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(54) **Title**: MOLD-TOOL SYSTEM COMPRISING RE-FLOWING MEANS CONFIGURED TO RE-FLOW RESIN TRAPPED BETWEEN MOLD GATE AND VALVE-STEM ASSEMBLY

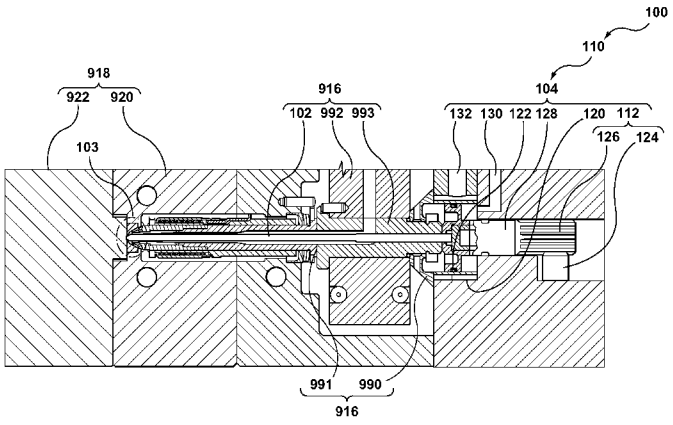

FIG. 2

(57) **Abstract**: A mold-tool system (100), comprising: re-flowing means (110) being configured to re-flow a resin being trapped between a mold gate (103) and a valve-stem assembly (102), so that the resin reflows from between the mold gate (103) and the valve-stem assembly (102), and the re-flowing means (110) reduces, at least in part, formation of a crown flash (200) on a surface of a molded article (210).

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MOLD-TOOL SYSTEM COMPRISING RE-FLOWING MEANS CONFIGURED TO RE-FLOW RESIN TRAPPED BETWEEN MOLD GATE AND VALVE-STEM ASSEMBLY

TECHNICAL FIELD

Aspects generally relate to (and not limited to) mold-tool systems including (and not limited to) molding systems.

SUMMARY

The inventors have researched a problem associated with known molding systems that inadvertently manufacture bad-quality molded articles or molded parts. After much study, the inventor believes he has arrived at an understanding of the problem and its solution, which are stated below with reference to FIG. **1**.

In order to overcome the problems, at least in part, there is provided (generally speaking), a mold-tool system (**100**), comprising: re-flowing means (**110**) being configured to re-flow a resin being trapped between a mold gate (**103**) and a valve-stem assembly (**102**), so that the resin reflows from between the mold gate (**103**) and the valve-stem assembly (**102**), and the re-flowing means (**110**) reduces, at least in part, formation of a gate vestige (**200**) on a surface of a molded article (**210**).

Other aspects and features of the non-limiting embodiments may now become apparent to those skilled in the art upon review of the following detailed description of the non-limiting embodiments with the accompanying drawings.

DETAILED DESCRIPTION OF THE DRAWINGS

The non-limiting embodiments may be more fully appreciated by reference to the following detailed description of the non-limiting embodiments when taken in conjunction with the accompanying drawings, in which:

FIG. **1** depicts an example schematic representation of a mold gate (**3**) associated with the prior art;

FIG. **2** depicts an example schematic representation of the mold-tool system (**100**);

FIG. **3** depicts another example schematic representation of the mold-tool system (**100**) of FIG. **2**; and

FIG. **4** depicts an example schematic representation of a molding system (**900**) having the mold-tool system (**100**) of FIG. **2**.

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

DETAILED DESCRIPTION OF THE NON-LIMITING EMBODIMENT(S)

FIG. **1** depicts the example schematic representation (cross-sectional view) of the mold gate (**3**). Referring now to FIG. **1**, for the case where a resin (**5**) is located between the valve-stem assembly (**102**) and the mold gate (**103**) has been cooled enough that the resin (**5**) remains viscous enough that the valve-stem assembly (**102**) cannot force the resin (**5**) out from the mold gate (**103**) and into a mold cavity of a mold assembly (not depicted), the resin (**5**) is located or positioned between the mold gate (**103**) and the valve-stem assembly (**102**). The resin (**5**) is a partially solidified film that creates a potential for pulling out a crown flash (**200**) from the molded article (**10**). A melt channel (**4**) is defined between the valve-stem assembly (**2**) and the mold gate (**3**). The mold gate (**3**) is an entranceway to a mold assembly that receives the resin.

More specifically, the film of resin (**5**) is located or positioned in an interface between the mold gate (**3**) and the valve-stem assembly (**2**). For example, the interface is located between a gate taper of the mold gate (**3**) and a stem taper of the valve-stem assembly (**2**). As a result, some of the resin (**5**) may be pulled or stretched out of the interface between the mold gate (**3**) and the valve-stem assembly (**2**), and some resin may be left on the molded article as a crown flash (**200**) on a surface of the molded article (**10**) that was molded by the mold assembly (not depicted). The crown flash (**200**) may also be called a remnant or a vestige. The crown flash (**200**) is unwanted or undesired feature that detracts from the cosmetic look of the molded article (**10**). It is desired to minimize, at least in part. the appearance of the crown flash (**200**).

