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Datasheet for the decision of 10 June 2008

Case Number: T 1411/06 - 3.2.05

Application Number: 98850108.6

Publication Number: 0885707

IPC: B29C 45/27

Language of the proceedings: EN

Title of invention:
Injection molding nozzle assembly

Patentee:
Husky Injection Molding Systems Ltd.

Opponent:
Mold-Masters Limited

Headword:
-

Relevant legal provisions:
EPC Art. 123(2), 54, 56

Keyword:
"Extension beyond the content of the application as filed (main request, no)"
"Novelty (main request, yes)"
"Inventive step (main request, yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 1411/06 **-** 3.2.05

D E C I S I O N
of the Technical Board of Appeal 3.2.05
of 10 June 2008

Appellant: (Opponent)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 22 June 2006 rejecting the opposition filed against European patent No. 0885707 pursuant to Article 102(2) EPC 1973.

Composition of the Board:

Chairman: W. Zellhuber
Members: P. Michel
M. J. Vogel

Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal against the decision of the Opposition Division rejecting the opposition filed against European Patent No. 0 885 707.

II. Oral proceedings were held before the Board of Appeal on 10 June 2008.

III. The appellant requested that the decision under appeal be set aside and that the European Patent No. 0 885 707 be revoked.

The respondent (patentee) requested as main request that the appeal be dismissed, or, as an auxiliary measure, that the decision under appeal be set aside and the patent in suit be maintained on the basis of claims 1 to 10 submitted as Auxiliary Request I on 8 May 2008.

IV. The following documents are referred to in this decision:

D1: US-A-4,588,367
E1: US-A-5,533,882
E2: US-A-3,113,346
E3: US-A-6,159,000

V. Claims 1 and 2 as granted (main request) read as follows:

"1. An injection nozzle (20b) mounted between plates of a hot half assembly for an injection mold (24), comprising:

an elongated nozzle body (48) having a head and a nozzle tip (44a, 44b) and a melt channel (52) extending along a longitudinal axis between said head and said nozzle tip (44a, 44b); a heater (120) located about said nozzle body (48) to heat, in use, said nozzle body (48); a manifold plate (38) having a recess in which the nozzle body (48) is partially located, the manifold plate further supporting a manifold (32) with an outlet (60, 64) against which the head of the nozzle body (48) is arranged to abut in order to receive, in use, melt for direction through the melt channel (52) to the nozzle tip (44a, 44b);

a cover plate (40) coupled to the manifold plate (38), the cover plate (40) configured to allow the nozzle tip (44a, 44b) to protect outwardly therefrom;

a first spacer (68) connected to said nozzle body (48) and having a first response characteristic to pressure applied thereto in parallel to said longitudinal axis, the first spacer (68) having a first end (72) abutting the manifold and a second end (76);

a second spacer (80, 108) to act between the second end (76) of the first spacer (68) and the cover plate (40), said second spacer (80, 108) having a second response characteristic which differs from said first response characteristic, said first (68) and second (80, 108) spacers co-operating, over a selected range of operational temperatures, to provide a sealing force between said head and the outlet (60, 64) of the manifold (32), wherein said second spacer (80, 108) does not contact the manifold (32) and the sealing

force results from compression of the first (68) and second (80, 108) spacers between the manifold (32) and the cover plate (40);

characterized in that:

no structure except said second spacer (80, 108) acts between the second end (76) of the first spacer (68) and the cover plate (40) and the nozzle body (48) and first (68) and second (80) spacers are directly removable from said recess from a cavity side of said manifold plate (38) upon removal of said cover plate (40) from said manifold plate.

