WHAT IS CLAIMED IS:

1. A turbine stage comprising:

a row of airfoils (14) integrally joined to corresponding platforms (16) and spaced laterally apart to define respective flow passages (36) therebetween for channeling gases (13, 19), each flow passage (36) having a width;

each of said airfoils (14) including a concave pressure side (20) and a laterally opposite convex suction side (22) extending in chord between opposite leading and trailing edges (24, 26); and

at least some of said platforms (16) having a scalloped flow surface including a purge trough (38) extending tangentially into a blend area (40) and at least a portion of a purge cavity wall (41) of the platform (16) and extending axially toward the suction side (22) of the airfoil (14), aft of the leading edge (22), to channel a purge flow (19).

2. The turbine stage according to claim 1, wherein said purge trough (38) is configured having a maximum depth laterally at a location -10% to 60% of the width of the passage (36) formed between the leading edges (24) of adjacent airfoils (14), wherein such measurement is measured commencing from the leading edge (24) of a first airfoil (14) extending laterally toward the convex suction side (22) of the first airfoil (14) and toward the leading edge (24) of a second adjacent airfoil (14) at the concave pressure side (20) of the second adjacent airfoil (14).

3. The turbine stage according to claim 2, wherein the purge trough (38) is configured having a maximum depth location at a position axially downstream of the leading edges (24) and within the passage (36) formed therebetween.

4. The turbine stage according to claim 2, wherein said purge trough (38) is configured having a maximum depth laterally at a location approximately midway between the leading edges (24) of adjacent airfoils (14).

5. The turbine stage according to claim 1, wherein said purge trough (38) is configured having a maximum depth axially at a location forward the leading edge (24) of the airfoil (14).

6. The turbine stage according to claim 1, wherein at least some of said platforms (16) include a bulge (46) extending along a portion of said airfoils (14) and coupled to said at least some platforms (16), the bulges (46) adjoining said pressure side (20) aft of said leading edge (24) of each respective airfoil (14) with the respective platforms (16).

7. The turbine stage according to claim 1, wherein at least some of said platforms (16) include a bowl (48) extending along a portion of said airfoils (14) and coupled to said at least some platforms (16), the bowls (48) adjoining said purge trough (38) and said suction side (22) aft of said leading edge (24) of each respective airfoil (14) with the respective platforms (16).

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8. The turbine stage according to claim 1, wherein at least some of said platforms (16) include a trailing edge ridge structure (50) extending along a portion of said airfoils (14) and coupled to said at least some platforms (16), the trailing edge ridge structures (50) adjoining said pressure side (20), said suction side (22), and said trailing edge (26) of each respective airfoil (14) with the respective platforms (16).

9. A turbine blade (10) comprising:
an airfoil (14) integrally joined to a platform (16), and having laterally opposite pressure and suction sides (20, 22) extending in chord between axially opposite leading and trailing edges (24, 26); and
said platform (16) including a purge trough (28) extending tangentially into a blend area (40) and at least a portion of a purge cavity wall (41) of the platform (16), the purge trough (38) extending axially toward the suction side (22) of the airfoil (14), aft of the leading edge (24), to channel a purge flow (19).

10. The blade (10) according to claim 9, further including a bulge (46) adjoining said pressure side (20) aft of said leading edge (24), a first bowl portion (52) adjoining said purge trough (38) and said suction side (22) aft of said leading edge (24), and a second bowl portion (54) integrally formed with said bulge (46) on said pressure side (20) and being complementary with said first bowl portion (52) to define therewith on an adjacent blade (10), a collective bowl (48).

CLAIMS

The invention claimed is:

1. A turbine stage comprising:

a row of airfoils integrally joined to corresponding platforms and spaced laterally apart to define respective flow passages therebetween for channeling gases, each flow passage having a width;

each of said airfoils including a concave pressure side and a laterally opposite convex suction side extending in chord between opposite leading and trailing edges; and

at least some of said platforms having a scalloped flow surface including a purge trough extending tangentially against a purge cavity, into a blend area and at least a portion of a purge cavity wall of the platform and extending axially from proximate the leading edge of a first airfoil toward the suction side of the first airfoil, and toward the leading edge of a second adjacent airfoil to channel a purge flow.

2. The turbine stage according to claim 1, wherein said purge trough is configured having a maximum depth laterally at a location -10% to 60% of the width of the passage formed between the leading edges of adjacent airfoils, wherein such measurement is measured commencing from the leading edge of the first airfoil extending laterally toward the convex suction side of the first airfoil and toward the leading edge of the second adjacent airfoil at the concave pressure side of the second adjacent airfoil.

3. The turbine stage according to claim 2, wherein the purge trough is configured having a maximum depth location at a position axially downstream of the leading edges and within the passage formed therebetween.

4. The turbine stage according to claim 2, wherein said purge trough is configured

having a maximum depth laterally at a location substantially midway between the leading edges of adjacent airfoils.

5. The turbine stage according to claim 1, wherein said purge trough is configured having a maximum depth axially at a location forward the leading edge of the airfoil.

6. The turbine stage according to claim 1, wherein at least some of said platforms include a bulge extending along a portion of said airfoils and coupled to said at least some platforms, the bulges adjoining said pressure side aft of said leading edge of each respective airfoil with the respective platforms.

7. The turbine stage according to claim 1, wherein at least some of said platforms include a bowl extending along a portion of said airfoils and coupled to said at least some platforms, the bowls adjoining said purge trough and said suction side aft of said leading edge of each respective airfoil with the respective platforms.