FIG. **2** depicts an example schematic representation (cross-sectional view) of the mold-tool system (**100**). Generally speaking, in the broadest possible terms, the mold-tool system (**100**) includes (and is not limited to): a re-flowing means (**110**). The re-flowing means (**110**) is configured to re-flow a resin that is trapped between a mold gate (**103**) and a valve-stem assembly (**102**), so that the resin reflows (and is displaced) from between the mold gate (**103**) and the valve-stem assembly (**102**). The re-flowing means (**110**) reduces (at least in part) formation of a crown flash (**200**) on a surface of a molded article (**210**). The crown flash (**200**) may also be called a crown flash. Examples of the re-flowing means (**110**) are described further below. Without specific limitation to the re-flowing means (**110**), the valve-stem assembly (**102**) is configured to be positioned in a resin no-flow position and a resin-flow position relative to the mold gate (**103**). The resin no-flow position may also be called a gate-closed position. The resin-flow position may be called a gate-open position. In the resin no-flow position, the valve-stem assembly (**102**) is set apart from the mold gate (**103**). In a resin-flow position, the valve-stem assembly (**102**) is adjacent, at least in part, to the mold gate (**103**). FIG. **3** depicts an example of valve-stem assembly (**102**) placed in the resin no-flow position. FIG. **2** depicts an example of the valve-stem assembly (**102**) placed in the resin-flow position.

According to an option, the mold-tool system (**100**) includes (and it not limited to) a combination of both the valve-stem assembly (**102**) and the re-flowing means (**110**). The valve-stem assembly (**102**) is movable relative to the mold gate (**103**). The re-flowing means (**110**) is configured to re-flow the resin that is trapped between the mold gate (**103**) and the valve-stem assembly (**102**). In this way, the resin is displaced from between the mold gate (**103**) and the valve-stem assembly (**102**), and thus reduce formation of a crown flash (**200**) on an outer surface of a molded article (**210**). The crown flash (**200**) is depicted in FIG. **3**.

By way of a specific non-limiting example, the re-flowing means (**110**) is configured generate and apply a localized frictional heat to the resin located between the valve-stem assembly (**102**) and the mold gate (**103**). The heat transmitted to the resin may be used to allow the resin to become softened and to re-flow and leave the interface between the mold gate (**103**) and the valve-stem assembly (**102**).

By way of a specific non-limiting example, the re-flowing means (**110**) includes (and is not limited to): an actuator mechanism (**104**). The actuator mechanism (**104**) is coupled, either directly or indirectly, to the valve-stem assembly (**102**).

The actuator mechanism (**104**) is configured to move (generally speaking) the valve-stem assembly (**102**) for a case where the valve-stem assembly (**102**) has been positioned in the resin no-flow position. The actuator mechanism (**104**) is configured to linear translate and/or rotate the valve-stem assembly (**102**). The valve-stem assembly (**102**), which is moved by the actuator mechanism (**104**), is configured to generate localized friction heating of the resin located between the valve-stem assembly (**102**) and the mold gate (**103**).

According to a specific example, the actuator mechanism (**104**) is configured to rotate the valve-stem assembly (**102**) for a case where the valve-stem assembly (**102**) has been positioned in the resin no-flow position. According to another specific example, the actuator mechanism (**104**) is configured to linearly translate the valve-stem assembly (**102**) for a case where the valve-stem assembly (**102**) has been positioned in the resin no-flow position. More specifically, the actuator mechanism (**104**) is configured to generate localized friction heating of the resin being located between a tip of the valve-stem assembly (**102**) and the mold gate (**103**).

According to the example depicted in FIG. **2**, the actuator mechanism (**104**) includes (and is not limited to): a gear-rack assembly (**112**) coupled to the valve-stem assembly (**102**). Generally speaking, the gear-rack assembly (**112**) includes a gear assembly (**126**) coupled to the valve-stem assembly (**102**), and also include a rack assembly (**124**) configured to interact with the gear assembly (**126**). The rack assembly (**124**) translate and in response to the rack assembly (**124**) translating, the gear assembly (**126**) is made to rotate, and thus the valve-stem assembly (**102**) is made to rotate as well.

A runner system (**916**) includes (and is not limited to): a back-up pad assembly (**990**), a seal assembly (**991**), a manifold assembly (**992**), and a manifold-bushing assembly (**993**), which are all known to persons of skill in the art and thus are not described in this document with any specific details.

By way of a specific example, the valve-stem assembly (**102**) includes (and is not limited to): a piston assembly (**120**), a piston cylinder (**122**), an air-closed circuit (**130**), and an air-

open circuit (**132**). The piston assembly (**120**) is attached to an end of the valve-stem assembly (**102**). The piston assembly (**120**) is configured to be received in the piston cylinder (**122**). The air-closed circuit (**130**) and the air-open circuit (**132**) are in fluid communication with the piston cylinder (**122**). The air-closed circuit (**130**) and the air-open circuit (**132**) are configured to translate the valve-stem assembly (**102**) by way of pressurization of a fluid (air for example) by way of forced movement of the piston assembly (**120**) along the piston cylinder (**122**).

Referring now to FIG. **2**, after the valve-stem assembly (**102**) is moved to the no-flow (closed) position, the force applied to the valve-stem assembly (**102**) is maintained and then the valve-stem assembly (**102**) is rotated by the actuator mechanism (**104**) so that friction is generated and local heating of the plastic at the interface. The actuator mechanism (**104**) may include, for example, a gear-rack assembly.

