CLAIMS

1. An injection stretch blow molding device comprising:

an injection molding section that produces N (N is an integer equal to or larger than 2) preforms by injection molding;

a cooling section that subjects the N preforms produced by injection molding to forced cooling;

a heating section that continuously transfers and heats the N preforms subjected to forced cooling; and

a blow molding section that subjects the N preforms heated by the heating section to stretch blow molding in n (n is an integer equal to or larger than 2) operations, the blow molding section simultaneously stretch blow molding M (M=N/n, M is a natural number) preforms among the N preforms into M containers.

2. The injection stretch blow molding device as defined in claim 1,

wherein the heating section heats M preforms among the N preforms that are initially subjected to blow molding and M preforms among the N preforms that are subsequently subjected to blow molding in a row during continuous transfer.

3. The injection stretch blow molding device as defined in claim 1 or 2, wherein:

each of the N preforms includes a neck;

the injection molding section produces the N preforms by injection molding in an upright state in which the neck is positioned on an upper side;

the heating section heats the N preforms in an inverted state in which the neck is positioned on a lower side, and

the cooling section includes:

an inversion section;

N first cooling pots that are provided on a first side of the inversion section; and

N second cooling pots that are provided on a second side of the inversion section that is opposite to the first side.

4. The injection stretch blow molding device as defined in claim 3, further comprising:

a recess being formed in an outer wall of each of the N first cooling pots and the N second cooling pots, and

wherein the inversion section includes a flow passage for a refrigerant, the flow passage includes a first flow passage that communicates with the recess of the N first cooling pots to circulate the refrigerant, and a second flow passage that communicates with the recess of the N second cooling pots to circulate the refrigerant.

5. The injection stretch blow molding device as defined in claim 4, wherein:

M is an even number, and

M/2 small diameter holes and M/2 large diameter holes are formed as cooling pot insertion holes in each of the first side and the second side of the inversion section, the M/2 small diameter holes and M/2 large diameter holes are alternately formed at an equal pitch in each of n rows.

6. The injection stretch blow molding device as defined in any one of claims 3 to 5,

wherein the cooling section subjects the N preforms to forced cooling over a time equal to or longer than an injection molding cycle time required for the injection molding section to produce the N preforms by injection molding.

7. The injection stretch blow molding device as defined in claim 6,

wherein the N preforms in the upright state that have been produced by injection molding in an (m+1)th cycle are held by the N second cooling pots, and cooled while

the N preforms in the upright state that have been produced by injection molding in an mth cycle are held by the N first cooling pots, and cooled in the inverted state after being inverted by the inversion section.

8. The injection stretch blow molding device as defined in any one of claims 1 to 7,

wherein the heating section is disposed along a continuous transfer path that forms part of a transfer path in which (k×N) (k is an integer equal to or larger than 2) preforms that correspond to k injection molding cycles are transferred.

9. The injection stretch blow molding device as defined in claim 8,

wherein the transfer path further includes:

a plurality of sprockets;

a plurality of transfer members that respectively hold one preform, two transfer members among the plurality of transfer members that are adjacent to each other in a transfer direction coming in contact with each other; and

a guide rail that guides the plurality of transfer members along the transfer direction to engage the plurality of sprockets.

10. The injection stretch blow molding device as defined in claim 9, wherein:

M transfer members that are adjacent to each other in the transfer direction are connected by a connection member to form one transfer jig;

some sprockets among the plurality of sprockets that are adjacent to each other in the transfer direction are continuously driven; and

other sprockets among the plurality of sprockets that are adjacent to each other in the transfer direction are intermittently driven at a high speed as compared with the some sprockets.

11. The injection stretch blow molding device as defined in claim 10,

wherein the cooling section transfers the N preforms subjected to forced cooling to n transfer jigs.

12. The injection stretch blow molding device as defined in claim 11, further comprising:

a discharge device that sequentially discharges the n transfer jigs, and causes a forefront transfer member of the transfer jig to engage a drive sprocket among the plurality of sprockets that is positioned on a most upstream side.

13. The injection stretch blow molding device as defined in any one of claims 1 to 12, further comprising:

an intermittent transfer mechanism that intermittently transfers the M preforms heated by the heating section to the blow molding section.

14. The injection stretch blow molding device as defined in any one of claims 1 to 13, further comprising:

a removal device that removes the N preforms from the injection molding section; and

a transfer device that transfers the N preforms from the removal device to the cooling section, wherein:

the injection molding section simultaneously producing M preforms among the N preforms by injection molding in each of n rows that are parallel to a first direction, a first interval between two adjacent preforms in each of the n rows at a center position in the first direction differs from a second interval between two other preforms when M is an even number;

the removal device transfers the M preforms in each of the n rows from the

injection molding section along a second direction that is perpendicular to the first direction, and changing a preform arrangement pitch in the second direction to a narrow pitch;

the transfer device changes the first interval so that the first interval coincides with the second interval; and

the cooling section simultaneously subjects M preforms among the N preforms to forced cooling in each of n rows that are parallel to the first direction.

