

Description**Background of the Invention****1. Field of the Invention**

This invention relates to a method of automatic and continuous manufacture of injection molded articles from molten material injected into molds, such as synthetic resin, aluminum alloy, zinc alloy, other metal and the like, and relates to an apparatus of the method.

2. Prior Art

As shown in USP No. 4434923, a conventional method of manufacturing of comparatively small articles made from material such as synthetic resin by plastic injection molding, or metal by die cast molding, generally has the following steps. A number of articles are molded at the same time in male and female molds so as to be attached to a runner-strip molded in a runner in this case, a molded piece containing the runner-strip and the articles attaching to the runner-strip is separately molded from preceding and following pieces. Then, the molded articles are introduced into a separately provided separating apparatus so that the articles are detached from the runner-strip.

With the conventional manufacturing method of this kind, an injection molding apparatus and a separating apparatus are provided separately. This causes a low efficiency of productivity to require excess labour costs.

Summary of the Invention

Accordingly, an object of the present invention is to provide a method and an apparatus of continuous manufacturing of injection molded articles facilitating efficient productivity by permitting articles, which are molded by one-shot of injection and which are attached to a runner-strip having a sprue molded in a runner, to be fed and to be separated from the runner-strip automatically and surely

According to the present invention there is provided a method as claimed in claim 1 and an apparatus as claimed in claim 9.

Preferred features of the method are claimed in claims 2 to 8 inclusive, whilst preferred features of the apparatus are claimed in claims 10 to 16 inclusive.

Embodiments of the present invention will now be described by way of example and with reference to the accompanying drawings, wherein:-

Figs. 1 and 2 are plan view and front view, respectively, of an apparatus of continuous manufacturing of injection molded articles of the present invention; Fig. 3 is a sectional view of an outlet for articles between a movable mold and a stationary mold as shown in Figure 1 when they are closed:

Fig. 4 is a sectional view of a supporting and guiding member for articles and a runner-strip pulled out from molds;

Fig. 5 is a plan view of part of the apparatus shown in Figure 1 when molten material is injected into molds;

Fig. 6 is a plan view of part of the apparatus shown in Figure 1 when both molds are opened;

Fig. 7 is a plan view showing operation of a pulling-out unit as shown in Figure 1 when a molded runner-strip is fed from the molds;

Fig. 8 is a plan view of the pulling-out unit of Figure 7 when the unit is returned to an original position;

Fig. 9 is a front view of a separating unit as shown in Figure 1; and

Fig. 10 is a sectional view of a modified separating unit.

Detailed Description of the Invention

As shown in Figs. 1 and 2, the apparatus comprises an injection molding unit 100 for molding a piece 50, 52 composed from a runner-strip 50 having a sprue 53, which is molded in a runner 5, and articles 52, which are molded in a cavity 6 and which are attached to the runner-strip 50, a pulling-out unit 200 for continuously pulling out the molded piece 50, 52, a separating unit 300 for removing the articles 52 from the runner-strip 50 and collecting units 44, 400 for collecting the articles 52 and the runner-strip 50 respectively.

The injection molding unit 100 has a stationary mold 3, which is connected to a storage 1 of molten material, through the intermediary of an injecting apparatus 2 for the molten material, and a movable mold 4, which faces the stationary mold 3 and which is placed so as to move back and forth toward the stationary mold 3. As shown in Fig. 3, on the inner face of the molds 3,4, the runner 5 is formed on the both sides or one side of a parting line of the molds 3,4, and the cavity 6 is formed on both sides of the runner 5. One end of the runner 5 extends to at least one of the side face of the movable mold 3 and/or the stationary mold 4, adjacent to a pulling-out unit 200 to make an opening 7. During continuous manufacture of injection molding, the opening 7 is plugged by a preceding runner-strip 50. However, at the beginning of the manufacturing of injection molding if the opening 7 is not plugged, molten material overflows from the opening 7. As shown in Fig. 3, in order to prevent its overflow, the stationary mold 3 is provided with a pin 8 urged resiliently toward the opening 7 by a spring 9, and at the beginning of the manufacturing, the opening 7 is plugged by the pin 8. The stationary mold 3 forms a recess (not shown) extending vertically in relation to a parting surface in order to form a projection 51 and the sprue 53 on the runner-strip 50. When the runner-strip 50 is molded and a preceding runner-strip 50 is fed out from both molds 3,4, while the backward end of the preceding runner-strip 50 plugs the opening 7 of the both molds 3, 4, the projection 51 or the sprue 53 of the preceding runner-

strip 50 is located with a predetermined distance from the opening 7. The abovementioned projection 51 or the sprue 53 functions as a puller engagement means. Further, as shown in Fig. 1, the movable mold 4 has a built-in pair of ejector pins 10, 10 for pushing the molded piece 50, 52 out of the movable mold 4.

As shown in Fig. 5, the movable mold 4 is moved forward to contact the stationary mold 3 and the molten material is injected into the molds 3, 4. After the molds 3, 4 are cooled, as shown in Fig. 6, the movable mold 4 is moved backward to open the molds 3, 4. In this case, the movable mold 4 is apart from the stationary mold 3 while the molded piece 50, 52 is attached to the movable mold 4. Therefore, as shown in Fig. 1, the two ejector pins 10, 10 are projected from the movable mold 4 to push the molded piece 50, 52 out so that the molded piece 50, 52 is detached from the movable mold 4.

As shown in Figs. 1, 7 and 8, the pulling-out unit 200 has a cylinder 11 by which the runner-strip 50 with a number of articles 52 molded in both molds 3, 4 is pulled out from the both molds 3, 4 straightly. A piston rod 12 extending from the cylinder 11, fixed to a supporting frame (not shown), has a reciprocating member 14 at the end of the piston rod 12 adjacent to the both molds 3, 4. The reciprocating member 14 is arranged to be perpendicular to the piston rod 12 through the intermediary of a sliding plate 17, which will be described hereinbelow, to be projected horizontally towards a feeding line of the runner-strip 50, and to bent downward at the end portion of the reciprocating member 14. A lever 15, in this embodiment, which is bent about its center to be a crank shape, is pivoted about its center to the downward end portion of the reciprocating member 14. Further, the reciprocating member 14 is provided with a stopper pin 16, which is arranged to be able to contact with the upper part of the lever 15 in the event that the lever 15 is pivoted about a certain angle. When the upper part of the lever 15 contacts with the stopper pin 16, the lower part of the lever 15 projects from the reciprocating member 14 in a substantially fixed manner. Further, when the reciprocating member 14 is moved forward, that is to say when it proceeds toward both molds 3, 4, even though there may be something to be contact the lower part of the lever 15, the upper part of the lever 15 does not contact the stopper pin 16. Therefore, the lever 15 is allowed to rotate. However, when the reciprocating member 14 is moved backward, if the lower part of the lever 15 contacts something, the upper part of the lever 15 contacts to the stopper pin 16. Therefore, the lever 15 is not allowed to rotate beyond a certain point.

