CLAIMS

What is claimed is:

1. A gas turbine engine comprising:

a fan at an axially outer location, said fan rotating about an axis of rotation;

said fan delivering air into an outer bypass duct, and across a booster fan positioned radially inwardly of said outer bypass duct, said booster fan delivering air into a radially middle duct, and said booster fan delivering air across a cold turbine into a radially inner core duct;

air from said inner core duct being directed into a compressor, and then flowing axially in a direction back toward said fan through a combustor section, and across a core turbine section, and then being directed into said middle duct; and

a gear reduction for driving said fan from a fan drive turbine section.

2. The gas turbine engine as set forth in claim 1, wherein a shaft downstream of said gear reduction relative to said fan drive turbine section also drives said booster fan.

3. The gas turbine engine as set forth in claim 2, wherein a shaft downstream of said gear reduction is also connected to rotate with said cold turbine.

4. The gas turbine engine a set forth in claim 3, wherein said fan booster, and said cold turbine rotate with a clutched shaft separate from a fan shaft driving said fan, and a clutch selectively connecting said clutched shaft to said fan shaft such that said fan shaft can selectively drive said clutched shaft.

5. A gas turbine engine as set forth in claim 1, wherein there are at least a plurality of core turbine sections, with one of said plurality of said core turbine sections driving said fan through said gear reduction and a second of said core turbine sections driving said fan booster.

6. The gas turbine engine as set forth in claim 1, wherein said compressor section includes at least a first compressor section and a second compressor section downstream of said first compressor section, and said core turbine section includes at least a first core turbine section and a second core turbine section, with said first core turbine section driving said second compressor section and said second core turbine section driving said first compressor section, with said second turbine section and said first compressor section operating at a slower speed and at lower pressures than said first turbine section and said second compressor section.

7. The gas turbine engine as set forth in claim 1, wherein a first cold turbine section is positioned adjacent said booster fan, and a second cold turbine section is positioned downstream of the first cold turbine section in the path of air flowing through said inner core duct, and upstream of said compressor section.

8. The gas turbine engine as set forth in claim 7, wherein one of said first and second cold turbine sections is provided with a flow diverter that allows bypass of air around a rotor associated with said one of said cold turbine sections.

9. The gas turbine engine as set forth in claim 8, wherein a radially outer extent of blades associated with said one of said cold turbine sections is spaced inwardly of a radially outer position for said flow diverter to allow bypass of air radially outwardly of said radially outermost extent of the blades of said one of said cold turbine sections.

10. The gas turbine engine as set forth in claim 9, wherein there are a pair of flow diverters, with said pair of flow diverters being movable between a position allowing the bulk of the air delivered to the compressor section to bypass the turbine rotors by passing radially outwardly of the radially outermost extent of the blades, and said flow diverters being movable to an alternative position wherein the great bulk of the air delivered across said one of said cold turbine sections passes radially inwardly of the radially outermost extent of the fan turbine blades.

11. The gas turbine engine as set forth in claim 8, wherein said flow diverter is associated with said first cold turbine section.

12. The gas turbine engine as set forth in claim 8, wherein said flow diverter is associated with said second cold turbine section.

13. The gas turbine engine as set forth in claim 1, wherein said cold turbine section is provided with a flow diverter that allows bypass of air around a rotor associated with said cold turbine section.

14. The gas turbine engine as set forth in claim 13, wherein a radially outer extent of blades associated with said cold turbine section is spaced inwardly of a radially outer position for said flow diverter to allow bypass of air radially outwardly of said radially outermost extent of the blades in said cold turbine section.

15. The gas turbine engine as set forth in claim 14, wherein there are a pair of flow diverters, with said pair of flow diverters being movable to a position allowing the bulk of the air delivered to the compressor section to bypass the turbine rotor by passing radially outwardly of the radially outermost extent of the blades, and said flow diverters being movable to an alternative position with a great bulk of the air delivered across said one of said cold turbine sections passes radially inwardly of the radially outermost extent of the fan turbine blades.

16. The gas turbine engine as set forth in claim 15, wherein said cold turbine section associated with said flow diverter is positioned adjacent to said booster fan.

17. The gas turbine engine as set forth in claim 15, wherein said cold turbine section associated with said flow diverter is positioned at a location adjacent to said compressor on an axial side of said compressor spaced away from said fan.

18. The gas turbine engine as set forth in claim 4, wherein said cold turbine section associated with said flow diverter is positioned adjacent to said booster fan.

19. The gas turbine engine as set forth in claim 13, wherein said cold turbine section associated with said flow diverter is positioned at a location adjacent to said compressor on an axial side of said compressor spaced away from said fan.

20. The gas turbine engine as set forth in claim 13, wherein said cold turbine section associated with said flow diverter is positioned adjacent to said booster fan.

21. A method of operating a gas turbine engine comprising the steps of:

(a) operating a turbine section having blades with a radially outermost extent, and a flow diverter that is operable to divert air radially inwardly of the radially outermost extent of the turbine blades, or allow air to pass radially outwardly of the radially outermost extent of the turbine blades; and

(b) positioning said flow diverter to increase or decrease the amount of gas passing across that turbine rotor to increase or decrease a power output by said turbine rotor.

