United States Patent 4,950,152 to Brun, published on August 21, 1990 teaches a plurality of injection cores are inserted by a movable platen into corresponding injection cavities defined by mold inserts within a stationary platen, and the cores extend through corresponding split transfer mold cavities. After hollow preforms with threaded neck portions are molded within the cavities, the preforms are removed from the mold cavities, separated from the injection cores, and then shifted transversely by the split transfer molds to cooling or blow cavities defined by blow cavity inserts within the stationary platen on opposite sides of the corresponding injection cavities. The transfer molds return to receive the injection cores, and corresponding blow core units are inserted into the preforms within the blow cavities for pressurizing and expanding the preforms into firm contact with the blow inserts. The preforms are removed from the blow cavities by the blow cores on alternate cycles of press operation and are then released by retraction of the blow cores. The split transfer molds are shifted transversely in opposite directions and are opened and closed by a cam system which includes cam tracks mounted on the movable platen and incorporating cam track switches.

SUMMARY

According to a first aspect described herein, there is provided a molded article transfer device for use with an injection mold. The molded article transfer device includes a shuttle that is slidably arranged, in use, within the injection mold, the shuttle defining a first aperture, at least in part, that alternately accommodates: (i) a first mold stack arranged therein; and (ii) a first molded article received therein with opening of the first mold stack to retract it from the first aperture. The first molded article is transferable, in use, within the first aperture with shuttling movement of the shuttle.

According to a second aspect described herein, there is provided an injection mold that includes a first mold half, a second mold half , a molded article transfer device, and an in-mold shutter. The first mold half includes a first mold shoe with a first stack portion of a first mold stack connected thereto. The second mold half includes a second mold shoe with a second stack portion of the first mold stack connected thereto. The in-mold shutter being configured to position, in use, the first stack portion and the second stack portion relative to each other, along a mold-stroke axis, to close and open a molding cavity that is defined therebetween for molding and ejecting, respectively, a first molded article. The molded article transfer device being configured to receive and transfer the first molded article with opening of the molding cavity. The molded article transfer device includes: a shuttle that is slidably arranged, in use, within the injection mold; the shuttle defining a first aperture, at least in part, that alternately accommodates: (i) the first mold stack arranged therein; and (ii) the first molded article received therein with opening of the first mold stack to retract it from the first aperture; the first molded article being transferable, in use, within the first aperture with shuttling movement of the shuttle.

According to a third aspect described herein, there is provided a molding process executable on a controller associated with an injection molding system having an injection mold arranged therein, the steps of the molding process being embodied in instructions retained in a controller-usable memory of the controller, the instructions for directing the controller to execute a molding process, comprising: closing a first mold stack of an injection mold to define a molding cavity therein, wherein the first mold stack is arranged within a first aperture that is defined by a shuttle of a molded article transfer device; molding a first molded article within the molding cavity; opening the first mold stack to retract it from the first aperture; arranging the first mold stack to eject the first molded article into the first aperture of the shuttle; and shuttling of the shuttle to transfer the first molded article within the first aperture.

According to an embodiment~~a third aspect~~ described herein, there is provided a controller including instructions being embodied in a controller-usable memory of the controller, the instructions for directing the controller to execute a molding process. The molding process includes: (i) closing a first mold stack of an injection mold to define a molding cavity therein, wherein the first mold stack is arranged within a first aperture that is defined by a shuttle of a molded article transfer device; (ii) molding a first molded article within the molding cavity; (iii) opening the first mold stack to retract it from the first aperture; (iv) arranging the first mold stack to eject the first molded article into the first aperture of the shuttle; and (v) shuttling of the shuttle to transfer the first molded article within the first aperture.

According to an embodiment~~a fourth aspect~~ described herein, there is provided an in-mold shutter for embedding in an injection mold. The in-mold shutter includes a shutter actuator that is configured to selectively engage a first mold shoe of an injection mold with a platen of a mold clamping assembly to hold the first mold shoe in an extended position, along a mold-stroke axis, during a step of molding a first molded article in the injection mold.

According to an embodiment~~a fifth aspect~~ described herein, there is provided an in-mold shutter for embedding in an injection mold. The in-mold shutter includes a shutter member that is associated, in use, with one of a platen of a mold clamping assembly and a first mold shoe of the injection mold. The in-mold shutter also includes a link member that is associated with a remaining one of the platen and the first mold shoe. The shutter member and the link member are configured to be selectively engageable, in use, to hold the first mold shoe in an extended position, along a mold-stroke axis, during a step of molding a first molded article in the injection mold.

According to an embodiment~~a sixth aspect~~ described herein, there is provided a controller including instructions being embodied in a controller-usable memory of the controller, the instructions for directing the controller to execute a molding process. The molding process includes: (i) closing a first mold stack of an injection mold to define a molding cavity therein; (ii) shuttering an in-mold shutter to engage a first mold shoe of the injection mold with one of a moving platen and a stationary platen of a injection molding system; (iii) molding a first molded article within the molding cavity; (iv) un-shuttering the in-mold shutter to disengage the first mold shoe from the one of the moving platen and the stationary platen; and (v) selectively positioning the first mold shoe, along a mold-stroke axis.

wherein the first channel is positioned to accommodate the first stack portion being retractably arranged therein during molding of the first molded article;
the first channel is further configured to accommodate the first molded article passing therealong, towards an exit thereof, with positioning, in use, of the first channel into the first transfer position, by the shuttling movement of the shuttle, wherein the first channel is positioned beside the first stack portion and the first barricade.

5. The molded article transfer device of claim 4, wherein:
the shuttle further defines a second channel that is adjacent to, and generally parallel with, the first channel, wherein with one of the first channel and the second channel being positioned in the first receiving position a remaining one of the first channel and the second channel is positioned in the first transfer position;
the second channel and the first barricade are configured to cooperate, in use, to define a second aperture with the first barricade being positioned within the second channel, with positioning, in use, of the second channel into the first receiving position, by the shuttling movement of the shuttle, wherein the second channel is positioned to accommodate the first stack portion being retractably arranged therein during molding of another of the first molded article;
the second channel is further configured to accommodate the another of the first molded article passing therealong, towards the exit thereof, with positioning, in use, of the second channel into the first transfer position, by the shuttling movement of the shuttle, wherein the second channel is positioned beside the first stack portion ~~10)~~ and the first barricade.

6. The molded article transfer device of claim 5, wherein:
the first channel and the second channel are defined between cooperating pairs of guide bars that are associated with the shuttle;
the pairs of guide bars define gaps therein through which the first barricade is slid, in use, with relative movement of the shuttle with respect to the first barricade.

7. The molded article transfer device of claim 5, wherein:
the molded article transfer device cooperates, in use, with the injection mold that is configured to simultaneously mold a plurality of molded articles using a first column of mold stacks that includes the first mold stack with which to mold the first molded article and a second mold stack with which to mold a second molded article;
the molded article transfer device further comprises a second barricade that is associated, in use, with one of the first mold half and the second mold half;