In order that the piece 50, 52 molded in the injection molding unit 100 is pulled out by the pulling-out unit 200, the reciprocating member 14 is reciprocated by moving operation of the cylinder 11. In this case, a length of the stroke of the cylinder 11 permits the backward end of the runner-strip 50 to be left in the opening 7 so as to plug the opening 7.

At the beginning of the molding in the injection molding unit 100, after the both molds 3, 4, are opened, the

runner-strip 50 is pulled out by manual operation. However although the first runner-strip 50 is pulled out once, all of the following runner-strips 50 are pulled out by the pulling-out unit 200. As shown in Fig. 7, when the cylinder 11 is driven backward, the lower part of the lever 15 engages with the projection 51 of the runner-strip 50. Accordingly, the runner-strip 50 is pulled out by the cylinder 11. After the reciprocating member 14 is moved backward with a predetermined stroke, as shown in Fig. 8, when the cylinder 11 is driven forward, even though the lower part of the lever 15 is contacted to the projection 51 or the sprue 53, the lever 15 is rotated over the projection 51 or the sprue 53. As shown in Fig. 5, during injection molding, the reciprocating member 14 is pushed toward the stationary mold 3 side by the runner strip 50 against a spring 13. In this case, the lever 15 engages with the projection 51 of the runner-strip 50. However, as shown in Fig. 6, when the movable mold 4 is moved backward on the completion of the injection molding, the runner-strip 50 is moved back together with the movable mold 4. Accordingly, the runner-strip 50 is disengages from the lever 15 for a moment, and the reciprocating member 14 is projected out toward the runner-strip 50. Then, as shown in Fig. 1, when the runner-strip 50 is pushed out from the movable mold 4 by the ejector pins 10, the projection 51 of the runner strip 50 engages with the lever 15.

The sprue 53, which is formed on the runner-strip 50 by the injection molding, might be used as the puller engagement means, instead of the projection 51 which is specially formed for this purpose.

As shown in Fig 1, a supporting and guiding member 201 for the pulled-out molded piece is placed in the pulling-out unit 200. The supporting and guiding member 201 for example, as shown in Fig 4, is placed along both sides of the runner-strip 50 and comprises back member 210 and front (projection 51-side) members 211 and 212. The three members 210, 211 and 212 are moved backward and forward toward the runner-strip 50 with movement coordinated with that of the ejector pins 10 of the movable mold 4. When the ejector pins 10 are projected out, the supporting and guiding member 201 is arranged to form a feed path for the molded piece 50, 52, the projection 51, the sprue 53. By the action of the supporting and guiding member 201, the backward end of the runner-strip 50, which is pulled out from the injection molding unit 100, keeps a position at the opening 7 without slipping off.

In this embodiment of the present invention shown in the figures, the lever 15 installed in the pulling-out unit 200 engages with the projection 51 so that the runner-strip 50 is pulled out. However, as described hereinbefore, when the sprue 53 formed on the runner-strip 50 is used as the puller engagement means, the projection 51 is not necessary to be formed on the runner-strip 50. That is to say, the runner-strip 50 can be pulled by engaging the lever 51 with the sprue 53 of the runner-strip 50.

Now, the composition of the separating unit 300 will be explained by Figs. 1, 2, 5, 6, 7, 8 and 9 The sliding

plate 17, which slides backward and forward on a guiding member (not shown), is placed parallel to and below the piston rod 12. However, the end portion of the sliding plate 17 is fixed to the end portion of the piston rod 12 adjacent to the injection molding unit 100. On the upper surface of the sliding plate 17, a cam groove 18 is formed with an undulating line having an axis disposed in a direction parallel to the piston rod 12. A casing 19 is laid across the feeding line of the runner-strip 50. In the casing 19, there are two gears 20, 21 in the upper and lower sides of the feeding line respectively. Two shafts 22, 23, to which gears 20, 21 are fixed respectively are placed parallel to the feeding line and go through the casing 19. A cross-rack 24, which can move back and forth in the direction being perpendicular to the feeding line of the runner-strip 50, is provided at the upper part of the casing 19 so as to interlock with the upper gear 20. A pin 25, which engages with the cam groove 18, is fixed to the fore end of the cross-rack 24. A backside rack 26, which can move upward and downward, is extended between the upper gear 20 and the lower gear 21 so as to interlock with the both gears 20, 21. The forward end of the upper shaft 22, in relation to a direction the runner-strip 50 is fed, is projected out through the casing 19. An arm 27 is fixed to the projecting forward end of the shaft 22 at the center of the arm 27. The both ends of the arm 27 are bent downward vertically. The each bottom of the each downward portion of the arm 27 is further bent and extended horizontally to be parallel to the shaft 22. The downward and horizontal portions of the arm 27 form a beating member 29. The front and back portions of the beating member 29, which face each other, are placed at the front and back sides of the molded articles 52, respectively. The horizontal portions of the beating member 29 are located at substantially the same level to the center of the articles 52. In relation to the shaft of the lower gear 23, an arm 28 and a beating member 30 are placed similarly so that the upper and lower beating members 29, 30 are placed to be faced each other.

As a result, a separating step is carried out as follows. When the cylinder 11 is moved backward and forward along the feed line of the runner-strip 50, the pin 25, which engages with the cam groove 18 of the sliding plate 17, moves back and forth in relation to the feeding line so that the cross rack 24 is moved back and forth. Therefore, as the upper gear 20 is rotated within a limited angle clockwise and counterclockwise due to movement of the cross rack 24, the lower gear 21 is rotated similarly through the intermediary of the back-side rack 26. The rotation of the upper and lower gears 20, 21 cause beating members 29, 30 to swing about the shafts 22, 23, respectively. Accordingly, by swinging of the beating members 29, 30, the articles 52, which are attached to the upper and lower sides of the runner-strip 50, are beaten from their both sides. Since a shock, caused from operation of the beating members 29, 30, is given to the articles 52, the articles 52 are detached from the runner-strip 50 to fall down. The articles 52, fallen from the sep-

arating unit 300, are received by a hopper 44, then, they are packed.

Another embodiment of the separating unit 300 is shown in Fig. 10. According to this embodiment, the molded articles 52 are trimmed, by removing unnecessary molded fragments which are formed together with the articles 52, as well as detached from the runner-strip 50. That is to say, the separating unit 300 is provided with a male and a female die 31, 32 having male and female patterns made for contours of the articles 52 on the inner opposite faces of the both dies 31, 32. A pair of female and male dies 31, 32 are moved off and moved in close each other by operation of a moving means (not shown), which is different from the above mentioned operation of the cylinder 11. By the movement of the both dies 31, 32, the molded piece 50, 52 is pushed from both sides. Therefore, the unnecessary molded fragments and gates are given a shock by the pattern formed on the inner faces of the both dies 31, 32 so as to be detached from the articles 52 and the runner-strip 50. At the same time, the articles 52 are detached from the runner-strip 50. Then, after both dies 31, 32 are opened, the unnecessary fragments are removed off by a suitable means such as spraying of air, brushing by a rammer and the like (not shown).