As the resin begins to flow, the valve-stem assembly (**102**) proceeds forward so that the valve-stem assembly (**102**) forces the resin into the mold cavity of the mold assembly (**918**) or backwardly into the runner system (**916**), until the valve-stem assembly (**102**) contacts the mold gate (**103**), or a surface of the mold gate (**103**) such as the gate taper. Once the part cooling time is reached, the molded article (**210**) that is ejected from the mold assembly (**918**) may have fewer flaws such as vestige, remnant that was previously caused by the film without the action of the actuator mechanism (**104**) acting on the valve-stem assembly (**102**).

FIG. **3** depicts another example schematic representation (cross-sectional view) of the mold-tool system (**100**) of FIG. **2**. Referring now to FIG. **3**, As a result of FIG. **2**, the resin between has been removed, at least in part, from between the mold gate (**103**) and the valve-stem assembly (**102**). The valve-stem assembly (**102**) is made to rotate so as to create a local softening of the resin that is trapped between the valve-stem assembly (**102**) and the mold gate (**103**), and the resin then re-flows out of the interface between the gate **9103**) and the valve-stem assembly (**102**) this reducing the potential for pulling out the crown flash (**200**) that is depicted in FIG. **1**.

Once the valve-stem assembly (**102**) is moved to the no-flow position to close the mold gate (**103**), the valve-stem assembly (**102**) then begins to rotate (for example) to provide localized friction heating at the (taper) interface between the mold gate (**103**) and the valve-

stem assembly (**102**). The resin is re-flowed back into the interface (also called a gate bubble area) between the valve-stem assembly (**102**) and the mold gate (**103**) until the valve-stem assembly (**102**) makes contact with the mold gate (**103**).

It will be appreciated that given the above description, a method of operating the mold-tool system (**100**) includes (and is not limited to): reflowing a resin being trapped between a mold gate (**103**) and a valve-stem assembly (**102**), so that the resin reflows from between the mold gate (**103**) and the valve-stem assembly (**102**), and there is a reduction, at least in part, in a formation of a crown flash (**200**) on a surface of a molded article (**210**).

FIG. **4** depicts an example schematic representation of a molding system (**900**) having the mold-tool system (**100**) of FIG. **2**. Referring now to FIG. **4**, the molding system (**900**) and the runner system (**916**) may include components that are known to persons skilled in the art, and these known components may not be described here; these known components are described, at least in part, in the following reference books (for example): (i) "*Injection Molding Handbook*" authored by OSSWALD/TURNG/GRAMANN (ISBN: **3-446-21669-2**), (ii) "*Injection Molding Handbook*" authored by ROSATO AND ROSATO (ISBN: **0-412-99381-3**), (iii) "*Injection Molding Systems*" **3**rd Edition authored by JOHANNABER (ISBN **3-446-17733-7**) and/or (iv) "*Runner and Gating Design Handbook*" authored by BEAUMONT (ISBN **1-446-22672-9**). It may be appreciated that for the purposes of this document, the phrase "includes (but is not limited to)" is equivalent to the word "comprising." The word "comprising" is a transitional phrase or word that links the preamble of a patent claims to the specific elements set forth in the claims that define what the invention itself actually is. The transitional phrase acts as a limitation on the claim, indicating whether a similar device, method, or composition infringes the patent if the accused device (etc) contains more or fewer elements than the claim in the patent. The word "comprising" is to be treated as an open transition, which is the broadest form of transition, as it does not limit the preamble to whatever elements are identified in the claim. As well, "an assembly" is functionally equivalent to "at least one assembly". "An assembly" is not limited to one and only one assembly. it is understood that "an assembly" and "at least one assembly" means that there is one or more instances of the assembly. It is understood that "an assembly, system, component, or entity, etc" is functionally equivalent to "at least one or more assemblies, systems, components, or entities".

On the one hand, the mold-tool system (**100**), the molding system (**900**), and the runner system (**916**) may all be sold separately. That is, the mold-tool system (**100**) may be sold as a retrofit item (assembly) that may be installed to an existing molding system (not depicted) and/or an existing runner system (not depicted). In accordance with an option, it may be appreciated that the mold-tool system (**100**) may further include (and is not limited to): a runner system (**916**) configured to support the mold-tool system (**100**). In accordance with an option, it may be appreciated that the mold-tool system (**100**) may further include (and is not limited to): a molding system (**900**) having a runner system (**916**) configured to support the mold-tool system (**100**). In accordance with an option, it may be appreciated that the mold-tool system (**100**) may further include (and is not limited to): a molding system (**900**) configured to support the mold-tool system (**100**). On the other hand, the mold-tool system (**100**), the molding system (**900**), and the runner system (**916**) may all be sold, to an end user, as an integrated product by one supplier.

