CLAIMS

What is claimed is:

1. An airfoil comprising:

an airfoil body including a leading edge and a trailing edge and a first side wall and a second side wall that is spaced apart from the first side wall, the first side wall and the second side wall joining the leading edge and the trailing edge and at least partially defining a cavity in the airfoil body; and

a damper member enclosed in the cavity, the damper member being loose within the cavity.

2. The airfoil as recited in claim 1, wherein the damper member is tapered.

3. The airfoil as recited in claim 1, further including at least one guide member fixed with regard to the first sidewall and the second sidewall, the at least one guide member including a bearing surface that circumscribes the damper member.

4. The airfoil as recited in claim 3, wherein the bearing surface is frustoconical.

5. The airfoil as recited in claim 3, wherein the airfoil body defines a longitudinal axis, and the bearing surface is inclined with regard to the longitudinal axis.

6. The airfoil as recited in claim 3, wherein the at least one guide member includes at least one support arm fixed to at least one of the first sidewall or the second sidewall, and a guide piece is supported on the least one support arm, the guide piece including a guide wall that defines an opening through which the damper member extends, the guide wall including the bearing surface.

7. The airfoil as recited in claim 6, wherein the at least one support arm is inclined with respect to a longitudinal axis defined by the airfoil body.

8. The airfoil as recited in claim 6, wherein the at least one support arm includes at least one opening there through.

9. The airfoil as recited in claim 3, wherein the at least one guide member includes a plurality of guide members that are longitudinally spaced apart with respect to a longitudinal axis defined by the airfoil body.

10. The airfoil as recited in claim 3, wherein the at least one guide member includes a cup having sidewalls, a bottom wall joining the sidewalls, and an open top through which the damper member extends.

11. The airfoil as recited in claim 10, wherein the bottom wall includes openings extending there through.

12. The airfoil as recited in claim 1, wherein the damper member is longitudinally elongated with respect to a longitudinal axis defined by the airfoil body.

13. The airfoil as recited in claim 12, wherein the damper member extends between a first terminal end and a second terminal end, and the first terminal end and the second terminal end are free of any connection to the airfoil body.

14. The airfoil as recited in claim 1, wherein the damper member includes longitudinally alternating bearing sections and non-bearing sections with respect to a longitudinal axis defined by the airfoil body.

15. A turbine engine comprising:

optionally, a fan;

a compressor section;

a combustor in fluid communication with the compressor section; and

a turbine section in fluid communication with the combustor, the turbine section being coupled to drive the compressor section and the fan, and

at least one of the fan, the compressor section and the turbine section including an airfoil having an airfoil body including a leading edge and a trailing edge and a first side wall and a second side wall that is spaced apart from the first side wall, the first side wall and the second side wall joining the leading edge and the trailing edge and at least partially defining a cavity in the airfoil body, and a damper member enclosed in the cavity, the damper member being loose within the cavity.

16. The turbine engine as recited in claim 15, wherein the damper member is tapered.

17. The turbine engine as recited in claim 15, further including at least one guide member fixed with regard to the first sidewall and the second sidewall, the at least one guide member including a bearing surface that circumscribes the damper member.

18. The turbine engine as recited in claim 17, wherein the bearing surface is frustoconical.

19. The turbine engine as recited in claim 15, wherein the damper member includes longitudinally alternating bearing sections and non-bearing sections with respect to a longitudinal axis defined by the airfoil body.

20. A method for processing an airfoil, the method comprising:

depositing multiple layers of a powdered metal onto one another;

joining the layers to one another with reference to data relating to a particular cross-section of an airfoil; and

producing the airfoil with an airfoil body including a leading edge and a trailing edge and a first side wall and a second side wall that is spaced apart from the first side wall, the first side wall and the second side wall joining the leading edge and the trailing edge and at least partially defining a cavity in the airfoil body, and a damper member enclosed in the cavity, the damper member being loose within the cavity.