In the collecting unit 400 for the runner-strip 50, the runner-strip 50 fed from the separating unit 300 is returned to the storage 1 of the injection molding unit 100. If the molten material is synthetic resin, since it can not be returned to the storage 1 directly for reproducing, the separated runner-strip 50 is kept in a stock-box and the like for a while. However, if the molten material is aluminum alloy and the like, since it can be molten to be reused soon, the separated runner-strip 50 is returned to the storage 1 directly for reproducing.

As shown in Fig. 1 and 2, the collecting unit 400 has a following composition. A supporting frame 35 is placed to be projected from a frame 33, which supports the storage 1, through the intermediary of a hinge 34. A guiding member 36, which is curved to be arc-shaped on its plan view and to be C-shaped on its cross section, is supported by the supporting frame 35. A pressing and curving means 37, which presses and curves the runner-strip 50 fed from the separating unit 300, is placed between the guiding member 36 and the separating unit 300 in order that the runner-strip 50 is introduced into the guiding member 36 while the runner-strip 50 is curved without returning to its original form by the pressing and curving means 37. The pressing and curving means 37 is composed of a pressing lever 38, which is placed on the movable mold 4-side of the feeding line of the runner-strip 50, and a receiving member 39, which is fixed to the end of the supporting frame 35 and which faces the pressing lever 38. The pressing lever 38 moves back and forth in a moving direction of the movable mold 4 with movement coordinated with that of the movable mold 4. The receiving member 39 has a recess 40 for receiving the sprue 53. A control rod 41 extends from the hinge 34-side end of the supporting frame 35 to be parallel with

the frame 33 so that the supporting frame 35 is fixed with an adjustable angle made between the supporting frame 35 and the control rod 41. A connecting member 43 is connected to the fore end of the control rod 41, for example, by screws. The connecting member 43 is connected and locked removably to an adjusting member 42, which projects from the frame 33, with an adjustable distance between the connecting member 43 and the adjusting member 42.

According to the above mentioned composition, the continuous manufacturing of injection molding related to the embodiments of the present invention is carried out as follows. At first, the piece (the runner-strip 50 and the articles 52 attaching to the runner-strip 50) is molded in the injection molding unit 100. The molded piece 50,52 is pulled out by the pulling-out unit 200, while it is joined to the proceeding piece 50, 52 to form a continuous series of the pieces 50, 52. During feeding of the piece 50, 52, the articles 52 are separated from the runner-strip 50 by a shock applied to the articles 52 caused from the swinging of the beating members 29, 30 provided at the both sides of the articles 52. The separated articles 52 are received by the hopper 44 as a collecting means for the articles 52 and packed in a box and the like.

When, the collecting unit 400 for the runner-strip 50 is placed, the runner-strip 50 removing the articles 52 is curved not to return to its original form by the pressuring lever 38 and the receive die 39, and introduced to the guiding member 36. Then, the runner-strip 50 is continuously inserted to the storage 1 via the guiding member 36. The part of the runner-strip 50, which locates shallowly in the storage 1, does not melt. The fore end part of the runner-strip 50 begins to melt when the part is inserted deeply in the storage 1 for reproduction. Accordingly, if the material is metal, it melts efficiently without oxidation.

It is to be understood that the present invention is not limited to the specific embodiments thereof except as defined in the appended claims.

Claims

1. A method of continuous manufacture of injection molded articles, wherein articles (52) are molded in an injection molding unit (100) from molten material injected through a runner (5), which is formed on the inner face of a stationary mold (3) and/or a movable mold (4) of said injection molding unit (100), into a cavity (6), which is formed to communicate with said runner (5), so as to form a molded piece (50,52); said molded piece (50,52) comprising a runner-strip (50), which is molded in said runner (5), and a number of said articles (52), which are molded in said cavity (6), attached thereto; and wherein said molded piece (50, 52) is fed to a separating unit (300) so as to be separated into said runner-strip (50) and said articles (52), on completion of molding of said piece (50, 52); and wherein said articles 52 and said runner-strip (50) of said piece (50, 52) are

collected in separately provided collecting units (44, 400) respectively; characterised in that said method comprises

a connecting step by which the trailing end of said runner-strip (50) molded by one-shot injection is connected through an opening (7) in the stationary mold (3) and/or movable mold (4) to the leading end of a following runner-strip 50 molded by a following one-shot injection, while the trailing end of said runner-strip (50) is left in said injection molding unit (100) so that the said piece (50,52) molded by every one-shot injection is joined to a preceding piece (50,52) and a following piece (50, 52) to form a continuous series of said molded pieces (50, 52);

a pulling-out step performed by a pulling-out unit (200) which pulls out said series of said molded pieces (50,52) in order; and

a separating step performed by said separating unit (300), whose operation is coordinated with the operation of said pulling-out unit (200), by application of mechanical shock to each molded piece (50, 52) in turn, so that said articles (52) are separated from said runner-strip (50).

2. A method of continuous manufacture of injection molded articles according to claim 1, wherein one end of said runner (5) extends to at least one side face of said movable mold (3) and/or said stationary mold (4) adjacent to said pulling-out unit 200 to from an opening (7).
3. A method of continuous manufacture of injection molded articles according to claim 1 or 2, wherein said pulling-out unit (200) for said molded piece (50,52) is provided with a reciprocating member (14) having an engaging means (15) arranged to engage with said runner-strip (50) so as to move said runner strip only in a pulling-out direction.
4. A method of continuous manufacture of injection molded articles according to any preceding claim, wherein said separating unit (300) is provided with shock members (29, 30) for giving a shock to said articles (52).
5. A method of continuous manufacture of injection molded articles according to any preceding claim, wherein said separating unit (300) is provided with a male and a female die (31, 32) having patterns for molding said articles (52) so that said piece (50, 52) is pressured by said dies (31, 32) from both sides so as to be trimmed as well as to be separated into said articles (52) and said runner-strip (50).
6. A method of continuous manufacture of injection molded articles according to any preceding claim, wherein said collecting unit (400) for said runner-strip (50) is placed between said separating unit (300) and a storage 1 of said injection molding unit



the frame 33 so that the supporting frame 35 is fixed with an adjustable angle made between the supporting frame 35 and the control rod 41. A connecting member 43 is connected to the fore end of the control rod 41, for example, by screws. The connecting member 43 is connected and locked removably to an adjusting member 42, which projects from the frame 33, with an adjustable distance between the connecting member 43 and the adjusting member 42.

According to the above mentioned composition, the continuous manufacturing of injection molding related to the embodiments of the present invention is carried out as follows. At first, the piece (the runner-strip 50 and the articles 52 attaching to the runner-strip 50) is molded in the injection molding unit 100. The molded piece 50, 52 is pulled out by the pulling-out unit 200, while it is joined to the proceeding piece 50, 52 to form a continuous series of the pieces 50, 52. During feeding of the piece 50, 52, the articles 52 are separated from the runner-strip 50 by a shock applied to the articles 52 caused from the swinging of the beating members 29, 30 provided at the both sides of the articles 52. The separated articles 52 are received by the hopper 44 as a collecting means for the articles 52 and packed in a box and the like.