More specifically, FIG **1** depicts an example of a schematic representation of the molding system (**900**), and an example of a schematic representation of a mold-tool system (**100**). The molding system (**900**) may also be called an injection-molding system for example. According to the example depicted in FIG. **1**, the molding system (**900**) includes (and is not limited to): (i) an extruder assembly (**902**), (ii) a clamp assembly (**904**), (iii) a runner system (**916**), and/or (iv) a mold assembly (**918**). By way of example, the extruder assembly (**902**) is configured, to prepare, in use, a heated, flowable resin, and is also configured to inject or to move the resin from the extruder assembly (**902**) toward the runner system (**916**). Other names for the extruder assembly (**902**) may include injection unit, melt-preparation assembly, etc. By way of example, the clamp assembly (**904**) includes (and is not limited to): (i) a stationary platen (**906**), (ii) a movable platen (**908**), (iii) a rod assembly (**910**), (iv) a clamping assembly (**912**), and/or (v) a lock assembly (**914**). The stationary platen (**906**) does not move; that is, the stationary platen (**906**) may be fixedly positioned relative to the ground or floor. The movable platen (**908**) is configured to be movable relative to the stationary platen (**906**). A platen-moving mechanism (not depicted but known) is connected to the movable platen (**908**), and the platen-moving mechanism is configured to move, in use, the movable platen (**908**). The rod assembly (**910**) extends between the movable platen (**908**) and the stationary platen (**906**). The rod assembly (**910**) may have, by way of example, four rod structures positioned at the corners of the respective stationary platen (**906**) and the movable platen (**908**). The rod assembly (**910**) is configured to guide movement of the movable platen (**908**) relative to the stationary platen (**906**). A clamping

assembly (**912**) is connected to the rod assembly (**910**). The stationary platen (**906**) is configured to support (or configured to position) the position of the clamping assembly (**912**). The lock assembly (**914**) is connected to the rod assembly (**910**), or may alternatively be connected to the movable platen (**908**). The lock assembly (**914**) is configured to selectively lock and unlock the rod assembly (**910**) relative to the movable platen (**908**). By way of example, the runner system (**916**) is attached to, or is supported by, the stationary platen (**906**). The runner system (**916**) includes (and is not limited to) a mold-tool system (**100**). The definition of the mold-tool system (**100**) is as follows: a system that may be positioned and/or may be used in a platen envelope (**901**) defined by, in part, an outer perimeter of the stationary platen (**906**) and the movable platen (**908**) of the molding system (**900**) as depicted in FIG. **1**. The molding system (**900**) may include (and is not limited to) the mold-tool system (**100**). The runner system (**916**) is configured to receive the resin from the extruder assembly (**902**). By way of example, the mold assembly (**918**) includes (and is not limited to): (i) a mold-cavity assembly (**920**), and (ii) a mold-core assembly (**922**) that is movable relative to the mold-cavity assembly (**920**). The mold-core assembly (**922**) is attached to or supported by the movable platen (**908**). The mold-cavity assembly (**920**) is attached to or supported by the runner system (**916**), so that the mold-core assembly (**922**) faces the mold-cavity assembly (**920**). The runner system (**916**) is configured to distribute the resin from the extruder assembly (**902**) to the mold assembly (**918**).

In operation, the movable platen (**908**) is moved toward the stationary platen (**906**) so that the mold-cavity assembly (**920**) is closed against the mold-core assembly (**922**), so that the mold assembly (**918**) may define a mold cavity configured to receive the resin from the runner system (**916**). The lock assembly (**914**) is engaged so as to lock the position of the movable platen (**908**) so that the movable platen (**908**) no longer moves relative to the stationary platen (**906**). The clamping assembly (**912**) is then engaged to apply a camping pressure, in use, to the rod assembly (**910**), so that the clamping pressure then may be transferred to the mold assembly (**918**). The extruder assembly (**902**) pushes or injects, in use, the resin to the runner system (**916**), which then the runner system (**916**) distributes the resin to the mold cavity structure defined by the mold assembly (**918**). Once the resin in the mold assembly (**918**) is solidified, the clamping assembly (**912**) is deactivated so as to remove the clamping force from the mold assembly (**918**), and then the lock assembly (**914**) is deactivated to permit movement of the movable platen (**908**) away from the stationary platen (**906**), and then a molded article may be removed from the mold assembly (**918**).

It will be appreciated that the molding system (**900**) may include more than two platens. According to an example, the molding system (**900**) includes (and is not limited to): a third platen (not depicted), which is also called a clamping platen that is known in the art and thus is not described here in greater detail. It will be appreciated that the mold-tool system (**100**) may further include (and is not limited to): the runner system (**916**) configured to support the mold-tool system (**100**). It will be appreciated that the mold-tool system (**100**) may further include (and is not limited to): a molding system (**900**) having a runner system (**916**) being configured to support the mold-tool system (**100**). It will be appreciated that the mold-tool system (**100**) may further include (and is not limited to): a molding system (**900**) being configured to support the mold-tool system (**100**).

