Claims

1. A modular, rotisserie type tooling fixture assembly for use in a coating operation comprising:

a retaining base defining a central aperture through which a shaft extends, and a plurality of anchor members disposed in a prescribed radial orientation from the central aperture, the anchor members configured or adapted to load and retain a plurality of workpieces to be coated; and

a unitary masking cap structure having a central aperture through which the arbor or shaft selectively is guided therethrough so as to align and engage the masking cap structure with the retaining base, the masking cap structure having a top portion and a bottom portion adapted to cover portions of the plurality of workpieces in a masking relationship.

2. The tooling fixture assembly of claim 1, wherein the anchor members comprise a positioning stop feature.

3. The tooling fixture assembly of claim 1, wherein the retaining base includes a platform having a central aperture and defining a central axis orthogonal to the plane of the platform.

4. The tooling fixture assembly of claim 1, wherein the top portion of the cap structure comprise a plurality of solid surfaces characterized by contoured surfaces conforming to the curvature of backsides of each of the workpieces.

5. The tooling fixture assembly of claim 1, wherein the bottom portion of the cap structure is a housing structure that contains corresponding openings that expose portions of the workpieces to be coated.

6. The tooling fixture assembly of claim 1, wherein the bottom portion of the cap structure is configured to mask the platform and root regions of a plurality of airfoil workpieces.

7. The tooling fixture assembly of claim 1, wherein each of the plurality of anchor members comprise a pair of rail-like structure including protrusions, the protrusions configured to engage with corresponding grooves contained along a dovetail section of an airfoil workpiece.

8. The tooling fixture assembly of claim 1, wherein the bottom portion of the cap structure is pentagon-shaped.

9. The tooling fixture assembly of claim 1, wherein the tooling fixture is configured to receive at least 5 airfoil workpieces.

10. The tooling fixture assembly of claim 1, wherein a top or distal section of the shaft is covered by a knob-like structure disposed over the masking cap structure.

11. The tooling fixture assembly of claim 1, wherein the tooling fixture assembly is characterized by a reduced ratio of thermal mass of the fixture assembly to thermal mass of the workpieces to be coated.

12. The tooling fixture assembly of claim 1, wherein a distal section of the shaft is secured to the cap structure to lock the tooling fixture assembly around the plurality of workpieces.

13. The tooling fixture assembly of claim 1, wherein each of the plurality of anchor members are disposed on a platform of the retaining assembly at a position that coincides with an opening contained within the bottom portion of the unitary masking cap structure.

14. The tooling fixture assembly of claim 1, further comprising a locking mechanism to keep the components of the tooling fixture assembly and optionally any workpieces retained therein coupled together.

15. A method for coating a plurality of workpieces comprising:

loading a plurality of workpieces into anchor members disposed in a prescribed radial orientation from a central aperture on a retaining base, the anchor members configured to retain the plurality of workpieces to be coated;

placing the retaining base on an arbor or shaft;

placing a unitary masking cap having a central aperture through which the arbor or shaft is selectively guided therethrough to be disposed in engagement and alignment with the retaining base, the masking cap having a plurality of solid walls or surfaces adapted to cover portions of the plurality of workpieces in a masking relationship while leaving exposed surfaces on the plurality of workpieces;

locking the retaining base and the unitary masking cap together to form a tooling fixture assembly;

mounting the tooling fixture assembly with workpieces disposed therein into a coating device adapted to coat exposed surfaces of the plurality of workpieces within the coating device; and

rotating the tooling fixture assembly within the coating device via the arbor or shaft until a desired coating has been formed on any exposed surfaces of the plurality of workpieces.

16. The method of claim 15, wherein five workpieces are loaded into the anchor members.

17. The method of claim 15, wherein the top portion of the unitary masking cap comprises a plurality of solid surfaces characterized by contoured surfaces conforming to the curvature of backsides of each of the workpieces.

18. The tooling fixture assembly of claim 15, wherein the bottom portion of the unitary masking cap comprises a housing structure that contains corresponding openings that expose selective surfaces of the workpieces to be coated.

19. The tooling fixture assembly of claim 15, wherein the workpieces are loaded into the anchor members until abutting against a positioning stop feature.

20. The tooling fixture assembly of claim 15, wherein the unitary masking cap structure comprises an engagement member within the central aperture that selectively couples to a portion of the shaft affixed to the retaining base.