When, the collecting unit 400 for the runner-strip 50 is placed, the runner-strip 50 removing the articles 52 is curved not to return to its original form by the pressuring lever 38 and the receive die 39, and introduced to the guiding member 36. Then, the runner-strip 50 is continuously inserted to the storage 1 via the guiding member 36. The part of the runner-strip 50, which locates shallowly in the storage 1, does not melt. The fore end part of the runner-strip 50 begins to melt when the part is inserted deeply in the storage 1 for reproduction. Accordingly, if the material is metal, it melts efficiently without oxidation.

It is to be understood that the present invention is not limited to the specific embodiments thereof except as defined in the appended claims.

Claims

1. A method of continuous manufacture of injection molded articles, wherein articles (52) are molded in an injection molding unit (100) from molten material injected through a runner (5), which is formed on the inner face of a stationary mold (3) and/or a movable mold (4) of said injection molding unit (100), into a cavity (6), which is formed to communicate with said runner (5), so as to form a molded piece (50, 52); said molded piece (50, 52) comprising a runner-strip (50), which is molded in said runner (5), and a number of said articles (52), which are molded in said cavity (6), attached thereto; and wherein said molded piece (50, 52) is fed to a separating unit (300) so as to be separated into said runner-strip (50) and said articles (52), on completion of molding of said piece (50, 52); and wherein said articles 52 and said runner-strip (50) of said piece (50, 52) are collected in separately provided collecting units (44, 400) respectively; characterised in that said method comprises
 - a connecting step by which the trailing end of said runner-strip (50) molded by one-shot injection is connected through an opening (7) in the stationary mold (3) and/or movable mold (4) to the leading end of a following runner-strip 50 molded by a following one-shot injection; while the trailing end of said runner-strip (50) is left in said injection molding unit (100) so that the said piece (50, 52) molded by every one-shot injection is joined to a preceding piece (50, 52) and a following piece (50, 52) to form a continuous series of said molded pieces (50, 52);
 - a pulling-out step performed by a pulling-out unit (200) which pulls out said series of said molded pieces (50, 52) in order; and
 - a separating step performed by said separating unit (300), whose operation is coordinated with the operation of said pulling-out unit (200), by application of mechanical shock to each molded piece (50, 52) in turn, so that said articles (52) are separated from said runner-strip (50).
2. A method of continuous manufacture of injection molded articles according to claim 1, wherein one end of said runner (5) extends to at least one side face of said movable mold (3) and/or said stationary mold (4) adjacent to said pulling-out unit 200 to from an opening (7).
3. A method of continuous manufacture of injection molded articles according to claim 1 or 2, wherein said pulling-out unit (200) for said molded piece (50, 52) is provided with a reciprocating member (14) having an engaging means (15) arranged to engage with said runner-strip (50) so as to move said runner strip only in a pulling-out direction.
4. A method of continuous manufacture of injection molded articles according to any preceding claim, wherein said separating unit (300) is provided with shock members (29, 30) for giving a shock to said articles (52).
5. A method of continuous manufacture of injection molded articles according to any preceding claim, wherein said separating unit (300) is provided with a male and a female die (31, 32) having patterns for molding said articles (52) so that said piece (50, 52) is pressured by said dies (31, 32) from both sides so as to be trimmed as well as to be separated into said articles (52) and said runner-strip (50).
6. A method of continuous manufacture of injection molded articles according to any preceding claim, wherein said collecting unit (400) for said runner-strip (50) is placed between said separating unit (300) and a storage 1 of said injection molding unit

(100) and includes a guiding member (36) for guiding said runner-strip (50).

7. A method of continuous manufacture of injection molded articles according to any preceding claim, wherein said collecting unit (44) for said article (52) is a hopper placed below said separating unit (300).
8. A method of continuous manufacture of injection molded articles according to any one of claims 1 to 7, wherein said runner-strip (50) is shaped by runner-strip pressing and curving means (37), before being fed to said storage (1).
9. An apparatus for continuous manufacture of injection-molded articles (52), the apparatus comprising: an injection-molding unit (100); a separating unit (300); and collecting units (44, 400);
 - the injection-molding unit (100) comprising storage means (1), a stationary mold (3), a movable mold (4) and injecting means; the movable mold (4) being movable into and out of engagement with the stationary mold (3); the storage means (1) being adapted to store molten material; the injecting means being adapted and arranged to receive the molten material from the storage means (1) and to inject the material in a one-shot injection cycle into a cavity (6) and into an axial runner (5); said cavity (6) and runner (5) being formed by the stationary and movable molds (3, 4) in combination, when engaged together; the cavity (6) being adapted to mold said articles (52) and said runner (5) being adapted to mold a runner-strip (50) in such a way that said articles (52) and runner-strip (50) are initially integrally connected together, as one integral injection-molded piece, but can later be readily separated;
 - the separating unit (300) being adapted and arranged for separating the articles (52) from the runner-strip (50) after the articles (52) have left the injection-molding unit (100);
 - the collecting units (44, 400) being adapted and arranged with sorting means such that, in operation, one collecting unit (44) collects the articles (52) and another collecting unit (400) collects the runner-strips (50);
 - characterised in that:-
 - said axial runner (5) extends axially to a side face of said movable mold (3) and/or of said stationary mold (4) to form an opening (7) thereat, through which each respective injection-molded piece (50, 52) can be pulled, out of the injection-molding unit (100), in a first direction, parallel to the axis of the runner (5) and away from the molds (3, 4);
 - said runner (5) is adapted for molding a first engagement means (51, 53), integral with the runner-strip (50), as an integral part of said injection-molded piece (50, 52);
 - a pulling-out unit (200) is provided for pulling-

out each injection-molded piece (50, 52) in said first direction after the injection-molding thereof;

the pulling-out unit (200) is arranged between the injection-molding unit (100) and the separating unit (300);

a second engagement means (15), adapted and arranged for engaging said first engagement means (51, 53), is disposed upon, and connected to, a reciprocable member (14) of said pulling-out unit (200);

said reciprocable member (14) of the pulling-out unit (200) is reciprocally-movable in said first direction and in a second direction, opposite to said first direction, with a predetermined stroke; said reciprocable member (14) being movable in said second direction so as to engage said second engagement means (15) with said first engagement means (51, 53); said reciprocable member (14) being thereafter movable in said first direction so as to pull-out each injection-molded piece (50, 52) in said first direction after the injection-molding thereof;

the limit of movement of said reciprocable member (14) in said first direction being such as to leave a trailing end of the runner-strip (50) still intruding through said opening (7) into said runner (5), whereby to cause a leading end of the runner-strip (50) of the next following injection-molded piece (50, 52) to become integrally joined to said trailing end;

said separating unit (300) has mechanical shock-imparting means adapted to impart mechanical shock to each injection-molded piece (50, 52) for separating the articles (52) from the runner-strip (50) after the articles (52) and the runner-strip (50) have left the injection-molding unit (100); and

said separating unit (300) is operationally-connected to the pulling-out unit (200) so that the operation of said mechanical shock-imparting means is synchronised with the reciprocation of said reciprocable member (14).