ADDITIONAL DESCRIPTION

The following clauses are offered as further description of the examples of the mold-tool system (**100**): Clause (**1**): a mold-tool system (**100**), comprising: re-flowing means (**110**) being configured to re-flow a resin being trapped between a mold gate (**103**) and a valve-stem assembly (**102**), so that the resin reflows from between the mold gate (**103**) and the valve-stem assembly (**102**), and the re-flowing means (**110**) reduces, at least in part, formation of a crown flash (**200**) on a surface of a molded article (**210**). Clause (**2**): a mold-tool system (**100**), comprising: a valve-stem assembly (**102**) being movable relative to a mold gate (**103**); and re-flowing means (**110**) being configured to re-flow a resin being trapped between the mold gate (**103**) and the valve-stem assembly (**102**), so that the resin is displaced between the mold gate (**103**) and the valve-stem assembly (**102**), and thus reducing formation of a crown flash (**200**) on an outer surface of a molded article (**210**). Clause (**3**): the mold-tool system (**100**) of any clause mentioned in this paragraph, wherein: the re-flowing means (**110**) is configured to generate and apply a localized frictional heat to the resin located between the valve-stem assembly (**102**) and the mold gate (**103**). Clause (**4**): the mold-tool system (**100**) of any clause mentioned in this paragraph, wherein the re-flowing means (**110**) includes: an actuator mechanism (**104**) being coupled to the valve-stem assembly (**102**). Clause (**5**): the mold-tool system (**100**) of any clause mentioned in this paragraph, wherein the re-flowing means (**110**) includes: an actuator mechanism (**104**) being configured to move the valve-stem assembly (**102**) for a case where the valve-stem assembly (**102**) has been positioned in a resin no-flow position; and the valve-stem assembly (**102**) being moved by the actuator mechanism (**104**) is configured to generate localized friction heating of the resin being located between the valve-stem assembly (**102**)

and the mold gate (**103**). Clause (**6**): the mold-tool system (**100**) of any clause mentioned in this paragraph, wherein the re-flowing means (**110**) includes: an actuator mechanism (**104**) being configured to rotate the valve-stem assembly (**102**) for a case where the valve-stem assembly (**102**) has been positioned in a resin no-flow position. Clause (**7**): the mold-tool system (**100**) of any clause mentioned in this paragraph, wherein the re-flowing means (**110**) includes: an actuator mechanism (**104**) being configured to linearly translate the valve-stem assembly (**102**) for a case where the valve-stem assembly (**102**) has been positioned in a resin no-flow position. Clause (**8**): the mold-tool system (**100**) of any clause mentioned in this paragraph, wherein the re-flowing means (**110**) includes: an actuator mechanism (**104**) being configured to generate localized friction heating of the resin being located between a tip of the valve-stem assembly (**102**) and the mold gate (**103**). Clause (**9**): the mold-tool system (**100**) of any clause mentioned in this paragraph, wherein the re-flowing means (**110**) includes: an actuator mechanism (**104**) including: a gear-rack assembly (**112**) being coupled to the valve-stem assembly (**102**). Clause (**10**): the mold-tool system (**100**) of any clause mentioned in this paragraph, wherein: the valve-stem assembly (**102**) is configured to be positioned in a resin no-flow position and a resin-flow position relative to the mold gate (**103**); in the resin no-flow position, the valve-stem assembly (**102**) is set apart from the mold gate (**103**); and in the resin-flow position, the valve-stem assembly (**102**) is adjacent, at least in part, to the mold gate (**103**). Clause (**11**): the mold-tool system (**100**) of any clause mentioned in this paragraph, further comprising: a runner system (**916**) being configured to support the mold-tool system (**100**). Clause (**12**): the mold-tool system (**100**) of any clause mentioned in this paragraph, further comprising: a molding system (**900**) having a runner system (**916**) being configured to support the mold-tool system (**100**). Clause (**13**): the mold-tool system (**100**) of any clause mentioned in this paragraph, further comprising: a molding system (**900**) being configured to support the mold-tool system (**100**).

Any one or more of the above-identified clauses may be combinable with any another one or more of the above-identified clauses. Any one of the above-identified clauses may stand on its own merit without having to be combined with another other of the above-identified clauses.

It may be appreciated that the assemblies and modules described above may be connected with each other as may be required to perform desired functions and tasks that are within the scope of persons of skill in the art to make such combinations and

permutations without having to describe each and every one of them in explicit terms. There is no particular assembly, components, or software code that is superior to any of the equivalents available to the art. There is no particular mode of practicing the disclosed subject matter that is superior to others, so long as the functions may be performed. It is believed that all the crucial aspects of the disclosed subject matter have been provided in this document. It is understood that the scope of the present invention is limited to the scope provided by the independent claim(s), and it is also understood that the scope of the present invention is not limited to: (i) the dependent claims, (ii) the detailed description of the non-limiting embodiments, (iii) the summary, (iv) the abstract, and/or (v) description provided outside of this document (that is, outside of the instant application as filed, as prosecuted, and/or as granted). It is understood, for the purposes of this document, the phrase “includes (and is not limited to)” is equivalent to the word “comprising.” It is noted that the foregoing has outlined the non-limiting embodiments (examples). The description is made for particular non-limiting embodiments (examples). It is understood that the non-limiting embodiments are merely illustrative as examples.

CLAIMS

WHAT IS CLAIMED IS:

1. A mold-tool system (**100**), comprising:

re-flowing means (**110**) being configured to re-flow a resin being trapped between a mold gate (**103**) and a valve-stem assembly (**102**), so that the resin reflows from between the mold gate (**103**) and the valve-stem assembly (**102**), and the re-flowing means (**110**) reduces, at least in part, formation of a crown flash (**200**) on a surface of a molded article (**210**).