"2. An injection nozzle (20b) mounted between plates of a hot half assembly for an injection mold (24), comprising:

an elongated nozzle body (48) having a head and a nozzle tip (44a, 44b) and a melt channel (52) extending along a longitudinal axis between said head and said nozzle tip (44a, 44b); a heater (120) located about said nozzle body (48) to heat, in use, said nozzle body (48);
a manifold plate (38) having a recess in which the nozzle body (48) is partially located, the manifold plate further supporting a manifold (32) with an outlet (60, 64) against which the head of the nozzle body (48) is arranged to abut in order to receive, in use, melt for direction through the melt channel (52) to the nozzle tip (44a, 44b);
a first spacer (68) connected to said nozzle body (48) and having a first response characteristic to

pressure applied thereto in parallel to said longitudinal axis, the first spacer (68) having a first end (72) abutting the manifold and a second end (76);
a second spacer (108) coupled to the second end (76) of the first spacer (68), said second spacer (108) having a second response characteristic which differs from said first response characteristic, said first (68) and second (108) spacers co-operating, over a selected range of operational temperatures, to provide a sealing force between said head and the outlet (60, 64) of the manifold (32), wherein said second spacer (108) does not contact the manifold (32) and the sealing force results from compression of the first (68) and second (108) spacers;

characterized in that:

the second spacer (108) includes a flange (112) adjacent an end of said second spacer (108) remote from the first spacer (68), said flange (112) configured to allow the second spacer (108) to be fixedly mounted to the manifold plate (38), and wherein the nozzle body (48) and first (68) and second (108) spacers are directly removable from said recess from a cavity side of said manifold plate (38) upon dismounting of said second spacer (108) from said manifold plate (38)."

VI. The appellant has argued substantially as follows in the written and oral proceedings in connection with the main request:

The feature of claim 1, according to which "no structure except said second spacer (80, 108) acts between the second end (76) of the first spacer (68) and the cover plate (40)", is not disclosed in the application as filed. It is noted that, according to column 6, lines 20 to 46, of the application as filed, either a single spacer, or more than two spacers may be used.

The term "protect" as used in claim 1 is also not disclosed in the application as filed.

Finally, the subject-matter of claim 4 is also not disclosed in the application as filed.

The requirements of Article 123(2) EPC are thus not satisfied.

The subject-matter of claim 1 according to the main request of the respondent is not new in view of the disclosure of document E1.

It is noted that paragraphs [0022] and [0023] of the patent in suit indicate that the injection nozzle may have either a single spacer or more than two spacers.

In the embodiment of Figure 1 of document E1, the nozzle body is pressed against the manifold plate by means of a sleeve 13, which need not be of a ceramic material, supported on a retaining plate (not numbered). Since the force must be applied as close to the manifold as possible, the person skilled in the art would recognise that the force is applied in this manner and not at the nozzle tip.

The subject-matter of claims 1 and 2 also does not involve an inventive step.

In respect of claim 1, the closest prior art is represented by the embodiment of Figure 4 of document D1. Owing to the presence of a step below the element 40, disassembly of the hot runner is difficult. Document E1, at column 6, lines 17 to 26, suggests a solution to this problem, that is, to enable insertion and removal of the nozzle from the front of the mould plate. In order to facilitate assembly of the hot runner, it would thus be an obvious measure to replace the step, which is the only element preventing such insertion and removal, either by a removable element, such as the retaining plate disclosed in document E1, or by a plate extending beyond the well.

As regards claim 2, document E2 is the closest prior art, showing a nozzle body supported on a member 41 which in turn is supported on a flanged member 26 removable from the front. Whilst sealing is achieved by virtue of the pressure exerted by the melt on the nozzle body, it does not involve an inventive step to use the same design with a different sealing concept.

Alternatively, document D1 could also be regarded as the closest prior art in respect of claim 2, document E2 offering a solution to the problem of facilitating disassembly of the hot runner.

VII. The respondent has argued substantially as follows in the written and oral proceedings in connection with the main request:

The term "protect" as used in claim 1 is an obvious typographic error. The subject-matter of claims 1 and 4 is disclosed in the application as filed. The requirements of Article 123(2) EPC are thus satisfied.

In the embodiments of Figures 1 and 5 of document E1, the nozzle body is pressed against the manifold plate by means of a force applied at the nozzle tip and not through the ceramic sleeve. The force required to seal the nozzle body against the manifold is applied to the nozzle tip so as to achieve not only a seal at the interface, but also between the two parts of the nozzle body.

The retainer plate in the embodiment of Figure 1 is merely present to ensure correct positioning of the sleeve, which acts as a guide for the piston, but not to apply an axial force thereto.

There is thus no disclosure in document E1 of a second spacer arranged as required by claim 1 of the patent in suit, so that the subject-matter of claim 1 is new.