10. An apparatus for continuous manufacture of injection molded articles according to claim 9, wherein said first engagement means (51, 53), integral with said runner-strip (50), is a projection projected toward said second engaging means (15) of said pulling-out unit (200).
11. An apparatus for continuous manufacture of injection molded articles according to claim 8 or 9, wherein said second engaging means (15) of said pulling-out unit (200) is a rotating lever engaging with said puller engagement means (51, 53) of said runner-strip (50) only in the direction in which said runner-strip (50) is pulled out.
12. An apparatus for continuous manufacture of injection molded articles according to claim 10 or 11 wherein said predetermined stroke of said reciprocating



ing member (14) is the same as the length of said runner-strip molded by one-shot injection.

13. An apparatus for continuous manufacture of injection molded articles according to any one of claims 9 to 12, wherein said shock means comprises beating members (29, 30) disposed at both sides of said articles (52) attached to said runner-strip (50), so as to beat both sides of said articles (52). 5
14. An apparatus for continuous manufacture of injection molded articles according to any one of claims 9 to 13, wherein said mechanical shock-imparting means is disposed at both sides of said article (52) attached to said runner-strip (50) and comprises a pair of faces facing each other, each face having either a male or a female pattern disposed thereupon, for shaping said articles (52), respectively, said faces being movable towards and away from each other during operation. 10 15 20
15. An apparatus for continuous manufacture of injection molded articles according to any one of claims 9 to 14, wherein said collecting unit (400) for said runner-strip 50 is provided with a guiding member (36) extending from said separating unit (300) to said storage (1) in said injection molding unit (100). 25
16. An apparatus for continuous manufacture of injection molded articles according to any one of claims 9 to 15, wherein pressing and curving means (37) are provided for shaping said runner-strip (50) prior to feeding said runner-strip (50) to said storage (1). 30

Patentansprüche

1. Verfahren zum kontinuierlichen Herstellen spritzgossener Gegenstände, bei dem Gegenstände (52) in einer Spritzgießeinheit (100) aus einem geschmolzenen Material gegossen werden, das durch einen Eingußkanal (5), der an der Innerseite einer ortsfesten Form(3) und/oder einer beweglichen Form(4) der Spritzgießeinheit(100) ausgebildet ist, in einen Hohlraum (6) eingespritzt wird, der so ausgebildet ist, daß er mit dem Eingußkanal (5) in Verbindung steht, um ein Gußteil (50, 52) zu bilden; wobei das Gußteil (50, 52) einen in dem Eingußkanal (5) gegossenen Eingußkanalstreifen (50) und eine Anzahl daran befestigter Gegenstände (52) umfaßt, die in den Hohlraum (6) gegossen werden; und wobei das Gußteil (50, 52) einer Trenneinheit (300) zugeführt wird, um das Gußteil (50, 52) nach dem Gießen in den Eingußkanalstreifen (50) und die Gegenstände (52) zu trennen, und wobei die Gegenstände (52) und der Eingußkanalstreifen (50) des Gußteils (50, 52) in getrennten Sammeleinheiten (44, 400) gesammelt werden, dadurch gekennzeichnet, daß das Verfahren umfaßt einen Verbindungsschritt, mit dem das 40 45 50 55

hintere Ende des mit einem einzelnen Einspritzvorgang gegossenen Eingußkanalstreifens (50) durch eine Öffnung (7) in der ortsfesten Form (3) und/oder der beweglichen Form (4) hindurch mit dem vorderen Ende eines durch einen nachfolgenden Einspritzvorgang gegossenen nachfolgenden Eingußkanalstreifen (50) verbunden wird, während das hintere Ende dieses Eingußkanalstreifens (50) in der Spritzgießeinheit (100) verbleibt, so daß das bei jedem einzelnen Einspritzvorgang gegossene Gußteil (50, 52) mit einem vorhergehenden Gußteil (50, 52) und einem nachfolgenden Gußteil (50, 52) verbunden ist, um eine fortlaufende Reihe der Gußteile (50, 52) zu bilden,

einen Abziehschritt, der mit einer Abzieheinheit (200) durchgeführt wird, die diese Reihen von Gußteilen (50, 52) nacheinander abzieht; und

einen Trennschritt, der mit der Trenneinheit (300) durchgeführt wird, deren Arbeitsweise mit der Arbeitsweise der Abzieheinheit (200) koordiniert ist, wobei auf jedes Gußteil (50, 52) eine mechanische Stoßbelastung ausgeübt wird, so daß die Gegenstände (52) von dem Eingußkanalstreifen (50) getrennt werden.

2. Verfahren zum kontinuierlichen Herstellen spritzgossener Gegenstände nach Anspruch 1, wobei sich ein Ende des Eingußkanals (5) zumindest bis zu einer Seitenfläche der beweglichen Form 3 und/oder der ortsfesten Form (4) neben der Abzieheinheit (200) erstreckt, um eine Öffnung (7) zu bilden.
3. Verfahren zum kontinuierlichen Herstellen spritzgossener Gegenstände nach Anspruch 1 oder 2, wobei die Abzieheinheit (200) für das Gußteil (50, 52) mit einem hin- und hergehenden Teil (14) versehen ist, das mit einer Eingriffseinrichtung (15) versehen ist, die mit dem Eingußkanalstreifen in Eingriff bringbar ist, um den Eingußkanalstreifen nur in einer Abziehrichtung zu bewegen.
4. Verfahren zum kontinuierlichen Herstellen spritzgossener Gegenstände nach einem der vorhergehenden Ansprüche, wobei die Trenneinheit (300) mit Schlagteilen (29, 30) versehen ist, um auf den Gegenstand (52) einen Schlag auszuüben.
5. Verfahren zum kontinuierlichen Herstellen spritzgossener Gegenstände nach einem der vorhergehenden Ansprüche, wobei die Trenneinheit (300) mit einem männlichen und einem weiblichen Gesenk (31, 32) ausgerüstet ist, die Muster zum Gießen der Gegenstände (52) haben, so daß das Gußteil (50, 52) durch diese Gesenke (31, 32) von beiden Seiten her druckbelastet wird, um es zu beschneiden und in die Gegenstände (52) und den Eingußkanalstreifen (50) zu trennen.



