CLAIMS

What is claimed is:

1. A fan drive gear system for a gas turbine engine, comprising:

a carrier supporting circumferentially arranged gears;

a torque frame having circumferentially arranged fingers, each finger including a bore having a bore axis;

a bushing arranged in each bore and providing an aperture, at least one bushing having a bushing axis offset from the bore axis; and

a pin disposed in the aperture and securing the carrier to the torque frame.

2. The fan drive gear system according to claim 1, wherein the bushing is arranged in a desired position relative to the bore.

3. The fan drive gear system according to claim 2, wherein the bushing includes a body having an outer diameter, and a flange extends radially outwardly from the body, the flange includes a locating feature maintaining the desired position.

4. The fan drive gear system according to claim 3, wherein the locating feature includes at least one notch corresponding to at least one discrete position.

5. The fan drive gear system according to claim 4, wherein the flange includes a scalloped periphery providing multiple notches corresponding to multiple discrete positions.

6. The fan drive gear system according to claim 4, comprising a retaining pin supported on the finger and received by the notch to maintain the desired position.

7. The fan drive gear system according to claim 6, wherein the retaining pin includes a collar arranged between opposing ends, the finger includes a recess having a hole, one of the ends received in the hole with the collar arranged in the recess.

8. The fan drive gear system according to claim 7, wherein the flange is arranged over the collar, and the bushing is captured within an opening of the carrier.

9. The fan drive gear system according to claim 1, wherein the bushing axes are aligned with one another in a common plane, a body having an outer diameter providing a body axis, and a flange extends radially outwardly from the body to a periphery, an aperture extending through the body and the flange and providing an inner diameter having a bushing axis.

10. The fan drive gear system according to claim 1, comprising a sun gear, star gears supported by the carrier, and a ring gear circumscribing the star gears, the star gears intermeshing with the sun gear and the ring gear.

11. A gas turbine engine comprising:

a fan section;

a turbine section coupled to the fan section via a geared architecture, the geared architecture including:

a carrier supporting circumferentially arranged gears;

a torque frame having circumferentially arranged fingers, each finger including a bore having a bore axis;

a bushing arranged in each bore and providing an aperture, at least one bushing having a bushing axis offset from the bore axis; and

a pin disposed in the aperture and securing the carrier to the torque frame.

12. The gas turbine engine according to claim 11, comprising a sun gear, star gears supported by the carrier, and a ring gear circumscribing the star gears, the star gears intermeshing with the sun gear and the ring gear.

13. The gas turbine engine according to claim 12, wherein the fan section includes a fan coupled to the ring gear, and the turbine section includes a high pressure turbine section and a low pressure turbine section, and a low speed spool supporting the low pressure turbine section and coupled to the star gear, the torque frame grounded to a static structure.

14. The gas turbine engine according to claim 11, wherein the bushing axes are aligned with one another in a common plane.

15. A bushing for an epicyclic gear train torque frame comprising:

a body having an outer diameter providing a body axis, and

a flange extends radially outwardly from the body to a periphery, an aperture extending through the body and the flange and providing an inner diameter having a bushing axis, the body axis and bushing axis offset from one another, at least one notch provided in the periphery corresponding to a desired angular position.

16. The bushing according to claim 15, wherein the flange includes a scalloped periphery providing multiple notches corresponding to multiple discrete positions, one of the discrete positions providing the desired angular position.

17. A method of assembly an epicyclic gear train comprising the steps of:
inserting an eccentric bushing into a bore of a torque frame finger;
selecting a bushing;
arranging the bushing relative to the bore to a desired position; and
fixing the busing relative to the bore.

18. The method according to claim 17, comprising the steps of positioning a carrier relative to the torque frame finger, and installing a pin into the bushing to secure the carrier to the torque frame finger.

19. The method according to claim 18, wherein bushing includes an aperture receiving the pin and providing a bushing axis, and the arranging step includes positioning the bushing axis of multiple circumferentially arranged bushings in a common plane.

20. The method according to claim 17, comprising the step of selecting a bushing from a set of bushings having different offsets, and inserting the selected bushing.

