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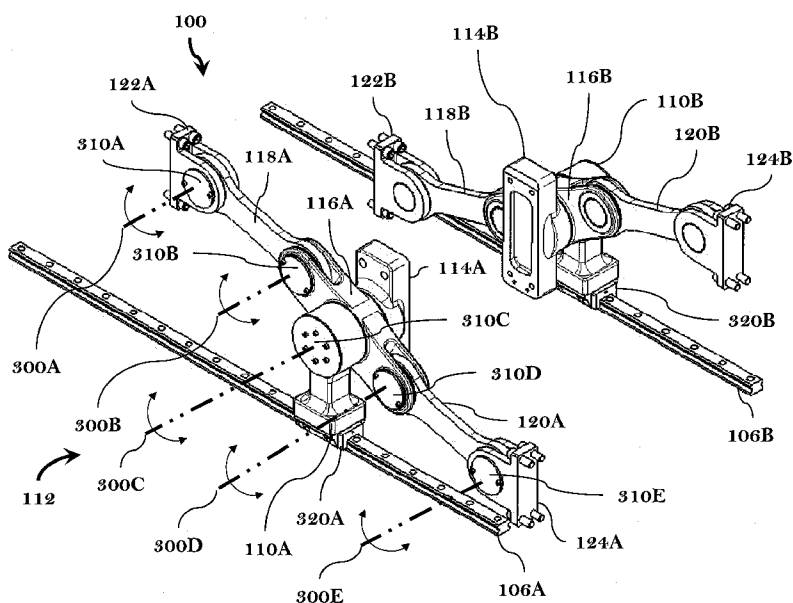


FIG. 2

(57) Abstract: Disclosed is a platen-linkage assembly (112), including: (i) a pair of supports (110A, 110B) being movably guidable along a respective one of a pair of linear-guide rails (106A, 106B), (ii) mold-carrier sections (114A, 114B) being configured to support a mold stack (117); and (iii) a pair of primary links (116A, 116B) being rotatably coupled with and being positioned between a chosen one of: (i) the mold-carrier sections (114A, 114B), and (ii) the pair of supports (110A, 110B).

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PLATEN-LINKAGE ASSEMBLY OF INJECTION-MOLDING SYSTEM**TECHNICAL FIELD**

5 The present invention generally relates to, but is not limited to, molding systems, and more specifically the present invention relates to, but is not limited to, (i) injection-molding systems, and/or (ii) platen-linkage assemblies of injection-molding systems.

BACKGROUND OF THE INVENTION

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Examples of known molding systems are (amongst others): (i) the HyPET (TRADEMARK) Molding System, (ii) the Quadloc (TRADEMARK) Molding System, (iii) the Hylectric (TRADEMARK) Molding System, and/or (iv) the HyMET (TRADEMARK) Molding System, all manufactured by Husky Injection Molding Systems (Location: Canada; Web Site: www.husky.ca).

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United States Patent Number 4,207,051 (Inventor: WRIGHT et al.; Published: 1980-06-10) discloses a stripper arrangement for an injection mold, which has a plate driven via a rack and pinion by a lost motion link to ensure positive stripping.

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United States Patent Number 4,408,981 (Inventor: BROWN; Published: 1983-10-11) discloses an injection molding machine with supported stack mold inner plates, which has an intermediate platen with outrigger arms terminating in part-cylindrical shoes engaging tie-bars.

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United States Patent Number 5,354,196 (Inventor: ZIV-AV et al.; Published: 1998-01-13) discloses a tie bar-less clamp mechanism for an injection molding machine, which has platens mounted by pivots to separate a base and clamping frames.

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United States Patent Number 5,707,666 (Inventor: DISIMONE et al.; Published: 1998-01-13) discloses an injection molding machine that is configured to support a stack mold that has a number of molding stations. The injection molding machine includes structure for supporting sets of mold plates and primary and secondary motion means in the form of linked arms for opening and closing all the molds simultaneously with uniform strokes.

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United States Patent Number 6,155,811 (Inventor: LOOIJIE et al.; Published: 12/5/2000) discloses a carrier assembly for supporting a mold center section of a stack mold. The carrier

assembly has a pair of mold supports to which the mold center section can be attached. Each mold support is movable along a linear rail attached to the base of a molding machine and has at least one block containing a linear bearing mounted thereto for engaging the linear rail. Each mold support further includes a linkage assembly for connecting the mold support to other platens so as to synchronize movement of each mold support with movement of at least one other platen.

United States Patent Number 6,503,075 (Inventor: SCHAD et al.; Published: 2003-01-07) discloses a stack mold injection molding machine for molding articles, which includes a stack mold system including a carrier assembly with two mold supports, an actuator and a rotary union.

United States Patent Number 7,125,247 (Inventor: GLAESNER et al.; Published: 2006-10-24) discloses a linkage assembly for opening and closing a level stack mold, which includes two short pivoting arms connected to an anchor point, extending arms pivotally connected to carriers at its midpoint, and pair of arms extending between each assembly.

United States Patent Number 7,229,268 (Inventor: DISIMONE; Published: 2007-06-12) discloses a mold set guidance system for an injection molding machine, which has: (i) slightly raised surface on guide slots, that initially moves a core plate away from a machine face, and (ii) a wedge shaped portion at base of the guide slots.