15. An injection stretch blow molding device comprising:

an injection molding section that produces N (N is an integer equal to or larger than 2) preforms by injection molding;

a heating section that continuously transfers and heats the N preforms transferred from the injection molding section; and

a blow molding section that subjects the N preforms heated by the heating section to stretch blow molding in n (n is an integer equal to or larger than 2) operations, the blow molding section simultaneously stretch blow molding M (M=N/n, M is a natural number) preforms among the N preforms into M containers.

16. A molded article heating device comprising:

a transfer path that transfers a plurality of molded articles; and

a heating section that is provided along the transfer path,

wherein the transfer path includes a plurality of sprockets, a plurality of transfer members that respectively hold one molded article, two transfer members among the plurality of transfer members that are adjacent to each other in a transfer direction coming in contact with each other, and a guide rail that guides the plurality of transfer members along the transfer direction to engage the plurality of sprockets.

17. The molded article heating device as defined in claim 16, further comprising:

a plurality of transfer members that are adjacent to each other in the transfer direction being connected by a connection member to form one transfer jig,

wherein some sprockets among the plurality of sprockets that are adjacent to each other in the transfer direction are continuously driven, and

wherein other sprockets among the plurality of sprockets that are adjacent to each other in the transfer direction are intermittently driven at a high speed as compared with the some sprockets.

18. The molded article heating device as defined in claim 17, further comprising:

a discharge device that discharges the transfer jig, and causes a forefront transfer member of the transfer jig to engage a drive sprocket among the plurality of sprockets that is positioned on a most upstream side.

19. An injection stretch blow molding device comprising:

an injection molding section that produces N (N is an integer equal to or larger than 2) preforms by injection molding, the injection molding section simultaneously producing M (M=N/n, M is a natural number) preforms by injection molding in each of n (n is an integer equal to or larger than 2) rows that are parallel to a first direction;

a cooling section that subjects the N preforms transferred from the injection molding section in a second direction perpendicular to the first direction to forced cooling in each of n rows that are parallel to the first direction in units of M preforms;

a heating section that continuously transfers and heats the N preforms that have been cooled and transferred in the first direction in units of M preforms along a roundabout path; and

a blow molding section that subjects the N preforms heated by the heating section to stretch blow molding in n (n is an integer equal to or larger than 2) operations,

M preforms being simultaneously and intermittently transferred to the blow molding section along the second direction, and the blow molding section simultaneously stretch blow molding M preforms into M containers.

CLAIMS

1. An injection stretch blow molding device comprising:

an injection molding section that produces N (N is an integer equal to or larger than 2) preforms by injection molding;

a cooling section that subjects the N preforms produced by injection molding to forced cooling;

a heating section that continuously transfers and heats the N preforms subjected to forced cooling; and

a blow molding section that subjects the N preforms heated by the heating section to stretch blow molding in n (n is an integer equal to or larger than 2) operations, the blow molding section simultaneously stretch blow molding M (M=N/n, M is a natural number) preforms among the N preforms into M containers.

2. The injection stretch blow molding device as defined in claim 1,

wherein the heating section heats M preforms among the N preforms that are initially subjected to blow molding and M preforms among the N preforms that are subsequently subjected to blow molding in a row during continuous transfer.

3. The injection stretch blow molding device as defined in claim 1, wherein:

each of the N preforms includes a neck;

the injection molding section produces the N preforms by injection molding in an upright state in which the neck is positioned on an upper side;

the heating section heats the N preforms in an inverted state in which the neck is positioned on a lower side, and

the cooling section includes:

an inversion section;

N first cooling pots that are provided on a first side of the inversion section; and

N second cooling pots that are provided on a second side of the inversion section that is opposite to the first side.

4. The injection stretch blow molding device as defined in claim 3, further comprising:

a recess being formed in an outer wall of each of the N first cooling pots and the N second cooling pots, and

wherein the inversion section includes a flow passage for a refrigerant, the flow

passage includes a first flow passage that communicates with the recess of the N first cooling pots to circulate the refrigerant, and a second flow passage that communicates with the recess of the N second cooling pots to circulate the refrigerant.

5. The injection stretch blow molding device as defined in claim 4, wherein:

M is an even number, and

M/2 small diameter holes and M/2 large diameter holes are formed as cooling pot insertion holes in each of the first side and the second side of the inversion section, the M/2 small diameter holes and M/2 large diameter holes are alternately formed at an equal pitch in each of n rows.

6. The injection stretch blow molding device as defined in claim 3,

wherein the cooling section subjects the N preforms to forced cooling over a time equal to or longer than an injection molding cycle time required for the injection molding section to produce the N preforms by injection molding.

7. The injection stretch blow molding device as defined in claim 6,

wherein the N preforms in the upright state that have been produced by injection molding in an (m+1)th cycle are held by the N second cooling pots, and cooled while the N preforms in the upright state that have been produced by injection molding in an mth cycle are held by the N first cooling pots, and cooled in the inverted state after being inverted by the inversion section.

8. The injection stretch blow molding device as defined in claim 1,

wherein the heating section is disposed along a continuous transfer path that forms part of a transfer path in which (kxN) (k is an integer equal to or larger than 2) preforms that correspond to k injection molding cycles are transferred.