6. Verfahren zum kontinuierlichen Herstellen spritzgegossener Gegenstände nach einem der vorhergehenden Ansprüche, wobei die Sammeleinheit (400) für den Eingußkanalstreifen (50) zwischen der Trenneinheit (300) und einem Vorratsspeicher (1) der Spritzgießeinheit (100) angeordnet ist und ein Führungsteil (36) zum Führen des Eingußkanalstreifens (50) aufweist. 5
7. Verfahren zum kontinuierlichen Herstellen spritzgegossener Gegenstände nach einem der vorhergehenden Ansprüche, wobei die Sammeleinheit (44) für den Gegenstand (52) ein unter der Trenneinheit (300) angeordneter Trichter ist. 10
8. Verfahren zum kontinuierlichen Herstellen spritzgegossener Gegenstände nach einem der Ansprüche 1 bis 7, wobei der Eingußkanalstreifen (50) durch eine Andrück- Krümmungseinrichtung (37) geformt wird, bevor er dem Vorratsspeicher (1) zugeführt wird. 20
9. Vorrichtung zum kontinuierlichen Herstellen spritzgegossener Gegenstände (52), wobei die Vorrichtung umfaßt: - eine Spritzgießeinheit (100); eine Trenneinheit (300); und Sammeleinheiten (44, 400); 25
wobei die Spritzgießeinheit (100) eine Speichereinrichtung (1), eine ortsfeste Form (3), eine bewegliche Form (4) und eine Einspritzeinrichtung umfaßt; wobei die bewegliche Form (4) mit der ortsfesten Form (3) in und außer Eingriff bringbar ist; wobei die Speichereinrichtung (1) geeignet ist, geschmolzenes Material zu speichern; wobei die Einspritzeinrichtung geeignet und angeordnet ist, um das geschmolzene Material von der Speichereinrichtung (1) zu empfangen und in einem einzigen Einspritzvorgang in einen Hohlraum (6) und in einen Eingußkanal (5) einzuspritzen; wobei der Hohlraum (6) und der Eingußkanal (5) gemeinsam von der ortsfesten und der beweglichen Form (3, 4) gebildet werden, wenn diese in Eingriff stehen; wobei der Hohlraum (6) zum Gießen der Gegenstände (52) und der Eingußkanal (5) zum Gießen eines Eingußkanalstreifens (50) geeignet sind derart, daß die Gegenstände (52) und der Eingußkanalstreifen (50) als ein einstückiges Spritzgußteil einstückig miteinander verbunden sind, aber später leicht getrennt werden können; 30
wobei die Trenneinheit (300) geeignet und angeordnet ist, die Gegenstände (52) von dem Eingußkanalstreifen (50) zu trennen, nachdem die Gegenstände (52) die Spritzgießeinheit (100) verlassen haben; 35
wobei die Sammeleinheit (44, 400) als Sortiereinrichtung geeignet oder ausgebildet ist, so daß im Betrieb die eine Sammeleinheit (44) die Gegenstände (52) und die andere Sammeleinheit (400) die Eingußkanalstreifen (50) sammelt; 40
dadurch gekennzeichnet, 45

daß sich der Eingußkanal (5) axial bis zu einer Seitenfläche der beweglichen Form (4) und/oder der ortsfesten Form (3) erstreckt, um dort eine Öffnung (7) zu bilden, durch die jedes einzelne Spritzgußteil (50, 52) aus der Spritzgießeinheit (100) in einer ersten Richtung parallel zur Achse des Eingußkanals (5) und von den Formen (3, 4) weg herausgezogen werden kann;

daß der Eingußkanal (5) geeignet ist, ein mit den Eingußkanalstreifen (50) einstückiges erstes Eingriffsmittel (51, 53) als einstückiges Bestandteil des Spritzgußteils (50, 52) zu gießen;

daß eine Abzieheinheit (200) vorgesehen ist, um jedes Spritzgußteil (50, 52) nach dem Spritzgießen desselben in der besagten ersten Richtung herauszuziehen;

wobei die Abzieheinheit (200) zwischen der Spritzgießeinheit (100) und der Trenneinheit (300) angeordnet ist;

daß eine zum Eingriff mit dem ersten Eingriffsmittel (51, 53) geeignete zweite Eingriffseinrichtung (15) an einem hin- und hergehenden Teil (14) der Abzieheinheit (200) angeordnet und mit diesem verbunden ist;

wobei das hin- und hergehende Teil (14) der Abzieheinheit (200) mit einem bestimmten Hub in der besagten ersten Richtung und in einer zu der ersten Richtung entgegengesetzten zweiten Richtung hin und her bewegbar ist; wobei das hin- und hergehende Teil (14) in der zweiten Richtung bewegbar ist, damit die zweite Eingriffseinrichtung (15) mit dem ersten Eingriffsmittel (51, 53) in Eingriff gelangt; wobei das hin- und hergehende Teil (14) sodann in der ersten Richtung bewegbar ist, damit es jedes Spritzgußteil (50, 52) nach dem Spritzgießen desselben in der ersten Richtung herauszieht; wobei die Bewegung des hin- und hergehenden Teils (14) in der ersten Richtung so begrenzt ist, daß ein hinteres Ende des Eingußkanalstreifens (50) verbleibt, das durch die Öffnung (7) in den Eingußkanal (5) hineinragt, um ein vorderes Ende des Eingußkanalstreifens (50) des nachfolgenden Spritzgußteils (50, 52) mit diesem hinteren Ende einstückig zu verbinden;

wobei die Trenneinheit (300) mechanische Stoßbelastungsmittel hat, die geeignet sind, auf jedes Spritzgußteil (50, 52) eine mechanische Stoßbelastung auszuüben, um die Gegenstände (52) von dem Eingußkanalstreifen (50) zu trennen, nachdem die Gegenstände (52) und der Eingußkanalstreifen (50) die Spritzgießeinheit (100) verlassen haben;

wobei die Trenneinheit (300) mit der Abzieheinheit (200) betriebsmäßig verbunden ist, so daß der Betrieb der mechanischen Stoßbelastungseinrichtung mit der Hin- und Herbewegung des hin- und hergehenden Teils (14) synchronisiert ist.