United States Patent Application Number US 2006/0263470 (Inventor: VANDERPLOEG et al.; Published: 2006-11-23) discloses, at paragraph 57: "a side view of the FIG. 2 embodiment showing the mold halves in the closed position. The figure shows the servo motors, the core plate, the cores, the cavity plate, the hot runner plates, and the hot runner. Secondary harmonic linkages are used transfer motion among the several pairs of mold core/cavity plates to ensure properly timed opening/closing of the mold plates."

United States Patent Application Number US 2007/0213868 (Inventor: MORTAZAVI et al.; Published: 9/13/2007) discloses a system that includes a mold-moving assembly that is cooperative with an insert-forming station to form an insert at least in part. The mold-moving assembly is also cooperative with an overmolding station to overmold another insert previously formed by the insert-forming station in cooperation with the mold-moving assembly. The mold-moving assembly, when so actuated, moves inserts between the insert-forming station and the

overmolding station. Operation of the insert-forming station and operation of the overmolding station overlap one another at least in part.

United States Patent Application Number US 2007/0250207 (Inventor: MACDONALD et al.;
5 Published: 10/25/2007) discloses a system including a mold-moving assembly configured to:
cooperate with a molding station to mold a molded article, cooperate with an insert-integration
station to integrate an insert with the molded article that was molded by the molding station in
cooperation with the mold-moving assembly, and move molded articles between the molding
station and the insert-integration station.

SUMMARY OF THE INVENTION

According to a first aspect of the present invention, there is provided a platen-linkage assembly
(112), including: (i) a pair of supports (110A, 110B) being movably guidable along a respective
15 one of a pair of linear-guide rails (106A, 106B), (ii) mold-carrier sections (114A, 114B) being
configured to support a mold stack (117); and (iii) a pair of primary links (116A, 116B) being
rotatably coupled with and being positioned between a chosen one of: (i) the mold-carrier
sections (114A, 114B), and (ii) the pair of supports (110A, 110B).

20 A technical effect, amongst other technical effects, of the aspects of the present invention is
improved footprint options for injection-molding systems.

BRIEF DESCRIPTION OF THE DRAWINGS

25 A better understanding of the non-limiting embodiments of the present invention (including
alternatives and/or variations thereof) may be obtained with reference to the detailed description
of the non-limiting embodiments along with the following drawings, in which:

FIG. 1 depicts perspective view of an injection-molding system 100 (hereafter "system 100")
30 and a platen-linkage assembly 112 (hereafter the "assembly 112") according to a first
non-limiting embodiment;

FIG. 2 depicts a perspective view of the assembly 112 according to a second non-limiting
embodiment;

FIG. 3 depicts a top view of the system 100 of FIG. 1 in a mold-open case; and

35 FIG. 4 depicts a top view of the system 100 of FIG. 1 in a mold-closed case.

The drawings are not necessarily to scale and are sometimes illustrated by phantom lines, diagrammatic representations and fragmentary views. In certain instances, details that are not necessary for an understanding of the embodiments or that render other details difficult to perceive may have been omitted.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

The system **100** may include components that are known to persons skilled in the art, and these known components will not be described here; these known components are described, at least in part, in the following text books (by way of example): (i) *“Injection Molding Handbook”* by Osswald/Turng/Gramann (ISBN: 3-446-21669-2; publisher: Hanser), (ii) *“Injection Molding Handbook”* by Rosato and Rosato (ISBN: 0-412-99381-3; publisher: Chapman & Hill), and/or (iii) *“Injection Molding Systems”* 3rd Edition by Johannaber (ISBN 3-446-17733-7).

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FIGS. 1 and 2 depict the perspective views of the system **100** and of the assembly **112**. It will be appreciated that the system **100** and the assembly **112** may be sold together or sold separately. The system **100** includes (amongst other things): (i) the assembly **112**, (ii) a stationary platen **102**, (iii) a pair of linear-guide rails **106A**, **106B** (from time to time hereafter referred to as the “rails **106A**, **106B**”), and (iv) a movable platen **108**. The stationary platen **102** has a stationary mold-support face **104** (hereafter referred to as the “face **104**”). The movable platen **108** has a movable mold-support face **111** (hereafter referred to as the “face **111**”). The face **111** is oriented toward the face **104**. The rails **106A**, **106B** are positioned such that the rails **106A**, **106B** extend between the stationary platen **102** and the movable platen **108**, so that (preferably) the rails **106A**, **106B** are positioned in a spaced-apart, parallel arrangement relative to each other. A platen-stroking actuator (not depicted, but known) is coupled to the movable platen **108**, so that the movable platen **108** may be linearly movable along the rails **106A**, **106B** relative to the stationary platen **102** between the mold-opened case and the mold-closed case (which are depicted in FIGS. 3 and 4 respectively).