There are a large number of possible solutions to the problem of improving disassembly of the hot runner in the embodiment of Figure 4 of document D1. One possibility is to use a two part nozzle housing as known from document E1.

The subject-matter of claim 1 according to the main request thus involves an inventive step.

Document E2 relates to an injection nozzle in which the pressure of the plastic melt is used to provide a sealing force and thus does not relate to the concept of the present invention. In addition, it does not disclose first and second spacers as defined in claim 2. It thus cannot be regarded as the closest prior art.

Document D1 is also the closest prior art in respect of claim 2. Document E2 does not, however, suggest modifying the injection nozzle of document D1 so as to arrive at the subject-matter of claim 2. In particular, the flange of bushing 26 is not configured to allow the bushing to be fixedly mounted to the manifold plate.

The subject-matter of claim 2 according to the main request thus also involves an inventive step.

Reasons for the Decision

Main Request

1. Amendments

The feature of claim 1, according to which "no structure except said second spacer (80, 108) acts between the second end (76) of the first spacer (68) and the cover plate (40)", is disclosed in the application as filed, in particular in Figures 1 and 3 of the drawings.

It is clear that the term "protect outwardly" as used in claim 1 is intended to read "project outwardly". For

the purposes of this decision, the claim is construed as if this clerical error had been corrected.

As regards claim 4, the subject-matter of this claim is disclosed in the application as filed (published version) at column 7, lines 51 to 53. The threaded outer edge of the flange must be circular.

The requirements of Article 123(2) EPC are thus satisfied.

2. Novelty of claim 1

2.1 Construction of the claim

Claim 1 specifies that the claimed injection nozzle comprises a first spacer connected to the nozzle body having a first end abutting the manifold and a second end, and a second spacer acting between the second end of the first spacer and a cover plate. It is further specified that the second spacer does not contact the manifold, and no structure except the second spacer acts between the second end of the first spacer and the cover plate.

It is thus clear from the wording of the claim itself that the claimed structure comprises two and only two spacers. It is accordingly not necessary to consult the description so as to obtain a clarification of the meaning of the claim.

2.2 Document E1

Document E1 is concerned with a valve gated system for a hot runner. In the embodiment of Figure 1, a valve stem 12 extending into the melt flow channel of a nozzle housing 16 is reciprocated by means of a piston 14 driven by compressed air which slidably engages the outer surface of a sleeve 13 and the inner surface of a bore 24 in a manifold plate 18 (column 3, lines 44 to 62).

As described at column 5, lines 22 to 25, and column 6, lines 42 to 45, of document E1, the sleeve 13 serves to guide piston 14, to align nozzle housing 16, and to insulate the piston 14 from the heat produced in the nozzle housing 16.

In the embodiment of Figure 5, a similar structure is disclosed, in which the piston reciprocates within the sleeve and is spaced from the nozzle housing.

The question of novelty of the subject-matter of claim 1 in view of the disclosure of document E1 turns upon the question of whether or not the sleeve 13 as shown in Figure 1 of document E1 serves the function of the second spacer as specified in claim 1 of the patent in suit in addition to the functions disclosed in document E1.

In order to provide a seal between the nozzle housing 16 and the manifold 31, it is necessary to apply a force to the nozzle housing, so as to press the nozzle housing against the manifold. Document E1 does not,

however, include an explicit disclosure as to how this may be achieved.

It was suggested on behalf of the appellant that it would be implicitly understood by the person skilled in the art that this force is applied to the nozzle housing 16 through the sleeve 13, which is supported on the component referred to in the present proceedings as a retaining plate (no reference numeral) at the lower end of the sleeve 13. Alternatively, as suggested on behalf of the respondent, this force could be applied to the nozzle housing through the nozzle tip, so that the sleeve is not involved in the application of a force to the nozzle housing.

In both embodiments of document E1, the nozzle housing is a two part structure, so as to enable assembly and access to a cross bar 44 and cap 50 which connect the piston to the valve stem. It is thus necessary not only to apply an axial force to the upper part of the nozzle housing, but also to the lower part, in order to provide a seal between the two parts as well as between the upper part and the manifold. This indicates that at least some force must be applied to the nozzle tip so as to provide this sealing force. This force must then pass through the lower part to the upper part, which in turn is pressed against the manifold.