10. Vorrichtung zum kontinuierlichen Herstellen spritzgegossener Gegenstände nach Anspruch 9, wobei das mit dem Eingußkanalstreifen (50) einstückige erste Eingriffsmittel (51, 53) ein Vorsprung ist, der zu dem zweiten Eingriffsmittel (15) der Abzieheinheit (200) hin vorspringt. 5
11. Vorrichtung zum kontinuierlichen Herstellen spritzgegossener Gegenstände nach Anspruch 8 oder 9, wobei das zweite Eingriffsmittel (15) der Abzieheinheit (200) ein schwenkbarer Hebel ist, der mit dem Abzieh- Eingriffsmittel (51, 53) des Eingußkanalstreifens 50 nur in der Richtung in Eingriff gelangt, in der der Eingußkanalstreifen (50) herausgezogen wird. 10 15
12. Vorrichtung zum kontinuierlichen Herstellen spritzgegossener Gegenstände nach Anspruch 10 oder 11, wobei der vorgegebene Hub des hin- und hergehenden Teils (14) der gleiche ist wie die Länge des durch einen Einspritzvorgang hergestellten Eingußkanalstreifens. 20
13. Vorrichtung zum kontinuierlichen Herstellen spritzgegossener Gegenstände nach einem der Ansprüche 9 bis 12, wobei die Stoßbelastungseinrichtung Schlagteile (29, 30) umfaßt, die auf beiden Seiten der an dem Eingußkanalstreifen (52) befestigten Gegenstände (52) angeordnet sind, um auf beide Seiten dieser Gegenstände eine Schläge auszuüben. 25 30
14. Vorrichtung zum kontinuierlichen Herstellen spritzgegossener Gegenstände nach einem der Ansprüche 9 bis 13, wobei die mechanische Stoßbelastungseinrichtung auf beiden Seiten des an dem Eingußkanalstreifen (50) befestigten Gegenstandes (52) angeordnet ist und zwei einander zugekehrte Flächen aufweist, wobei jede Fläche mit einem männlichen oder weiblichen Muster versehen ist, um die Gegenstände (52) zu formen, wobei diese Flächen im Betrieb zueinander hin und voneinander weg bewegbar sind. 35 40
15. Vorrichtung zum kontinuierlichen Herstellen spritzgegossener Gegenstände nach einem der Ansprüche 9 bis 14, wobei die Sammeleinheit (400) für den Eingußkanalstreifen (50) mit einem Führungsteil (36) versehen ist, das sich von der Trenneinheit (300) zu dem Speicher (1) in der Spritzgießeinheit (100) erstreckt. 45 50
16. Vorrichtung zum kontinuierlichen Herstellen spritzgegossener Gegenstände nach einem der Ansprüche 9 bis 15, wobei Andrück- und Krümmungsmittel (37) vorgesehen sind, um den Eingußkanalstreifen (50) zu formen, bevor der Eingußkanalstreifen (50) dem Speicher (1) zugeführt wird. 55

Revendications

1. Procédé de fabrication en continu d'articles moulés par injection, dans lequel des articles (52) sont moulés dans un dispositif de moulage par injection (100) à partir d'une matière fondue injectée par l'intermédiaire d'un canal de coulée (5), qui est formé sur la face intérieure d'un moule fixe (3) et/ou d'un moule mobile (4) dudit dispositif de moulage par injection (100), dans une empreinte (6), qui est formée de manière à communiquer avec ledit canal de coulée (5), afin de former une pièce moulée (50, 52); ladite pièce moulée (50, 52) comprenant une bande de liaison (50), qui est moulée dans ledit canal de coulée (5), et un grand nombre desdits articles, qui sont moulés dans ladite empreinte (6), et sont fixés à cette bande de liaison; et dans lequel ladite pièce moulée (50, 52) est avancée jusqu'à un dispositif de séparation (300) afin d'être séparée en ladite bande de liaison (50) et en lesdits articles (52) lorsque le moulage de ladite pièce (50, 52) est terminé; et dans lequel lesdits articles (52) et ladite bande de liaison (50) de ladite pièce (50, 52) sont recueillis, respectivement, dans des dispositifs collecteurs (44, 400) disposés séparément; ledit procédé étant caractérisé en ce qu'il comprend:
une étape de raccordement au cours de laquelle l'extrémité arrière de ladite bande de liaison (50), moulée par injection en une seule fois, est raccordée, à travers une ouverture (7) formée dans le moule fixe (3) et/ou dans le moule mobile (4), à l'extrémité avant de la bande de liaison suivante (50), moulée par une injection en une seule fois, tandis que l'extrémité arrière de ladite bande de liaison (50) est laissée dans ledit appareil (100) de moulage par injection, de telle sorte que ladite pièce (50, 52) moulée par chaque injection en une seule fois, se trouve reliée à une pièce précédente (50, 52) et à une pièce suivante (50, 52) de manière à former une série continue desdites pièces moulées (50, 52);
une étape d'extraction exécutée par un dispositif d'extraction (200) qui extrait ladite série desdites pièces moulées (50, 52) dans l'ordre; et
une étape de séparation exécutée par ledit dispositif de séparation (300), dont le fonctionnement est coordonné avec le fonctionnement dudit dispositif d'extraction (200), par application d'un choc mécanique à chaque pièce moulée (50, 52) tour à tour, de telle sorte que lesdits articles (52) soient séparés de ladite bande de liaison (50).
2. Procédé de fabrication en continu d'articles moulés par injection selon la revendication 1, dans lequel une des extrémités dudit canal de coulée (5) s'étend jusqu'à au moins une des faces latérales dudit moule mobile (3) et/ou dudit moule fixe (4) au voisinage dudit dispositif d'extraction (200) de manière à former une ouverture (7).



3. Procédé de fabrication en continu d'articles moulés par injection selon la revendication 1 ou 2, dans lequel ledit dispositif d'extraction (200) pour extraire ladite pièce moulée (50, 52) est pourvu d'un élément (14) à mouvement de va-et-vient comportant un moyen d'attaque (15) disposé de manière à attaquer ladite bande de liaison (50) afin de déplacer ladite bande de liaison uniquement dans une direction d'extraction. 5
 4. Procédé de fabrication, en continu d'articles moulés par injection selon l'une quelconque des revendications précédentes, dans lequel ledit dispositif de séparation (300) est pourvu d'éléments (29, 30) d'application de choc pour appliquer un choc auxdits articles (52). 10
 5. Procédé de fabrication en continu d'articles moulés par injection selon l'une quelconque des revendications précédentes, dans lequel ledit dispositif de séparation (300) est pourvu d'éléments de matriçage mâle et femelle (31, 32) comportant des dessins pour mouler lesdits articles (52), de telle sorte que ladite pièce (50, 52) soit pressée par lesdits éléments de matriçage (31, 32) sur ses deux côtés de manière à être parée et à être séparée en lesdits articles (52) et en ladite bande de liaison (50). 15
 6. Procédé de fabrication en continu d'articles moulés par injection selon l'une quelconque des revendications précédentes, dans lequel ledit dispositif collecteur (400) destiné à ladite bande de liaison (50) est placée entre ledit dispositif de séparation (300) et un moyen d'emmagasinement (1) dudit appareil de moulage par injection (100) et comprend un élément de guidage (36) pour guider ladite bande de liaison (50). 20
 7. Procédé de fabrication en continu d'articles moulés par injection selon l'une quelconque des revendications précédentes, dans lequel ledit dispositif collecteur (44) destiné audit article (52) est une trémie placée en-dessous dudit dispositif de séparation (300). 25
 8. Procédé de fabrication en continu d'articles moulés par injection selon l'une quelconque des revendications 1 à 7, dans lequel ladite bande de liaison (50) est mise en forme par un moyen (37) de pression et de cintrage de bande de liaison avant d'être avancée jusqu'audit magasin (1). 30
 9. Appareil de fabrication en continu d'articles (52) moulés par injection, l'appareil comprenant: un dispositif de moulage par injection (100); un dispositif de séparation (300); et des dispositifs collecteurs (44, 400); 35
- le dispositif de moulage par injection (100) comprenant un moyen d'emmagasinement (1), un