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The assembly **112** includes (amongst other things): (i) a pair of supports **110A**, **110B** (from time to time hereafter referred to as the “supports **110A**, **110B**”) that are offset from each other, (ii) mold-carrier sections **114A**, **114B**, (iii) a pair of primary links **116A**, **116B** (from time to time hereafter referred to as the “primary links **116A**, **116B**”), (iv) a first pair of secondary links **118A**, **118B** (from time to time hereafter referred to as the “secondary links **118A**, **118B**”), and (v) a second pair of secondary links **120A**, **120B** (from time to time hereafter referred to as the “secondary links **120A**, **120B**”). The supports **110A**, **110B** are guidable and/or movable (that is,

linearly translatable) along a respective one of the pair of linear-guide rails **106A**, **106B**. That is, the support **110A** and the support **110B** are movably guidable along the rail **106A** and the rail **106B**, respectively, between the stationary platen **102** and the movable platen **108**. Linear-guide blocks **320A**, **320B** are positioned between the supports **110A**, **110B** and the rails **106A**, **106B**, respectively. The mold-carrier section **114A** is rotatably coupled with: (i) the support **110A**, and (ii) the support **110A**. The mold-carrier section **114B** is rotatably coupled with: (i) the support **110B**, and (ii) the support **110B**. It is understood that if it is desired so that the mold-carrier sections **114A** and **114B** do not rotate, so as to prevent the mold stack **117** from spinning or rotating about a horizontal axis, then the mold-carrier sections **114A** and **114B** do not rotate. However, if it is desired so that the mold-carrier sections **114A** and **114B** do rotate, so as to cause the mold stack **117** to spin about a horizontal axis, then the mold-carrier sections **114A** and **114B** do rotate and additional ancillary mechanisms may be required to align the mold stack **117** with its mating mold halves.

The mold-carrier sections **114A**, **114B** are configured to couple with a mold stack **117** (which is depicted in FIGS. 3 and 4) so that the mold stack **117** is supported by the mold-carrier sections **114A**, **114B**. In this arrangement once the mold-carrier sections **114A**, **114B** are linearly moved along the rails **106A**, **106B**, the mold stack **117** may be linearly moved as well. The pair of primary links **116A**, **116B** is rotatably coupled with (and is positioned between) a chosen one of: (i) the mold-carrier sections **114A**, **114B**, and (ii) the pair of supports **110A**, **110B**. Specifically, the primary link **116A** is: (i) rotatably coupled with the mold-carrier section **114A**, and (ii) positioned between the mold-carrier section **114A** and the support **110A**. In addition, the primary link **116B** is: (i) rotatably coupled with the mold-carrier section **114B**, and (ii) positioned between the mold-carrier section **114B** and the support **110B**. The first pair of secondary links **118A**, **118B** is rotatably coupled with: (i) the stationary platen **102**, and (ii) one end of the pair of primary links **116A**, **116B**. That is, the secondary link **118A** is rotatably coupled with: (i) the primary link **116A**, and (ii) the stationary platen **102**. The secondary link **118B** is rotatably coupled with: (i) the primary link **116B**, and (ii) the stationary platen **102**. The second pair of secondary links **120A**, **120B** is rotatably coupled with: (i) the movable platen **108**, and (ii) one end of the pair of primary links **116A**, **116B**. That is, the secondary link **120A** is rotatably coupled with: (i) the primary link **116A**, and (ii) the stationary platen **102**. The secondary link **120B** is rotatably coupled with: (i) the primary link **116B**, and (ii) the stationary platen **102**.

The assembly **112** further includes (amongst other things): (i) a primary pair of clevises **122A**, **122B** (from time to time hereafter referred to as the “primary clevises **122A**, **122B**”), and (ii) a secondary pair of clevises **124A**, **124B** (from time to time hereafter referred to as the “secondary clevises **124A**, **124B**”). The primary pair of clevises **122A**, **122B** are: (i) connected with the face **104** of the stationary platen **102**, and (ii) rotatably coupled with a selected one of the first pair of secondary links **118A**, **118B**. That is, the primary clevis **122A** is rotatably coupled with the secondary link **118A**, the primary clevis **122B** is rotatably coupled with the secondary link **118B**, and the primary clevises **122A**, **122B** are connected with the face **104** of the stationary platen **102**. Once so mounted to the face **104**, the primary clevis **122A** is offset from the primary clevis **122B**. The secondary pair of clevises **124A**, **124B** are: (i) connected with the face **111** of the movable platen **108**, and (ii) rotatably coupled with a selected one of the second pair of secondary links **120A**, **120B**. That is, the secondary clevis **124A** is rotatably coupled with the secondary link **120A**, the secondary clevis **124B** is rotatably coupled with the secondary link **120B**, and the secondary clevises **124A**, **124B** are connected with the face **111** of the movable platen **108**. Once so mounted to the face **111**, the secondary clevis **124A** is offset from the secondary clevis **124B**. The primary clevises **122A**, **122B** and the secondary clevises **124A**, **124B** are U-shaped devices having prongs, and the prongs define a hole at the end of each prong through which a pin or bolt may be pushed to secure another part in place.

The primary clevis **122A** and the secondary link **118A** rotate at a rotation axis **300A** associated with a pivot **310A**. The secondary link **118A** and the primary link **116A** rotate at a rotation axis **300B** associated with a pivot **310B**. A central region of the primary link **116A** rotates at a rotation axis **300C** associated with a pivot **310C**. The secondary link **120A** and the primary link **116A** rotate at a rotation axis **300D** associated with a pivot **310D**. The secondary clevis **124A** and the secondary link **120A** rotate at a rotation axis **300E** associated with a pivot **310E**. The same arrangement, as described above, exists for corresponding elements of the assembly **112**: that is, the rotation arrangement is the same for: (i) the primary clevis **122B** and the secondary link **118B**, (ii) the secondary link **118B** and the primary link **116B**, (iii) a central region of the primary link **116B**, (iv) the secondary link **120B** and the primary link **116B**, and (v) the secondary clevis **124B** and the secondary link **120B**.