22. The method as set forth in claim 21, wherein there are a pair of flow diverters, with said flow diverters moving between a position which passes all of the gas radially inwardly of the radially outermost extent of the turbine rotors, and to a position which diverts the gas radially outwardly of the radially outermost extent.

23. The method as set forth in claim 21, wherein said flow diverter is moved to the position to allow bypass of the gases in low power conditions, such as when a gas turbine associated with the turbine section is in a aircraft at cruise conditions, and the flow diverter being moved to direct the air radially inwardly of the radially outermost extent at high power conditions, such as take-off for that aircraft.

CLAIMS

1. A gas turbine engine comprising:

a fan at an axially outer location, said fan rotating about an axis of rotation;

said fan delivering air into an outer bypass duct, and across a booster fan positioned radially inwardly of said outer bypass duct, said booster fan delivering air into a radially middle duct, and said booster fan delivering air across a cold turbine into a radially inner core duct;

air from said inner core duct being directed into a compressor, and then flowing axially in a direction back toward said fan through a combustor section, and across a core turbine section, and then being directed into said middle duct; and

a gear reduction for driving said fan from a fan drive turbine section.

2. The gas turbine engine as set forth in claim 1, wherein a shaft downstream of said gear reduction relative to said fan drive turbine section also drives said booster fan.

3. The gas turbine engine as set forth in claim 2, wherein a shaft downstream of said gear reduction is also connected to rotate with said cold turbine.

4. The gas turbine engine as set forth in claim 3, wherein said fan booster, and said cold turbine rotate with a clutched shaft separate from a fan shaft driving said fan, and a clutch selectively connecting said clutched shaft to said fan shaft such that said fan shaft can selectively drive said clutched shaft.

5. A gas turbine engine as set forth in claim 1, wherein there are at least a plurality of core turbine sections, with one of said plurality of said core turbine sections driving said fan through said gear reduction and a second of said core turbine sections driving said fan booster.

6. The gas turbine engine as set forth in claim 1, wherein said compressor section includes at least a first compressor section and a second compressor section downstream of said first compressor section, and said core turbine section includes at least a first core turbine section and a second core turbine section, with said first core turbine section driving said second compressor section and said second core turbine section driving said first compressor section, with said second turbine section and said first compressor section operating at a slower speed and at lower pressures than said first turbine section and said second compressor section.

7. The gas turbine engine as set forth in claim 1, wherein a first cold turbine section is positioned adjacent said booster fan, and a second cold turbine section is positioned downstream of the first cold turbine section in the path of air flowing through said inner core duct, and upstream of said compressor section.

8. The gas turbine engine as set forth in claim 7, wherein one of said first and second cold turbine sections is provided with a flow diverter that allows bypass of air around a rotor associated with said one of said cold turbine sections.

9. The gas turbine engine as set forth in claim 8, wherein a radially outer extent of blades associated with said one of said cold turbine sections is spaced inwardly of a radially outer position for said flow diverter to allow bypass of air radially outwardly of said radially outermost extent of the blades of said one of said cold turbine sections.

10. The gas turbine engine as set forth in claim 9, wherein there are a pair of flow diverters, with said pair of flow diverters being movable between a position allowing the bulk of the air delivered to the compressor section to bypass the turbine rotors by passing radially outwardly of the radially outermost extent of the blades, and said flow diverters being movable to an alternative position wherein the great bulk of the air delivered across said one of said cold turbine sections passes radially inwardly of the radially outermost extent of the fan turbine blades.

11. The gas turbine engine as set forth in claim 8, wherein said flow diverter is associated with said first cold turbine section.

12. The gas turbine engine as set forth in claim 8, wherein said flow diverter is associated with said second cold turbine section.

13. The gas turbine engine as set forth in claim 1, wherein said cold turbine section is provided with a flow diverter that allows bypass of air around a rotor associated with said cold turbine section.

14. The gas turbine engine as set forth in claim 13, wherein a radially outer extent of blades associated with said cold turbine section is spaced inwardly of a radially outer position for said flow diverter to allow bypass of air radially outwardly of said radially outermost extent of the blades in said cold turbine section.

15. The gas turbine engine as set forth in claim 14, wherein there are a pair of flow diverters, with said pair of flow diverters being movable to a position allowing the bulk of the air delivered to the compressor section to bypass the turbine rotor by passing radially outwardly of the radially outermost extent of the blades, and said flow diverters being movable to an alternative position with a great bulk of the air delivered across said one of said cold turbine sections passes radially inwardly of the radially outermost extent of the fan turbine blades.

16. The gas turbine engine as set forth in claim 15, wherein said cold turbine section associated with said flow diverter is positioned adjacent to said booster fan.

17. The gas turbine engine as set forth in claim 15, wherein said cold turbine section associated with said flow diverter is positioned at a location adjacent to said compressor on an axial side of said compressor spaced away from said fan.

18. The gas turbine engine as set forth in claim 13, wherein said cold turbine section associated with said flow diverter is positioned adjacent to said booster fan.

19. The gas turbine engine as set forth in claim 13, wherein said cold turbine section associated with said flow diverter is positioned at a location adjacent to said compressor on an axial side of said compressor spaced away from said fan.

20. The gas turbine engine as set forth in claim 13, wherein said cold turbine section associated with said flow diverter is positioned adjacent to said booster fan.