9. The injection stretch blow molding device as defined in claim 8,

wherein the transfer path further includes:

a plurality of sprockets;

a plurality of transfer members that respectively hold one preform, two transfer members among the plurality of transfer members that are adjacent to each other in a transfer direction coming in contact with each other; and

a guide rail that guides the plurality of transfer members along the transfer direction to engage the plurality of sprockets.

10. The injection stretch blow molding device as defined in claim 9, wherein:

M transfer members that are adjacent to each other in the transfer direction are connected by a connection member to form one transfer jig;

some sprockets among the plurality of sprockets that are adjacent to each other in the transfer direction are continuously driven; and

other sprockets among the plurality of sprockets that are adjacent to each other in the transfer direction are intermittently driven at a high speed as compared with the some sprockets.

11. The injection stretch blow molding device as defined in claim 10,

wherein the cooling section transfers the N preforms subjected to forced cooling to n transfer jigs.

12. The injection stretch blow molding device as defined in claim 11, further comprising:

a discharge device that sequentially discharges the n transfer jigs, and causes a forefront transfer member of the transfer jig to engage a drive sprocket among the plurality of sprockets that is positioned on a most upstream side.

13. The injection stretch blow molding device as defined in claim 1, further comprising:

an intermittent transfer mechanism that intermittently transfers the M preforms heated by the heating section to the blow molding section.

14. The injection stretch blow molding device as defined in claim 1, further comprising:

a removal device that removes the N preforms from the injection molding section; and

a transfer device that transfers the N preforms from the removal device to the cooling section, wherein:

the injection molding section simultaneously produces M preforms among the N preforms by injection molding in each of n rows that are parallel to a first direction, a first interval between two adjacent preforms in each of the n rows at a center position in the first direction differs from a second interval between two other preforms when M is an even number;

the removal device transfers the M preforms in each of the n rows from the injection molding section along a second direction that is

perpendicular to the first direction, and changing a preform arrangement pitch in the second direction to a narrow pitch;

the transfer device changes the first interval so that the first interval coincides with the second interval; and

the cooling section simultaneously subjects M preforms among the N preforms to forced cooling in each of n rows that are parallel to the first direction.

15. An injection stretch blow molding device comprising:

an injection molding section that produces N (N is an integer equal to or larger than 2) preforms by injection molding;

a heating section that continuously transfers and heats the N preforms transferred from the injection molding section; and

a blow molding section that subjects the N preforms heated by the heating section to stretch blow molding in n (n is an integer equal to or larger than 2) operations, the blow molding section simultaneously stretch blow molding M (M=N/n, M is a natural number) preforms among the N preforms into M containers.

16. A molded article heating device comprising:

a transfer path that transfers a plurality of molded articles; and

a heating section that is provided along the transfer path,

wherein the transfer path includes a plurality of sprockets, a plurality of transfer jigs that are not connected to each other, and a guide rail that guides the plurality of transfer jigs along a transfer direction to engage the plurality of sprockets,

wherein each of the plurality of transfer jigs includes:

i) a plurality of transfer members, wherein each of said transfer members holds one respective molded article; and

ii) a connection member that connects the plurality of transfer members so that the plurality of transfer members integrally move in the transfer direction, and

wherein each said connection member includes a chain segment that engages the plurality of sprockets, and the chain segments of transfer jigs that are adjacent in the transfer direction are not connected.

17. The molded article heating device as defined in claim 16,

wherein some sprockets among the plurality of sprockets that are adjacent to each other in the transfer direction are continuously driven, and

wherein other sprockets among the plurality of sprockets that are adjacent to

each other in the transfer direction are intermittently driven at a high speed as compared with the some sprockets.

18. The molded article heating device as defined in claim 17, further comprising:

a discharge device that discharges the transfer jig, and causes a forefront transfer member of the transfer jig to engage a drive sprocket among the plurality of sprockets that is positioned on a most upstream side.

19. An injection stretch blow molding device comprising:

an injection molding section that produces N (N is an integer equal to or larger than 2) preforms by injection molding, the injection molding section simultaneously producing M (M=N/n, M is a natural number) preforms by injection molding in each of n (n is an integer equal to or larger than 2) rows that are parallel to a first direction;

a cooling section that subjects the N preforms transferred from the injection molding section in a second direction perpendicular to the first direction to forced cooling in each of n rows that are parallel to the first direction in units of M preforms;

a heating section that continuously transfers and heats the N preforms that have been cooled and transferred in the first direction in units of M preforms along a roundabout path; and

a blow molding section that subjects the N preforms heated by the heating section to stretch blow molding in n (n is an integer equal to or larger than 2) operations, M preforms being simultaneously and intermittently transferred to the blow molding section along the second direction, and the blow molding section simultaneously stretch blow molding M preforms into M containers.

20. The molded article heating device as defined in claim 16,

wherein each of the plurality of transfer members includes a ring-like member, and

wherein the connection member connects the plurality of transfer members while allowing two ring-like members adjacent to each other in the transfer direction to come in rolling contact with each other.