FIG. 3 depicts the top view of the system **100** of FIG. 1 in the mold-open case. The mold stack **117** cooperates with: (i) a stationary mold **216A** that is mounted with the face **104** of the stationary platen **102**, and (ii) a movable mold **216B** that is mounted with the face **111** of the movable platen **108**. As depicted in FIG. 3, the stationary mold **216A** is offset from the mold

stack 117, and the mold stack 117 is offset from the movable mold 216B so that in the mold-open case, molded articles may be removed from the stationary mold 216A and the movable mold 216B. That is, the molded articles may be ejected or removed either by robot (not depicted, but known) or by ejection mechanisms (not depicted, but known).

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A technical effect of the assembly 112 (of amongst others) is that the assembly 112 is positioned relative to (or cooperative with) the stationary platen 102 and the movable platen 108 such that a system footprint 200 associated with the system 100 is at most a width (or side-to side length) of the stationary platen 102 and the movable platen 108. That is (more specifically), the assembly 112 is so positioned and so moved (along the rails 106A, 106B) that the assembly 112 remains within the width of the stationary platen 102 and the movable platen 108, and in this manner the system footprint 200 is minimized.

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Another technical effect of the assembly 112 (of amongst others) is that a mold footprint 210 that is associated with the mold stack 117, the stationary mold 216A and the movable mold 216B may be arranged to be less than a side-to-side width (or side-to-side length) of the assembly 112. Specifically, the side-to-side width of the assembly 112 is arranged so as to maximize the side to side width of the mold footprint 210 while minimizing the system footprint 200.

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In operation, the transition from the mold-open case (as depicted in FIG. 3) to the mold-closed case (as depicted in FIG. 4) includes (amongst other things) the following sequence: initially the movable platen 108 is offset and spaced apart from the stationary platen 102. The movable platen 108 is linearly stroked toward the stationary platen 102, so that the movable platen 108 pushes against the secondary links 120A, 120B, and this action causes: (A) the secondary links 120A, 120B to rotate relative to the movable platen 108, and (B) the primary links 116A, 116B to rotate relative to the secondary links 120A, 120B. In this manner, the primary links 116A, 116B and the secondary links 120A, 120B become oriented from a stretched position to an outstretched position. In response to the primary links 116A, 116B being rotated, the secondary links 118A, 118B become rotated relative to the stationary platen 102, so that the supports 110A, 110B (along with the mold stack 117 that is attached to the supports 110A, 110B) are linearly moved toward the stationary platen 102 until the stationary mold 216A the movable mold 216B are shut or closed against the mold stack 117 (so that then molded article may then be manufactured).

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FIG. 4 depicts the top view of the system **100** of FIG. 1 in the mold-closed case. As depicted in FIG. 4, the stationary mold **216A** abuts the mold stack **117**, and the mold stack **117** abuts the movable mold **216B**, so that in this case mold cavities are defined, which permits molded articles to be molded once an injection unit **220** (of the system **100**) injects a molten molding material into the mold cavities. The mold cavities may be defined by the combination of: (i) the stationary mold **216A**, the movable mold **216B**, and/or (iii) the mold stack **117** (that is, once these components are closed together in the mold-closed position as depicted in FIG. 4). In operation, the transition from the mold-closed case (as depicted in FIG. 4) to the mold-open case (as depicted in FIG. 3) includes (amongst other things) the following sequence: the movable platen **108** is moved away from the stationary platen **102** so that the movable platen **108** causes the secondary links **120A**, **120B** to become rotated in a manner such that the secondary links **120A**, **120B** and the primary links **116A**, **116B** are oriented from the outstretched position to the stretched position; in response, the supports **110A**, **110B** become pulled toward the movable platen **108**, and the secondary links **118A**, **118B** become rotated relative to the primary links **116A**, **116B**. The movable platen **108** is moved until the stationary mold **216A** the movable mold **216B** becomes offset from each other enough so that the molded articles may be removed or ejected from the stationary mold **216A**, the movable mold **216B** and/or the mold stack **117**.

The description of the non-limiting embodiments provides non-limiting examples of the present invention; these non-limiting examples do not limit the scope of the claims of the present invention. The non-limiting embodiments described are within the scope of the claims of the present invention. The non-limiting embodiments described above may be: (i) adapted, modified and/or enhanced, as may be expected by persons skilled in the art, for specific conditions and/or functions, without departing from the scope of the claims herein, and/or (ii) further extended to a variety of other applications without departing from the scope of the claims herein. It is understood that the non-limiting embodiments illustrate the aspects of the present invention. Reference herein to details and description of the non-limiting embodiments is not intended to limit the scope of the claims of the present invention. Other non-limiting embodiments, which may not have been described above, may be within the scope of the appended claims. It is understood that: (i) the scope of the present invention is limited by the claims, (ii) the claims themselves recite those features regarded as essential to the present invention, and (ii) preferable embodiments of the present invention are the subject of dependent claims. Therefore, what is protected by way of letters patent are limited only by the scope of the following claims:

WHAT IS CLAIMED IS:

1. A platen-linkage assembly (112), comprising:
 - a pair of supports (110A, 110B) being movably guidable along a respective one of a pair of linear-guide rails (106A, 106B);
 - mold-carrier sections (114A, 114B) being configured to: (i) support a mold stack (117), and (ii) rotatably couple with a chosen one of the pair of supports (110A, 110B);
 - a pair of primary links (116A, 116B) being rotatably coupled with and being positioned between a selected one of: (i) the mold-carrier sections (114A, 114B), and (ii) the pair of supports (110A, 110B);
 - a first pair of secondary links (118A, 118B) being rotatably coupled with: (i) a stationary platen (102), and (ii) one of the pair of primary links (116A, 116B), the first pair of secondary links (118A, 118B) being rotatably coupled with a stationary mold-support face (104) of the stationary platen (102); and
 - a second pair of secondary links (120A, 120B) being rotatably coupled with: (i) a movable platen (108), and (ii) one of the pair of primary links (116A, 116B), the second pair of secondary links (120A, 120B) being rotatably coupled with a movable mold-support face (111) of the movable platen (108).
2. The platen-linkage assembly (112) of claim 1, further comprising:
 - a primary pair of clevises (122A, 122B) being: (i) connected with the stationary platen (102), and (ii) rotatably coupled with a selected one of the first pair of secondary links (118A, 118B).
3. The platen-linkage assembly (112) of claim 1, further comprising:
 - a secondary pair of clevises (124A, 124B) being: (i) connected with the movable platen (108), and (ii) rotatably coupled with a selected one of the second pair of secondary links (120A, 120B).
4. The platen-linkage assembly (112) of claim 1, further comprising:
 - a primary pair of clevises (122A, 122B) being: (i) connected with the stationary platen (102), and (ii) rotatably coupled with a selected one of the first pair of secondary links (118A, 118B); and

a secondary pair of clevises (124A, 124B) being: (i) connected with the movable platen (108), and (ii) rotatably coupled with a selected one of the second pair of secondary links (120A, 120B).

5. The platen-linkage assembly (112) of claim 1, wherein:

the mold stack (117) cooperates with: (i) a stationary mold (216A) that is mounted with the stationary mold-support face (104) of the stationary platen (102), and (ii) a movable mold (216B) that is mounted with the movable mold-support face (111) of the movable platen (108).

6. The platen-linkage assembly (112) of claim 1, wherein:

the mold stack (117) cooperates with: (i) a stationary mold (216A) that is mounted with the stationary mold-support face (104) of the stationary platen (102), and (ii) a movable mold (216B) that is mounted with the movable mold-support face (111) of the movable platen (108),

the platen-linkage assembly (112) is so positioned relative to the stationary platen (102) and the movable platen (108) such that:

a system footprint (200) associated with an injection-molding system (100) is at most a width of the stationary platen (102) and the movable platen (108)

7. The platen-linkage assembly (112) of claim 1, wherein:

the mold stack (117) cooperates with: (i) a stationary mold (216A) that is mounted with the stationary mold-support face (104) of the stationary platen (102), and (ii) a movable mold (216B) that is mounted with the movable mold-support face (111) of the movable platen (108),

the platen-linkage assembly (112) is so positioned relative to the stationary platen (102) and the movable platen (108) such that: (i) a system footprint (200) associated with an injection-molding system (100) is at most a width of the stationary platen (102) and the movable platen (108), and (ii) a mold footprint (210) that is associated with the mold stack (117), the stationary mold (216A) and the movable mold (216B) is less than a side-to-side width of the platen-linkage assembly (112) so as to maximize the mold footprint (210) while minimizing the system footprint (200).

8. The platen-linkage assembly (112) of claim 1, wherein:

the mold stack (117) cooperates with: (i) a stationary mold (216A) that is mounted with the stationary mold-support face (104) of the stationary platen (102), and (ii) a movable mold (216B) that is mounted with the movable mold-support face (111) of the movable platen (108), the platen-linkage assembly (112) is so positioned relative to the stationary platen (102) and the

movable platen (108) such that: (i) a system footprint (200) associated with an injection-molding system (100) is at most a width of the stationary platen (102) and the movable platen (108), and (ii) a mold footprint (210) that is associated with the mold stack (117), the stationary mold (216A) and the movable mold (216B) is less than a side-to-side width of the platen-linkage assembly (112) so as to maximize the mold footprint (210) while minimizing the system footprint (200).