CLAIMS

1. A fan drive gear system for a gas turbine engine, comprising:

a carrier supporting circumferentially arranged gears;

a torque frame having circumferentially arranged fingers, each finger including a bore having a bore axis;

a bushing arranged in each bore and providing an aperture, at least one bushing having a bushing axis offset from the bore axis; and

a pin disposed in the aperture and securing the carrier to the torque frame.

2. The fan drive gear system according to claim 1, wherein the bushing is arranged in a desired position relative to the bore.

3. The fan drive gear system according to claim 2, wherein the bushing includes a body having an outer diameter, and a flange extends radially outwardly from the body, the flange includes a locating feature maintaining the desired position.

4. The fan drive gear system according to claim 3, wherein the locating feature includes at least one notch corresponding to at least one discrete position.

5. The fan drive gear system according to claim 4, wherein the flange includes a scalloped periphery providing multiple notches corresponding to multiple discrete positions.

6. The fan drive gear system according to claim 4, comprising a retaining pin supported on the finger and received by the notch to maintain the desired position.

7. The fan drive gear system according to claim 6, wherein the retaining pin includes a collar arranged between opposing ends, the finger includes a recess having a hole, one of the ends received in the hole with the collar arranged in the recess.

8. The fan drive gear system according to claim 7, wherein the flange is arranged over the collar, and the bushing is captured within an opening of the carrier.

9. The fan drive gear system according to claim 1, wherein the bushing axes are aligned with one another in a common plane, a body having an outer diameter providing a body axis, and a flange extends radially outwardly from the body to a periphery, an aperture extending through the body and the flange and providing an inner diameter having a bushing axis.

10. The fan drive gear system according to claim 1, comprising a sun gear, star gears supported by the carrier, and a ring gear circumscribing the star gears, the star gears intermeshing with the sun gear and the ring gear.

11. A gas turbine engine comprising:

a fan section;

a turbine section coupled to the fan section via a geared architecture, the geared architecture including:

a carrier supporting circumferentially arranged gears;

a torque frame having circumferentially arranged fingers, each finger including a bore having a bore axis;

a bushing arranged in each bore and providing an aperture, at least one bushing having a bushing axis offset from the bore axis; and

a pin disposed in the aperture and securing the carrier to the torque frame.

12. The gas turbine engine according to claim 11, comprising a sun gear, star gears supported by the carrier, and a ring gear circumscribing the star gears, the star gears intermeshing with the sun gear and the ring gear.

13. The gas turbine engine according to claim 12, wherein the fan section includes a fan coupled to the ring gear, and the turbine section includes a high pressure turbine section and a low pressure turbine section, and a low speed spool supporting the low pressure turbine section and coupled to the star gear, the torque frame grounded to a static structure.

14. The gas turbine engine according to claim 11, wherein the bushing axes are aligned with one another in a common plane.

15. A bushing for an epicyclic gear train torque frame comprising:

a body having an outer diameter providing a body axis, and

a flange extends radially outwardly from the body to a periphery, an aperture extending through the body and the flange and providing an inner diameter having a bushing axis, the body axis and bushing axis offset from one another, at least one notch provided in the periphery corresponding to a desired angular position.

16. The bushing according to claim 15, wherein the flange includes a scalloped periphery providing multiple notches corresponding to multiple discrete positions, one of the discrete positions providing the desired angular position.

17. A method of assembly an epicyclic gear train comprising the steps of:

inserting an eccentric bushing into a bore of a torque frame finger;

selecting a bushing;

arranging the bushing relative to the bore to a desired position; and

fixing the bushing relative to the bore.

18. The method according to claim 17, comprising the steps of positioning a carrier relative to the torque frame finger, and installing a pin into the bushing to secure the carrier to the torque frame finger.

19. The method according to claim 18, wherein bushing includes an aperture receiving the pin and providing a bushing axis, and the arranging step includes positioning the bushing axis of multiple circumferentially arranged bushings in a common plane.

20. The method according to claim 17, comprising the step of selecting a bushing from a set of bushings having different offsets, and inserting the selected bushing.