moule fixe (3), un moule mobile (4) et un moyen d'injection; le moule mobile (4) pouvant être déplacé de manière à être associé au moule fixe (3) et à en être séparé; le moyen d'emmagasinement (1) étant adapté de manière à emmagasiner la matière fondue; le moyen d'injection étant adapté et disposé de manière à recevoir la matière fondue en provenance du moyen d'emmagasinement (1) et à injecter la matière, au cours d'un cycle en une seule fois, dans une empreinte (6) et dans un canal de coulée axial (5); ladite empreinte (6) et ledit canal de coulée (5) étant formés par les moules fixe et mobile (3, 4), en combinaison, quand ils sont associés l'un à l'autre; ladite empreinte (6) étant adaptée de manière à mouler lesdits articles (52) et ledit canal de coulée (5) étant adapté de manière à mouler une bande de liaison (50) de telle façon que lesdits articles (52) et la bande de liaison (50) fassent initialement corps les uns avec les autres, sous la forme d'une pièce monobloc moulée par injection, mais puissent être ultérieurement facilement séparés;

le dispositif de séparation (300) étant adapté et disposé de manière à séparer les articles (52) de la bande de liaison (50) après que les articles (52) aient quitté le dispositif (100) de moulage par injection;

les dispositifs collecteurs (44, 400) étant adaptés et agencés avec des moyens de triage de telle sorte que, pendant le fonctionnement, un dispositif collecteur (44) recueille les articles (52) et un autre dispositif collecteur (400) recueille les bandes de liaison (50);

caractérisé en ce que:

ledit canal axial de coulée (5) s'étend axialement jusqu'à une face latérale dudit moule mobile (3) et/ou dudit moule fixe (4) de manière à y former une ouverture (7), à travers laquelle chaque pièce respective (50, 52) moulée par injection peut être extraite du dispositif de moulage par injection (100), dans une première direction, parallèlement à l'axe du canal de coulée (5) et être éloignée des moules (3, 4);

ledit canal de coulée (5) est adapté de manière à mouler un premier moyen d'engagement (51, 53) faisant corps avec la bande de liaison (50), en tant que partie intégrante de ladite pièce (50, 52) moulée par injection;

un dispositif d'extraction (200) est prévu pour extraire, dans ladite première direction, chaque pièce moulée par injection (50, 52) après son moulage par injection;

le dispositif d'extraction (200) est disposé entre le dispositif de moulage par injection (100) et le dispositif de séparation (300);

un second moyen d'engagement (15), adapté et disposé de manière à attaquer ledit premier moyen d'engagement (51, 53), est disposé sur un élément (14) à mouvement de va-et-vient et est relié à cet élément;



ledit élément (14) à mouvement de va-et-vient du dispositif d'extraction (200) peut être déplacé suivant un mouvement alternatif dans ladite première direction et dans une seconde direction, opposée à ladite première direction sur une course prédéterminée; ledit élément (14) à mouvement de va-et-vient pouvant être déplacé dans ladite seconde direction de manière à attaquer ledit second moyen d'engagement (15) avec ledit premier moyen d'engagement (51, 53); ledit élément (14) à mouvement de va-et-vient pouvant ensuite être déplacé dans ladite première direction de manière à extraire chaque pièce moulée par injection (50, 52) dans ladite première direction après le moulage par injection de cette pièce;

la limite de déplacement dudit élément (14), à mouvement de va-et-vient, dans ladite première direction étant telle qu'elle laisse l'extrémité arrière de la bande de liaison (50) pénétrant encore, à travers ladite ouverture (7), dans ledit canal de coulée (5), ce qui a pour effet que l'extrémité avant de la bande de liaison (50) de la pièce moulée par injection (50, 52) venant immédiatement à la suite est amenée à faire corps avec ladite extrémité arrière;

ledit dispositif de séparation (300) comporte un moyen d'application de choc mécanique, adapté de manière à appliquer un choc mécanique à chaque pièce moulée par injection (50, 52) pour séparer les articles (52) de la bande de liaison (50) après que les articles (52) et la bande de liaison (50) aient quitté le dispositif de moulage par injection (100); et

ledit dispositif de séparation (300) est relié fonctionnellement au dispositif d'extraction (200) de telle sorte que le fonctionnement dudit moyen d'application de choc mécanique soit synchronisé avec le mouvement alternatif dudit élément (14) à mouvement de va-et-vient (14).

10. Appareil de fabrication en continu d'articles moulés par injection selon la revendication 9, dans lequel ledit premier moyen d'engagement (51, 53) faisant corps avec ladite bande de liaison (50) est une protubérance faisant saillie vers ledit second moyen d'engagement (15) dudit dispositif d'extraction (200).
11. Appareil de fabrication en continu d'articles moulés par injection selon la revendication 8 ou la revendication 9, dans lequel ledit second moyen d'engagement (15) dudit dispositif d'extraction (200) est un levier tournant venant attaquer ledit premier moyen d'engagement (51, 53) de ladite bande de liaison (50) uniquement dans la direction dans laquelle ladite bande de liaison (50) est extraite.
12. Appareil de fabrication en continu d'articles moulés par injection selon la revendication 10 ou 11, dans

lequel ladite course prédéterminée dudit élément (14) à mouvement de va-et-vient a la même longueur que celle de ladite bande de liaison moulée par injection en une seule fois.

13. Appareil de fabrication d'articles moulés par injection selon l'une quelconque des revendications 9 à 12, dans lequel ledit moyen communiquant un choc comprend des éléments de frappe (29, 30) disposés de part et d'autre desdits articles (52) fixés à ladite bande de liaison (50), de manière à frapper les deux côtés desdits articles (52).
14. Appareil de fabrication en continu d'articles moulés par injection selon l'une quelconque des revendications 9 à 13, dans lequel ledit moyens d'application de choc mécanique est disposé de part et d'autre dudit article (52) fixé à ladite bande de liaison (50) et comprend une paire de faces orientées l'une vers l'autre, chaque face comportant soit un dessin en relief, soit un dessin en creux, disposé sur ces faces, pour mettre en forme lesdits articles (52), respectivement, lesdites faces pouvant être rapprochées et éloignées l'une de l'autre pendant le fonctionnement.
15. Appareil de fabrication en continu d'articles moulés par injection selon l'une quelconque des revendications 9 à 14, dans lequel ledit dispositif collecteur (400) destiné à ladite bande de liaison (50) est pourvu d'un élément de guidage (36) s'étendant depuis ledit dispositif de séparation (300) jusqu'audit moyen d'emmagasinage (1) se trouvant dans ledit dispositif de moulage par injection (100).
16. Appareil de fabrication en continu d'articles moulés par injection selon l'une quelconque des revendications 9 à 15, dans lequel le moyen de pression et de cintrage (37) sert à mettre en forme ladite bande de liaison (50) avant d'avancer ladite bande de liaison (50) jusqu'au moyen d'emmagasinage (1).