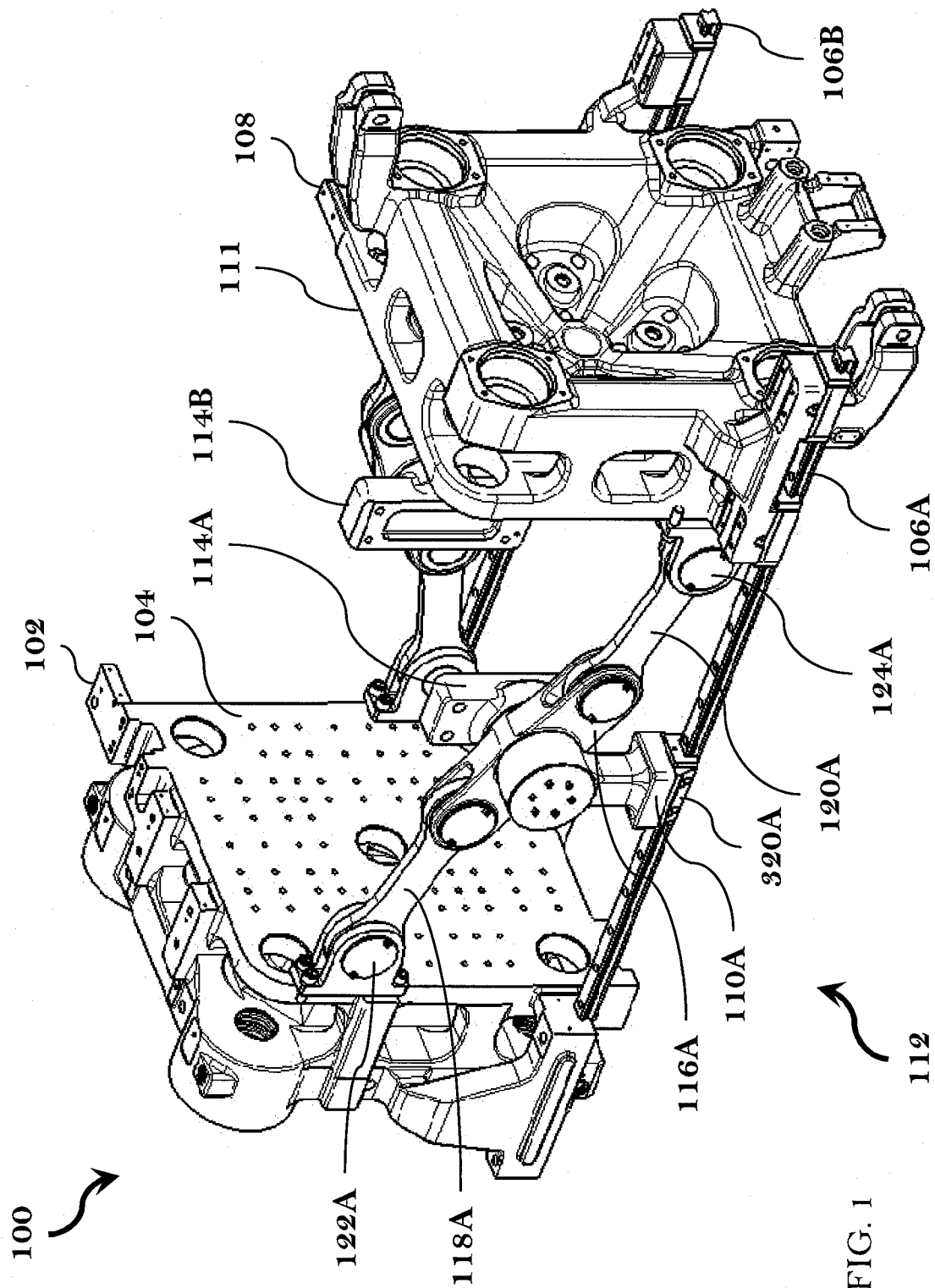
9. The platen-linkage assembly (112) of claim 1, further comprising:

a primary pair of clevises (122A, 122B) being: (i) connected with the stationary platen (102), and (ii) rotatably coupled with a selected one of the first pair of secondary links (118A, 118B); and

a secondary pair of clevises (124A, 124B) being: (i) connected with the movable platen (108), and (ii) rotatably coupled with a selected one of the second pair of secondary links (120A, 120B),

the mold stack (117) cooperates with: (i) a stationary mold (216A) that is mounted with the stationary mold-support face (104) of the stationary platen (102), and (ii) a movable mold (216B) that is mounted with the movable mold-support face (111) of the movable platen (108), the platen-linkage assembly (112) is so positioned relative to the stationary platen (102) and the movable platen (108) such that: (i) a system footprint (200) associated with an injection-molding system (100) is at most a width of the stationary platen (102) and the movable platen (108), and (ii) a mold footprint (210) that is associated with the mold stack (117), the stationary mold (216A) and the movable mold (216B) is less than a side-to-side width of the platen-linkage assembly (112) so as to maximize the mold footprint (210) while minimizing the system footprint (200).