2. A mold-tool system (**100**), comprising:

a valve-stem assembly (**102**) being movable relative to a mold gate (**103**); and

re-flowing means (**110**) being configured to re-flow a resin being trapped between the mold gate (**103**) and the valve-stem assembly (**102**), so that the resin is displaced between the mold gate (**103**) and the valve-stem assembly (**102**), and thus reducing formation of a crown flash (**200**) on an outer surface of a molded article (**210**).

3. The mold-tool system (**100**) of any preceding claim, wherein:

the re-flowing means (**110**) is configured to generate and apply a localized frictional heat to the resin located between the valve-stem assembly (**102**) and the mold gate (**103**).

4. The mold-tool system (**100**) of any preceding claim, wherein:

the re-flowing means (**110**) includes:

an actuator mechanism (**104**) being coupled to the valve-stem assembly (**102**).

5. The mold-tool system (**100**) of any preceding claim, wherein:

the re-flowing means (**110**) includes:

an actuator mechanism (**104**) being configured to move the valve-stem assembly (**102**) for a case where the valve-stem assembly (**102**) has been positioned in a resin no-flow position; and

the valve-stem assembly (**102**) being moved by the actuator mechanism (**104**) is configured to generate localized friction heating of the resin being located between the valve-stem assembly (**102**) and the mold gate (**103**).

6. The mold-tool system (**100**) of any preceding claim, wherein:

the re-flowing means (**110**) includes:

an actuator mechanism (**104**) being configured to rotate the valve-stem assembly (**102**) for a case where the valve-stem assembly (**102**) has been positioned in a resin no-flow position.

7. The mold-tool system (**100**) of any preceding claim, wherein:

the re-flowing means (**110**) includes:

an actuator mechanism (**104**) being configured to linearly translate the valve-stem assembly (**102**) for a case where the valve-stem assembly (**102**) has been positioned in a resin no-flow position.

8. The mold-tool system (**100**) of any preceding claim, wherein:

the re-flowing means (**110**) includes:

an actuator mechanism (**104**) being configured to generate localized friction heating of the resin being located between a tip of the valve-stem assembly (**102**) and the mold gate (**103**).

9. The mold-tool system (**100**) of any preceding claim, wherein:

the re-flowing means (**110**) includes:

an actuator mechanism (**104**) including:

a gear-rack assembly (**112**) being coupled to the valve-stem assembly (**102**).

10. The mold-tool system (**100**) of any preceding claim, wherein:

the valve-stem assembly (**102**) is configured to be positioned in a resin no-flow position and a resin-flow position relative to the mold gate (**103**);

in the resin no-flow position, the valve-stem assembly (**102**) is set apart from the mold gate (**103**); and

in the resin-flow position, the valve-stem assembly (**102**) is adjacent, at least in part, to the mold gate (**103**).

11. The mold-tool system (**100**) of any one of claims 1 to 11, further comprising:

a runner system (**916**) being configured to support the mold-tool system (**100**).

12. The mold-tool system (**100**) of any one of claims 1 to 11, further comprising:

a molding system (**900**) having a runner system (**916**) being configured to support the mold-tool system (**100**).

13. The mold-tool system (**100**) of any one of claims 1 to 11, further comprising:

a molding system (**900**) being configured to support the mold-tool system (**100**).

14. A method of operating a mold-tool system (**100**), the method comprising:

reflowing a resin being trapped between a mold gate (**103**) and a valve-stem assembly (**102**) of the mold-tool system (**100**), so that the resin reflows from between the mold gate (**103**) and the valve-stem assembly (**102**), and there is a reduction, at least in part, in a formation of a crown flash (**200**) on a surface of a molded article (**210**).