Claims

1. A modular, rotisserie type tooling fixture assembly (10, 700) for use in a coating operation comprising:

a retaining base (20, 720) defining a central aperture (23) through which a shaft (50, 750) extends, and a plurality of anchor members (26, 726) disposed in a prescribed radial orientation from the central aperture (23), the anchor members (26, 726) configured or adapted to load and retain a plurality of workpieces (25,725) to be coated;

characterized by:

a unitary masking cap structure (40) having a central aperture (63) through which the arbor or shaft (50, 750) selectively is guided therethrough so as to align and engage the masking cap structure (40) with the retaining base (20, 720), the masking cap structure (40) having a top portion (41, 741) and a bottom portion (42,742) adapted to cover portions of the plurality of workpieces (25, 725) in a masking relationship.

2. The tooling fixture assembly (1 0, 700) of claim 1, wherein the anchor members (26, 726) comprise a positioning stop feature (76).

3. The tooling fixture assembly (10, 700) of claim 1, wherein the retaining base (20, 720) includes a platform (22, 722) having a central aperture (23) and defining a central axis orthogonal to the plane of the platform (22, 722).

4. The tooling fixture assembly (10, 700) of claim 1 wherein the top portion (41, 741) of the cap structure (40) comprises a plurality of solid surfaces characterized by contoured surfaces conforming to the curvature of backsides of each of the workpieces (25, 725).

5. The tooling fixture assembly (10, 700) of claim 1, wherein the bottom portion (42, 742) of the cap structure (40) is a housing structure that contains corresponding openings that expose portions of the workpieces (25, 725) to be coated.

6. The tooling fixture assembly of claim 1, wherein the bottom portion (42, 742) of the cap structure (40) is configured to mask the platform (22,722) and root regions (28, 728) of a plurality of airfoil workpieces (25, 725).

7. The tooling fixture assembly (10, 700) of claim 1, wherein each of the plurality of anchor members (26, 726) comprise a pair of rail-like structure including protrusions, the protrusions configured to engage with corresponding grooves contained along a dovetail section of an airfoil workpiece (25, 725).

8. The tooling fixture assembly (10, 700) of claim 1, wherein the bottom portion (42, 742) of the cap structure (40) is pentagon-shaped.

9. The tooling fixture assembly (10, 700) of claim 1, wherein the tooling fixture assembly (10, 700) is configured to receive at least 5 airfoil workpieces (25, 725).

10. The tooling fixture assembly (10) of claim 1, wherein a top or distal section of the shaft (50) is covered by a knob-like structure (56) disposed over the masking cap structure.

11. The tooling fixture assembly (10) of claim 10, wherein a distal section of the

shaft (50) is secured to the cap structure (56) to lock the tooling fixture assembly (10) around the plurality of workpieces (25).

12. The tooling fixture assembly (10, 700) of claim 1, wherein each of the plurality of anchor members (26, 726) are disposed on a platform (22. 722) of the retaining base (20, 720) at a position that coincides with an opening contained within the bottom portion (42, 742) of the unitary masking cap (40) structure.

13. The tooling fixture assembly (10, 700) of claim 1, further comprising a locking mechanism to keep the components of the tooling fixture assembly (10, 700) and optionally any workpieces (25, 725) retained therein coupled together.

14. A method for coating a plurality of workpieces (25, 725) comprising:

loading a plurality of workpieces (25, 725) into anchor members (26, 726) disposed in a prescribed radial orientation from a central aperture (23) on a retaining base (20, 720), the anchor members (26, 726) configured to retain the plurality of workpieces (25, 725) to be coated;

placing the retaining base (20, 720) on an arbor or shaft (50, 750);

placing a unitary masking cap (40) having a central aperture through which the arbor or shaft (50, 7 0) is selectively guided therethrough to be disposed in engagement and alignment with the retaining base (20, 720), the masking cap (40) having a plurality of solid walls or surfaces adapted to cover portions of the plurality of workpieces (25, 725) in a masking relationship while leaving exposed surfaces on the plurality of workpieces (25, 725);

locking the retaining base (20, 720) and the unitary masking cap (40) together to form a tooling fixture assembly (10, 700);

mounting the tooling fixture assembly (10, 700) with workpieces (25, 725) disposed therein into a coating device adapted to coat exposed surfaces of the plurality of workpieces (25, 725) within the coating device; and

rotating the tooling fixture assembly (10, 700) within the coating device via the

arbor or shaft (59, 750) until a desired coating has been fanned on any exposed surfaces of the plurality of workpieces (25, 725).

15. The method of claim 14, wherein the workpieces (25, 725) are loaded into the anchor members until abutting against a positioning stop feature.