8. The turbine stage according to claim 1, wherein at least some of said platforms include a trailing edge ridge structure extending along a portion of said airfoils and coupled to said at least some platforms, the trailing edge ridge structures adjoining said pressure side, said suction side, and said trailing edge of each respective airfoil with the respective platforms.

9. The turbine stage according to claim 1, wherein at least some of said platforms further include:

a bulge extending along a portion of said airfoils and coupled to said at least some platforms, the bulges adjoining said pressure side aft of said leading edge of each respective airfoil with the respective platforms; and

a bowl extending along a portion of said airfoils and coupled to said at least some platforms, the bowls adjoining said purge trough and said suction side aft of said leading edge of each respective airfoil with the respective platforms,

said bulge and bowl form laterally therebetween an arcuate channel extending axially along said platform between adjacent airfoils.

10. The turbine stage according to claim 9, further including a trailing edge ridge structure extending along a portion of said airfoils and coupled to said at least some platforms, the trailing edge ridge structures adjoining said pressure side, said suction side, and said trailing edge of each respective airfoil with the respective platforms.

11. The turbine stage according to claim 9, wherein said bulge and bowl terminate laterally in said flow passage between said trailing edges.

12. The turbine stage according to claim 9, wherein said bulge is centered at said pressure side aft of said leading edge, and decreases in height forward, aft, and laterally therefrom and said bowl is centered at said suction side near the maximum thickness of said airfoils, and blends in a forward direction with said purge trough, and decreases in depth in an aft direction and laterally therefrom.

13. The turbine stage according to claim 9, wherein said bulge decreases in height rapidly in a forward direction, aft of said leading edge and decreases gradually to said trailing edge and said bowl blends with said purge trough near said leading edge and gradually to said trailing edge.

14. The turbine stage according to claim 9, wherein said purge trough is concave laterally, said bulge is convex forward and aft, and said bowl is concave laterally.

15. A turbine stage comprising:

a row of airfoils integrally joined to corresponding platforms and spaced laterally apart to define respective flow passages therebetween for channeling gases, each flow passage having a defined width;

each of said airfoils including a concave pressure side and a laterally opposite convex suction side extending in chord between opposite leading and trailing edges;

at least some of said platforms having a scalloped flow surface including a purge trough extending tangentially against a purge cavity, into a blend area and at least a portion of a purge cavity wall of the platform, a bulge adjoining said pressure side aft of said leading edge of said respective airfoils, and a bowl adjoining said purge trough and said suction side aft of said leading edge of said respective airfoils,

the purge trough extending axially from proximate the leading edge of a first airfoil toward the suction side of the first airfoil and toward the leading edge of a second adjacent airfoil to blend with the bowl and channel a purge flow.

16. The turbine stage according to claim 15, wherein at least some of said platforms having a trailing edge ridge structure extending along a portion of said airfoils and coupled to said at least some platforms, the trailing edge ridge structures adjoining said pressure side, said suction side, and said trailing edge of each respective airfoil with the respective platforms.

17. The turbine stage according to claim 15, wherein said purge trough is configured having a maximum depth laterally at a location -10% to 60% of the width of the passage formed between the leading edges of adjacent airfoils, wherein such measurement is measured commencing from the leading edge of the first airfoil extending laterally toward the convex suction side of the first airfoil and toward the leading edge of the second adjacent airfoil at the concave pressure side of the second adjacent airfoil.

18. The turbine stage according to claim 17, wherein the purge trough is configured having a maximum depth axially at a position axially downstream of the leading edges and within the passage formed therebetween.

19. The turbine stage according to claim 15, wherein said purge trough is configured having a maximum depth laterally at a location forward the leading edge of the airfoil.

20. The turbine stage according to claim 15, wherein said bulge is centered at said pressure side aft of said leading edge, and decreases in height forward, aft, and laterally therefrom and said bowl is centered at said suction side near the maximum thickness of said airfoils, and blends in a forward direction with said purge trough, and decreases in depth in an aft direction and laterally therefrom.

21. A turbine blade comprising:

an airfoil integrally joined to a platform, and having laterally opposite pressure and suction sides extending in chord between axially opposite leading and trailing edges; and

said platform including a purge trough extending tangentially into a blend area and at least a portion of a purge cavity wall of the platform, the purge trough extending axially from proximate the leading edge of the airfoil and toward a lateral edge of the platform toward the suction side of the airfoil, to channel a purge flow.

22. The blade according to claim 21, further including a bulge adjoining said pressure side aft of said leading edge, a first bowl portion adjoining said purge trough and said suction side aft of said leading edge, and a second bowl portion integrally formed with said bulge on said pressure side and being complementary with said first bowl portion.

23. The blade according to claim 21, wherein said platform includes a trailing edge ridge extending along a portion of said airfoil and coupled to said platform, the trailing edge ridge adjoining said pressure side, said suction side, and said trailing edge of said airfoil.

24. The blade according to claim 21, wherein said platform includes a trailing edge ridge extending along a portion of said airfoil and coupled to said platform, the trailing edge ridge adjoining at least one of said pressure side, said suction side, and said trailing edge of said airfoil.

25. The blade according to claim 21, wherein the purge trough is configured having a maximum depth axially at a position axially downstream of the leading edge.

26. The blade according to claim 21, wherein said purge trough is configured having a maximum depth laterally at a location forward the leading edge of the airfoil.