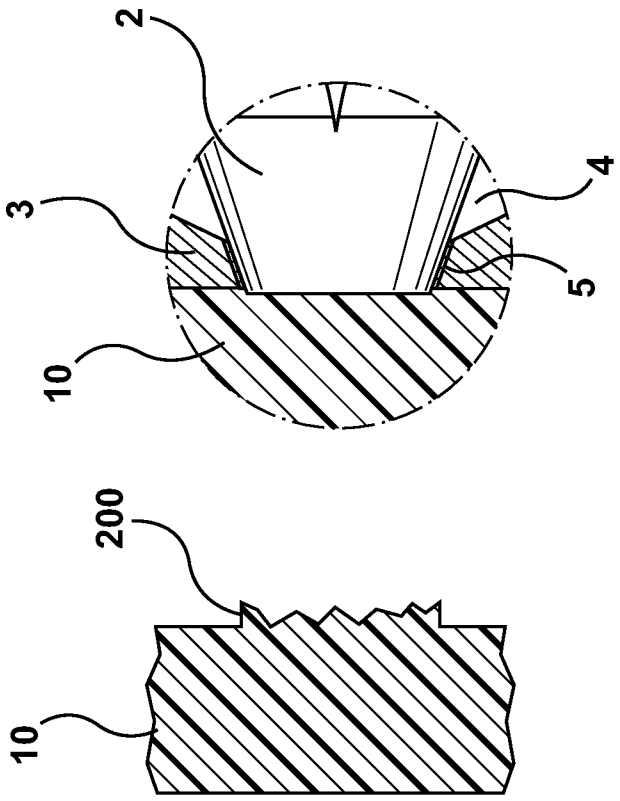
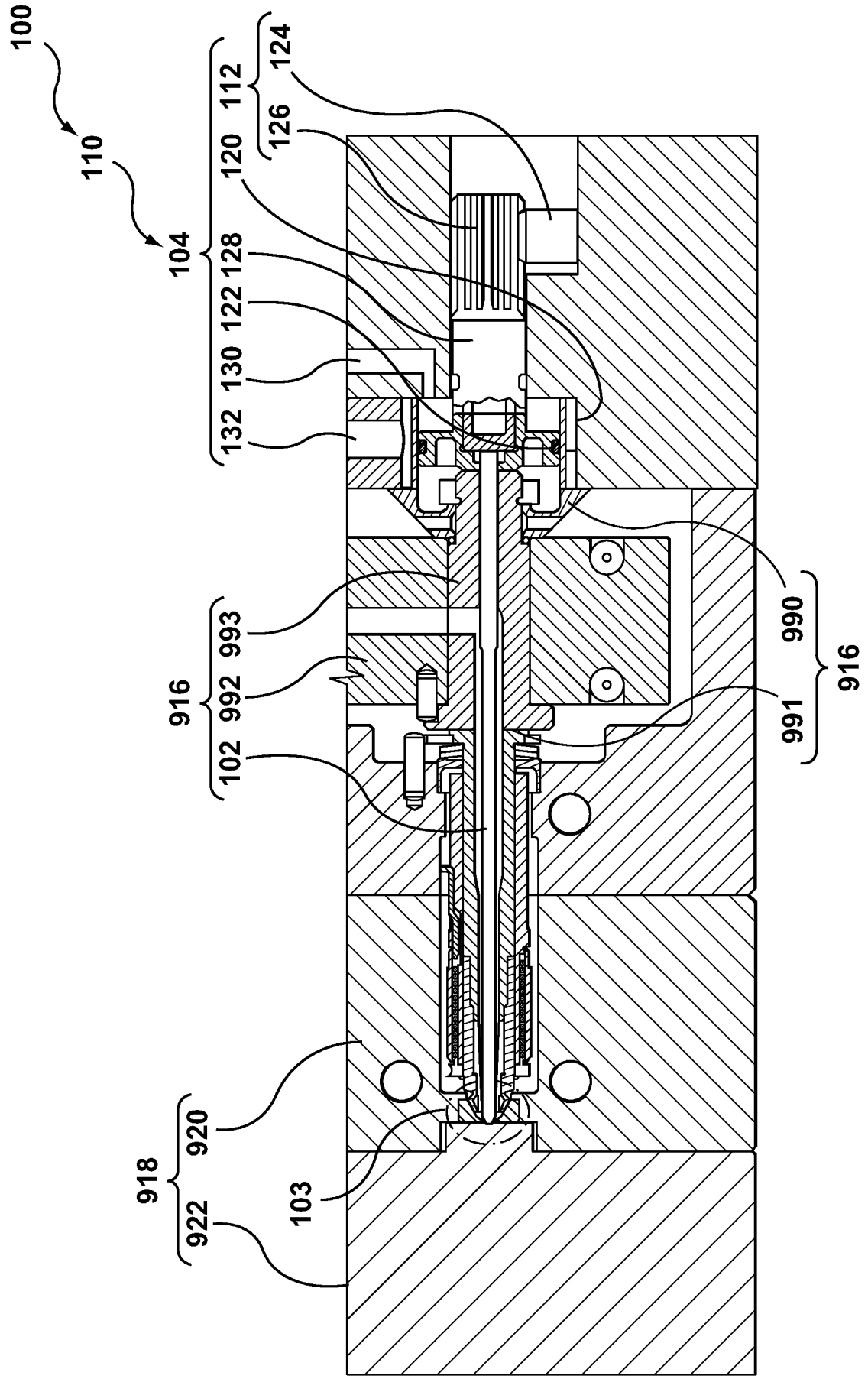


FIG. 1 (PRIOR ART)


100
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993
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102
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922
103