CLAIMS

1. An airfoil comprising:

an airfoil body including a leading edge and a trailing edge and a first side wall and a second side wall that is spaced apart from the first side wall, the first side wall and the second side wall joining the leading edge and the trailing edge and at least partially defining a cavity in the airfoil body;

a damper member enclosed in the cavity, the damper member being loose within the cavity; and

at least one guide member fixed with regard to the first sidewall and the second sidewall, the at least one guide member including a bearing surface that circumscribes the damper member, wherein the at least one guide member includes at least one support arm fixed to at least one of the first sidewall or the second sidewall, and a guide piece is supported on the least one support arm, the guide piece including a guide wall that defines an opening through which the damper member extends, the guide wall including the bearing surface,

wherein the airfoil body defines a longitudinal axis, and the bearing surface is inclined with regard to the longitudinal axis,

the at least one guide member includes a plurality of guide members that are longitudinally spaced apart with respect to a longitudinal axis defined by the airfoil body, and

the damper member includes longitudinally alternating bearing sections and non-bearing sections with respect to a longitudinal axis defined by the airfoil body.

2. The airfoil as recited in claim 1, wherein the damper member is tapered.

3. The airfoil as recited in claim 1, wherein the bearing surface is frustoconical.

4. The airfoil as recited in claim 1, wherein the at least one support arm is inclined with respect to a longitudinal axis defined by the airfoil body.

5. The airfoil as recited in claim 1, wherein the at least one support arm includes at least one opening there through.

6. The airfoil as recited in claim 1, wherein the at least one guide member includes a cup having sidewalls, a bottom wall joining the sidewalls, and an open top through which the damper member extends.

7. The airfoil as recited in claim 6, wherein the bottom wall includes openings extending there through.

8. The airfoil as recited in claim 1, wherein the damper member is longitudinally elongated with respect to a longitudinal axis defined by the airfoil body.

9. The airfoil as recited in claim 8, wherein the damper member extends between a first terminal end and a second terminal end, and the first terminal end and the second terminal end are free of any connection to the airfoil body.

10. A turbine engine comprising:

a fan;

a compressor section;

a combustor in fluid communication with the compressor section; and

a turbine section in fluid communication with the combustor, the turbine section being coupled to drive the compressor section and the fan,

at least one of the fan, the compressor section and the turbine section including an airfoil having an airfoil body including a leading edge and a trailing edge and a first side wall and a second side wall that is spaced apart from the first side wall, the first side wall and the second side wall joining the leading edge and the trailing edge and at least partially defining a cavity in the airfoil body, and a damper member enclosed in the cavity, the damper member being loose within the cavity, and

at least one guide member fixed with regard to the first sidewall and the second sidewall, the at least one guide member including a bearing surface that circumscribes the damper member, wherein the at least one guide member includes at least one support arm fixed to at least one of the first sidewall or the second sidewall, and a guide piece is supported on the least one support arm, the guide piece including a guide wall that defines an opening through which the damper member extends, the guide wall including the bearing surface,

wherein the airfoil body defines a longitudinal axis, and the bearing surface is inclined with regard to the longitudinal axis,

the at least one guide member includes a plurality of guide members that are longitudinally spaced apart with respect to a longitudinal axis defined by the airfoil body, and

the damper member includes longitudinally alternating bearing sections and non-bearing sections with respect to a longitudinal axis defined by the airfoil body.

11. The turbine engine as recited in claim 10, wherein the damper member is tapered.

12. The turbine engine as recited in claim 10, wherein the bearing surface is frustoconical.

13. A method for processing an airfoil, the method comprising:

depositing multiple layers of a powdered metal onto one another;

joining the layers to one another with reference to data relating to a particular cross-section of an airfoil; and

producing the airfoil with an airfoil body including a leading edge and a trailing edge and a first side wall and a second side wall that is spaced apart from the first side wall, the first side wall and the second side wall joining the leading edge and the trailing edge and at least partially defining a cavity in the airfoil body, and a damper member enclosed in the cavity, the damper member being loose within the cavity, and at least one guide member fixed with regard to the first sidewall and the second sidewall, the at least one guide member including a bearing surface that circumscribes the damper member, wherein the at least one guide member includes at least one support arm fixed to at least one of the first sidewall or the second sidewall, and a guide piece is supported on the least one support arm, the guide piece including a guide wall that defines an opening through which the damper member extends, the guide wall including the bearing surface,

wherein the airfoil body defines a longitudinal axis, and the bearing surface is inclined with regard to the longitudinal axis,

the at least one guide member includes a plurality of guide members that are longitudinally spaced apart with respect to a longitudinal axis defined by the airfoil body, and

the damper member includes longitudinally alternating bearing sections and non-bearing sections with respect to a longitudinal axis defined by the airfoil body.