be maintained.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:



S. Fabiani

The Chairman:



P. Dropmann

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