10. An injection-molding system (100) having the platen-linkage assembly (112) of claim 1.



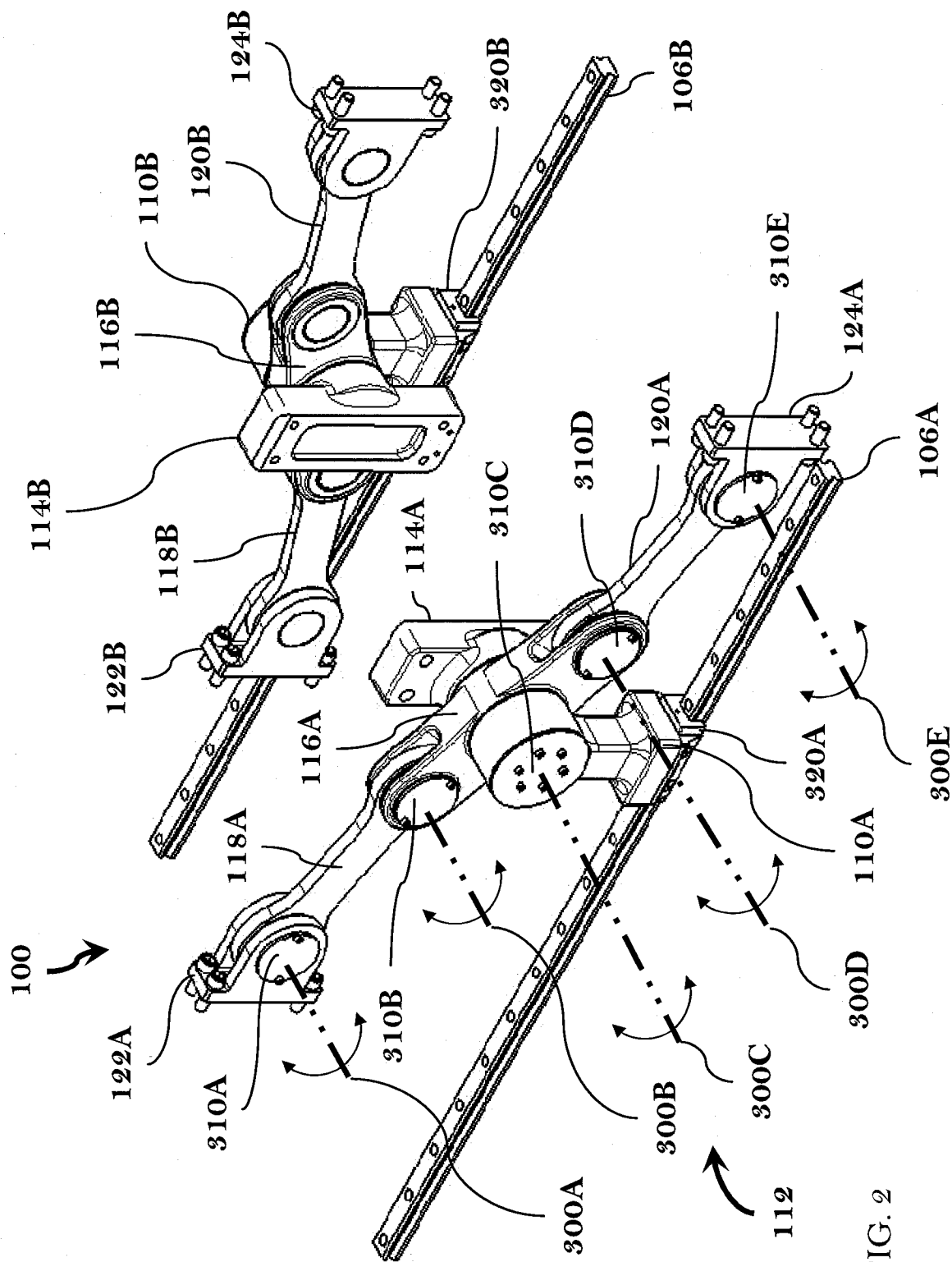
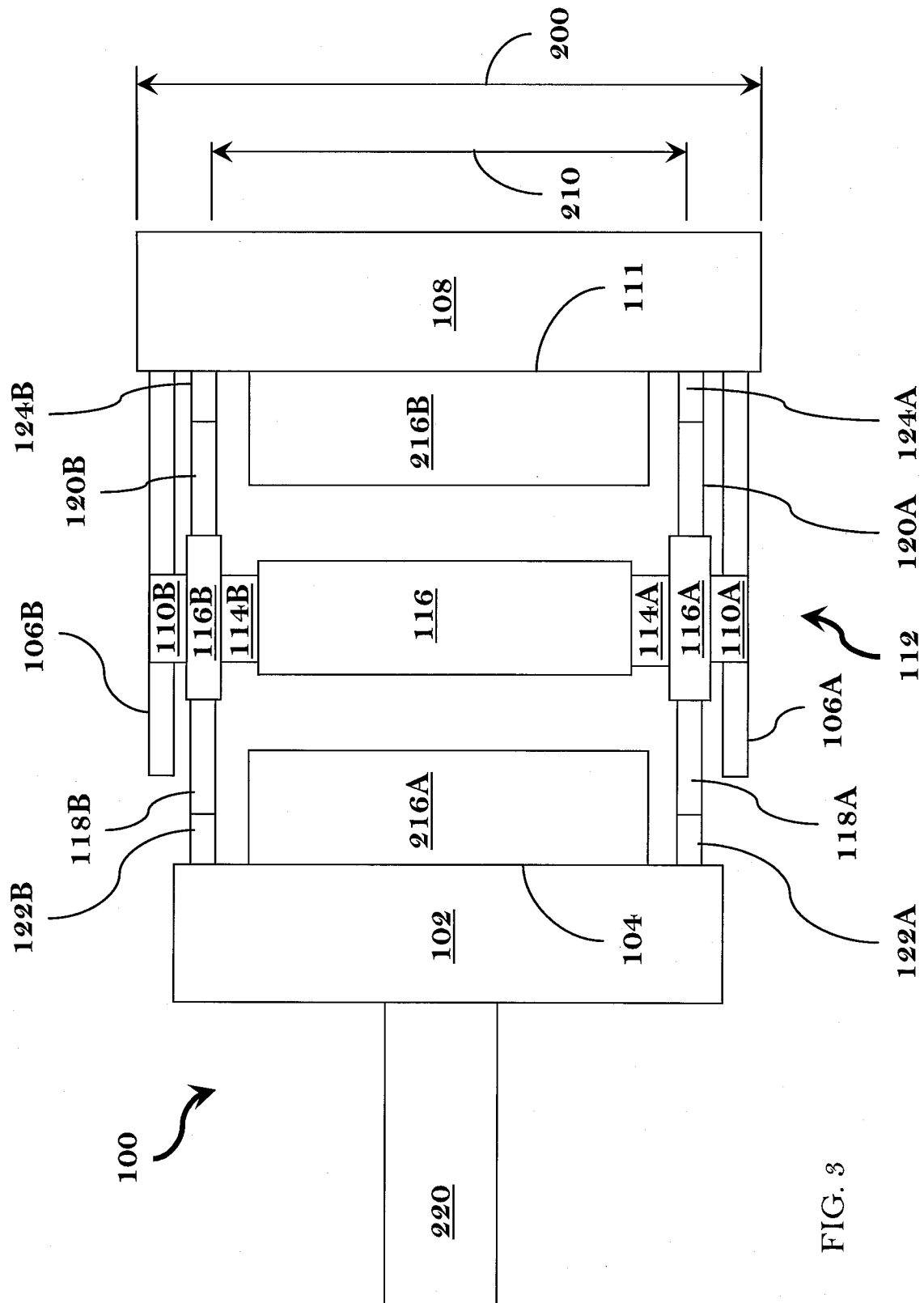
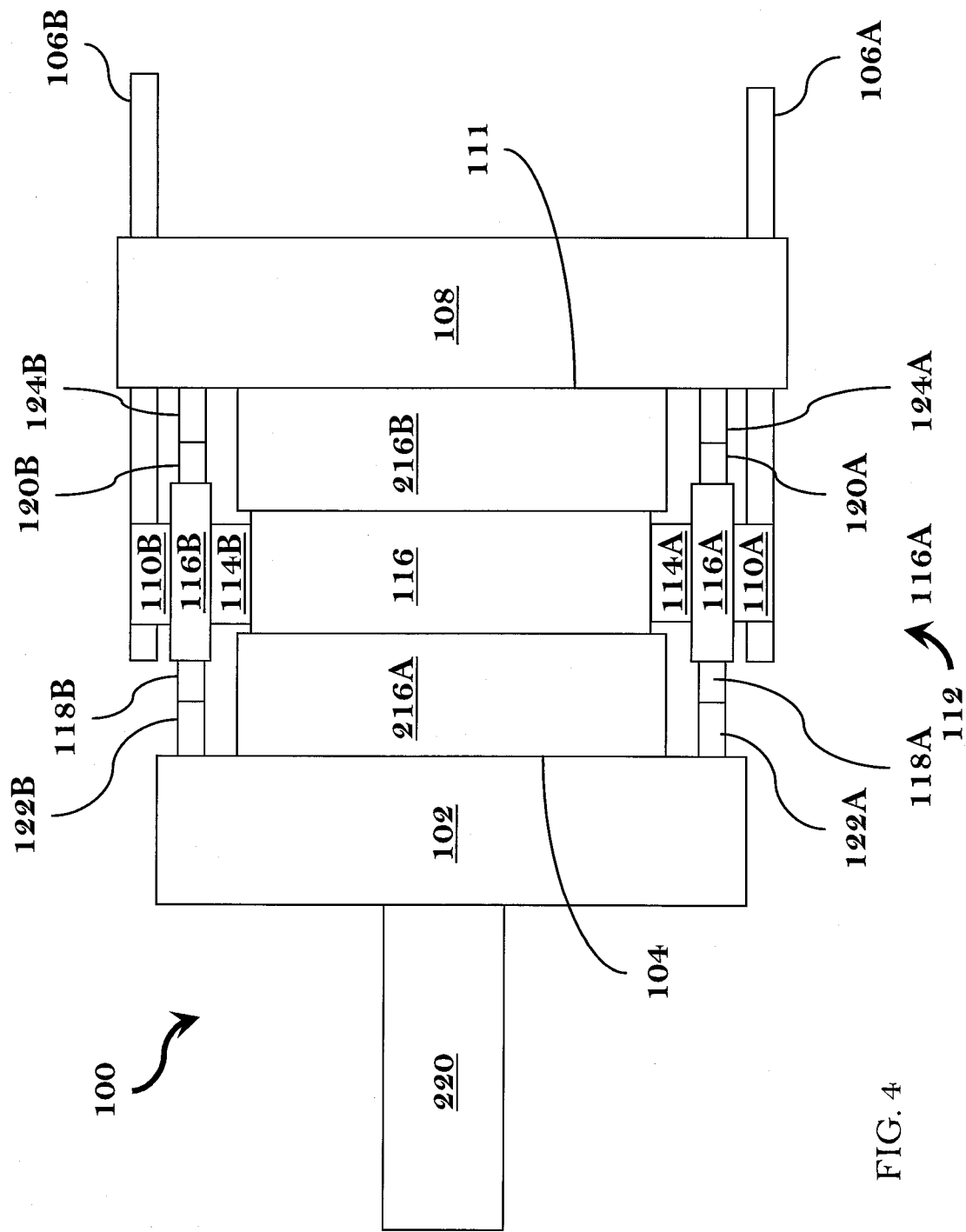


FIG. 2





INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2008/002057

A. CLASSIFICATION OF SUBJECT MATTER

IPC: **B29C 45/17** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: **B29C** (2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)

Delphion, Derwent, CPD with key words, such as: stack mold/mould, stack molding/moulding machine, platen, linkage and clevis

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6503075 B1 (SCHAD, R. D. et al.) 7 January 2003 (07-01-2003) *cited by applicant* *whole document*	1 - 10

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

11 February 2009 (11-02-2009)

Date of mailing of the international search report

25 February 2009 (25-02-2009)

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Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
US 6,503,075 B1	07-01-2003	AU 7226701A	04-03-2002
		TW 495427B	21-07-2002
		WO 0216109A1	28-02-2002