There is thus no indication in document E1 that the sealing force between the nozzle housing 16 and the outlet of the manifold 31 results from pressure applied to the flange of the nozzle housing 16 by the sleeve 13 supported on the retaining plate (no reference numeral) at the lower end of the sleeve 13. Rather, it is just

as likely, if not more so, that the sealing force is applied to the lower end or tip of the nozzle housing.

Whilst document E3 (published after the date of filing of the patent in suit) discloses an injection nozzle in which the sealing force is applied via a spring element 14 and an outer housing 16, this does not provide evidence that this is also the case in the injection nozzle of document E1. Indeed, document E3, assigned to the respondent, could be regarded as relating to an injection nozzle incorporating features of the present invention.

The subject-matter of claim 1 is thus new.

3. Inventive step of claim 1

3.1 Closest Prior Art

The closest prior art is represented by document D1. In the injection nozzle shown in Figure 2 of the drawings, the sealing force between the nozzle body and the manifold (11) is created by thermal expansion of a tubular member (32), which engages a wall (38) of a manifold plate (17) (see column 3, lines 8 to 29). In the embodiment of Figure 4, a Belleville disc (40) is additionally provided between the tubular member (32) and the wall (38).

3.2 Object of the Invention

Such an arrangement suffers from the disadvantage that servicing of the nozzle assembly is inconvenient, owing to the necessity of disassembling the manifold system.

The problem to be solved is thus to facilitate servicing of the nozzle assembly.

3.3 Solution

A solution to this problem is suggested in document E1 at column 6, lines 17 to 26, that is, to arrange for the nozzle assembly to be inserted from the front surface of the nozzle plate. Document E1 does not, however, suggest a modification of the structure of Figure 4 of document D1 which would result in an injection nozzle as specified in claim 1.

As discussed above under point 2.2 above, in connection with the question of novelty, document E1 does not disclose a structure in which an axial force is applied through first and second spacers positioned between a cover plate and the manifold in the manner specified in claim 1. The retaining plate shown in Figure 1 of this document is associated with the sleeve and piston, provided for reciprocating the gating valve, and is not involved with the provision of a force for sealing the nozzle body against the manifold.

Thus, in order to arrive at a structure of the nozzle assembly which can be inserted from the front surface of the nozzle plate, the person skilled in the art is left with a choice as to at which location on the nozzle body an axial force should be applied, for example at or near the nozzle tip.

It is not accepted that the person skilled in the art would automatically select a point on the nozzle body close to the manifold. Indeed, since the point at which

potential leakage of melt between the nozzle body and the manifold may occur is close to the axis of the nozzle body, a point closer to the axis may well also be desirable.

4. Inventive step of claim 2

4.1 Closest Prior Art

It was suggested on behalf of the appellant that document E2 is the closest prior art. This cannot, however, be accepted. In the nozzle arrangement disclosed in this document, hot melt acts on a rear face of the nozzle 30, so as to urge the nozzle into sealing contact with an insulating member 41 mounted in a bushing 26. This document thus does not relate to an injection nozzle incorporating the concept of cooperating spacers which generate a sealing force by compression between the manifold and a cover plate.

Accordingly, document D1 is regarded as representing the closest prior art, as discussed in connection with claim 1 under point 3.1 above.

4.2 Object of the Invention

As stated under point 3.2 above, the problem to be solved is to facilitate servicing of the nozzle assembly.

4.3 Solution

Document E2 is not concerned with this problem, being concerned rather with a novel arrangement for

preventing leakage of plastic melt, exploiting the injecting pressure of the melt itself. In particular, there is no suggestion that the flanged bushing 26 could form part of a spacer arrangement as specified in claim 2.

5. The subject-matter of claims 1 and 2 thus involves an inventive step within the meaning of Article 56 EPC.

6. Claims 3 to 11 are directly or indirectly dependent from claims 1 and 2 and relate to preferred features of the nozzle assembly, so that the subject-matter of these claims similarly involves an inventive step.

7. In view of the fact that the main request of the respondent is allowable, it is not necessary to consider the auxiliary request.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

D. Meyfarth W. Zellhuber