CLAIMS

We claim:

1. A molten material funnel, comprising:

a first outlet lip; and

a second outlet lip, wherein first and second outlet lips are configured to both contact molten material communicated through a molten material funnel.

2. The molten material funnel of claim 1, wherein molten material moves in a direction D into the molten material funnel, the first outlet lip and the second outlet lip both angled relative to the direction D.

3. The molten material funnel of claim 2, wherein an angle of the first outlet lip relative to the direction D is greater than an angle of the second outlet lip relative to the direction D.

4. The molten material funnel of claim 2, wherein an angle of the first outlet lip relative to the direction D is greater than 40 degrees, and the angle of the second outlet lip relative to the direction D is less than 40 degrees.

5. The molten material funnel of claim 2, wherein an angle of the first outlet lip relative to the direction D is about 40 degrees, and the angle of the second outlet lip relative to the direction D is about 25 degrees.

6. The molten material funnel of claim 1, wherein the molten material communicates from the molten material funnel to an opening in a shot tube, the opening extending radially from a bore of the shot tube.

7. The molten material funnel of claim 6, wherein molten material moves in a direction D into the molten material funnel, the direction D normal to a tangent of the bore.

8. The molten material funnel of claim 7, wherein the opening includes first portion and a second portion, the first portion extending from the bore along an first axis that is angled relative to the direction D, the second portion extending from the first portion along a second axis that is angled relative to the first axis.

9. The molten material funnel of claim 8, wherein the first outlet lip is configured to directly contact the shot tube in the second portion.

10. The molten material funnel of claim 1, wherein the first and second outlet lips are configured to reduce an impingement angle of the molten material on a shot tube to less than 60 degrees from a tangent of a bore of the shot tube.

11. The molten material funnel of claim 1, including wherein at least one outlet lip comprises a replaceable sheet.

12. The molten material funnel of claim 11, wherein both the funnel and replaceable sheet comprises a steel, a superalloy, a refractory metal, a ceramic or a hybrid material.

13. The molten material funnel of claim 1, wherein the first outlet lip extends from a first wall of the molten material funnel, and the second outlet lip extends from an opposing, second wall of the molten material funnel.

14. The molten material funnel of claim 13, wherein molten material moves in a direction D into the molten material funnel, the first wall and the second wall aligned with the direction D.

15. A casting assembly, comprising:

a supply of molten material;

a shot tube that communicates molten material to a die; and

a funnel having at least one outlet lip, the funnel configured to communicate molten material from the supply to the shot tube such that the molten material impinges on the at least one outlet lip.

16. The casting assembly of claim 15, wherein at least one outlet lip comprises a first outlet lip and a second outlet lip, the funnel configured to communicate molten material from the first outlet lip to the second outlet lip, and then to the shot tube.

17. The casting assembly of claim 15, wherein the at least one outlet lip comprises a removable plate.

18. The casting assembly of claim 15, wherein the die comprises a mold cavity for a turbomachine component.

19. A method of communicating molten material, comprising:

impinging a flow of molten material on a surface of a funnel prior to communicating the molten material to a die cavity.

20. The method of claim 19, including impinging the molten material on both a first outlet lip and a second outlet lip of the funnel.

21. The method of claim 19, using at least three distinct funnel orientations to communicate molten material to at least three distinct areas of a shot tube.

CLAIMS

We claim:

1. A molten material funnel, comprising:

a first outlet lip; and

a second outlet lip, wherein first and second outlet lips are configured to both contact molten material communicated through a molten material funnel.

2. The molten material funnel of claim 1, wherein molten material travels under the influence of gravity in a direction D into the molten material funnel, the first outlet lip and the second outlet lip both angled relative to the direction D.

3. The molten material funnel of claim 2, wherein an angle of the first outlet lip relative to the direction D is greater than an angle of the second outlet lip relative to the direction D.