FIG. 2

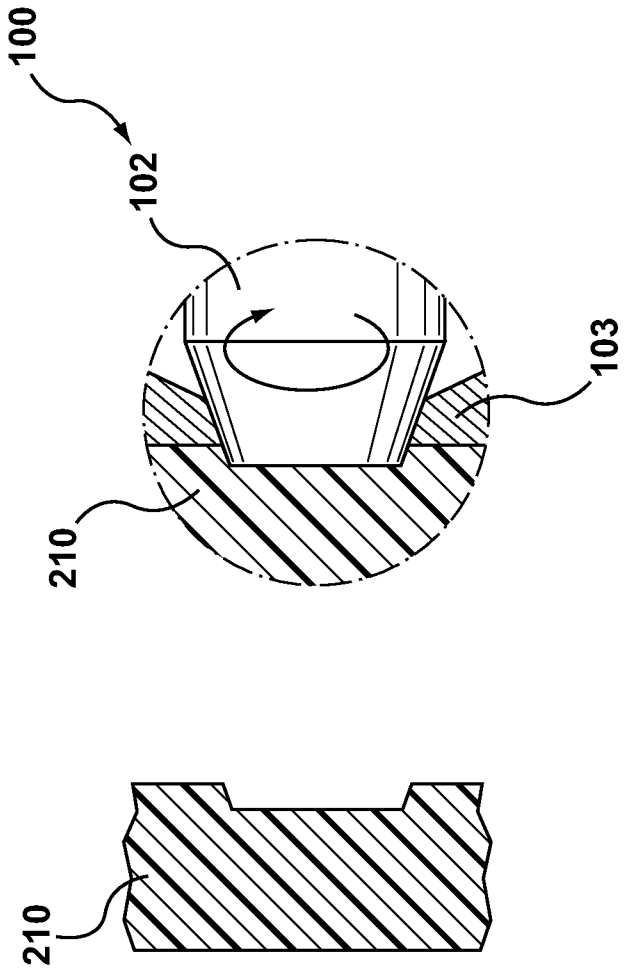

FIG. 3

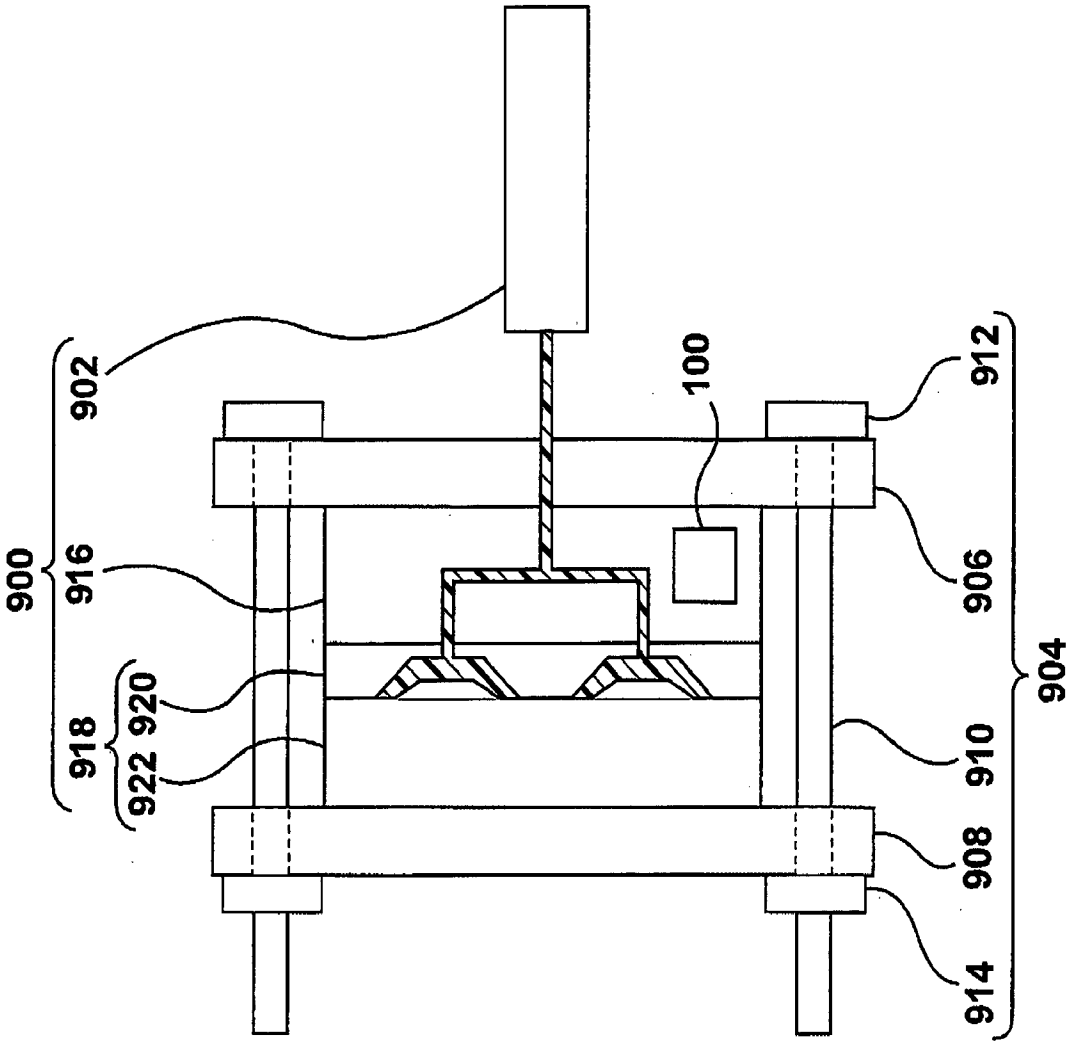

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/030322

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - B29C 45/23 (2013.01)
USPC - 425/562
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(8) - B29C 45/23 (2013.01)
USPC - 164/303, 324; 249/108, 110; 264/328.1, 328.15, 328.9, 336; 425/527, 533, 542, 549, 553, 557, 562, 564, 568, 571, 574

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC - B29C 45/23, 45/232 (2013.01)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Patbase, Orbit, Google Patent, Google

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 6,135,757 A (JENKO) 24 October 2000 (24.10.2000) entire document	1, 2, 14 ---------- 3
Y	US 6,344,164 B1 (TYLER et al) 05 February 2002 (05.02.2002) entire document	3
A	WO 2011/126750 A1 (JENKO) 13 October 2011 (13.10.2011) entire document	1-3, 14

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"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)
"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
"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
"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
"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
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 April 2013	10 MAY 2013
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/030322

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☒ Claims Nos.: 4-13
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.