PROPOSED CLAIM AMENDMENTS

What is claimed is:

1. A deposition mechanism configured for producing a three-dimensional object on a build platform using a resin in a layer-by-layer technique, with a build area defined adjacent to the build platform, the deposition mechanism comprising:

a carriage configured for movement through the build area;

a supply of the resin in flowable form mounted on the carriage;

a roller in communication with the supply of the resin and rotatably mounted on the carriage; and

an exposure device mounted on the carriage and configured for emitting electromagnetic waves,

wherein the exposure device is configured for emitting the electromagnetic waves to a first exposure site located adjacent to the roller within the supply of the resin, to at least partially solidify a layer of the resin,

wherein the roller is configured for rotating to carry the layer of the resin to an application site within the build area for application to produce the three-dimensional object as the carriage passes through the build area, and

wherein the exposure device is further configured for emitting the electromagnetic waves to a second exposure site within the build area to apply the layer to produce the three-dimensional object.

2. The deposition mechanism of claim 1, further comprising a controller configured for controlling movement of the carriage and the roller and for controlling activation of the exposure device to produce the three-dimensional object.

3. The deposition mechanism of claim 1, further comprising a first plurality of optical fibers having first exit ends arranged in a first array and first entrance ends configured for receiving the electromagnetic waves from the exposure device, and a second plurality of optical fibers having second exit ends arranged in a second array and second entrance ends configured for receiving the electromagnetic waves from the exposure device, wherein the first plurality of optical fibers are configured such that the electromagnetic waves emitted by the exposure device travel through the first plurality of optical fibers and exit the exit ends of the first array directed toward

the first exposure site, and the second plurality of optical fibers are configured such that the electromagnetic waves emitted by the exposure device travel through the second plurality of optical fibers and exit the exit ends of the second array directed toward the second exposure site.

4. The deposition mechanism of claim 3, wherein the exposure device comprises a plurality of LEDs, wherein each of the first plurality of optical fibers and each of the second plurality of optical fibers is associated with one of the plurality of LEDs.

5. The deposition mechanism of claim 1, wherein the roller is permeable to the electromagnetic waves, and the exposure device is configured such that the electromagnetic waves pass through the roller in traveling to the first exposure site and the second exposure site.

6. The deposition mechanism of claim 1, wherein the deposition mechanism further comprises a resin removal mechanism positioned between the first exposure site and the second exposure site and configured for removing excess unsolidified resin from the layer between the first and second exposure sites.

7. The deposition mechanism of claim 1, wherein the deposition mechanism further comprises a first lens array positioned between the exposure device and the first exposure site and a second lens array positioned between the exposure device and the second exposure site, wherein the first and second lens arrays are configured to focus the electromagnetic waves directed toward the first exposure site and the second exposure site.

8. The deposition mechanism of claim 1, wherein the deposition mechanism further comprises a thickness limiter positioned at the first exposure site, such that the first exposure site is located between the roller and the thickness limiter, and wherein a space between the roller and the thickness limiter defines a thickness of the layer.

9. The deposition mechanism of claim 8, wherein the thickness limiter comprises a secondary roller rotatably mounted at least partially within the supply of the resin.

10. The deposition mechanism of claim 1, wherein the carriage is configured to be mounted on a track for movement through the build area, and wherein the carriage is further configured for autonomous movement separate from the track.

11. The deposition mechanism of claim 1, wherein the first exposure site and the second exposure site are located at approximately 180° from each other relative to the roller.

12. An apparatus comprising the deposition mechanism according to claim 1 and a support assembly having the build platform with the build area defined adjacent to the build platform.

13. A deposition mechanism configured for producing a three-dimensional object on a build platform using a resin in a layer-by-layer technique, with a build area defined adjacent to the build platform, the deposition mechanism comprising:

a carriage configured for movement through the build area;

a supply of the resin in flowable form mounted on the carriage;

a primary roller in communication with the supply of the resin and rotatably mounted on the carriage;

a secondary roller rotatably mounted at least partially within the supply of the resin, such that a space is defined between the primary roller and the secondary roller; and

an exposure device mounted on the carriage and configured for emitting electromagnetic waves,

wherein the exposure device is configured for emitting the electromagnetic waves to a first exposure site located within the supply of the resin and within the space between the primary and secondary rollers, to at least partially solidify a layer of the resin, such that the space between the primary and secondary rollers defines a thickness of the layer,

wherein the primary roller is configured for rotating to carry the layer of the resin to an application site within the build area for application to produce the three-dimensional object as the carriage passes through the build area, and

wherein the exposure device is further configured for emitting the electromagnetic waves to a second exposure site within the build area to apply the layer to produce the three-dimensional object.

14. The deposition mechanism of claim 13, further comprising a controller configured for controlling movement of the carriage and the primary and secondary rollers and for controlling activation of the exposure device to produce the three-dimensional object.

15. The deposition mechanism of claim 13, further comprising a first plurality of optical fibers having first exit ends arranged in a first array and first entrance ends configured for receiving the electromagnetic waves from the exposure device, and a second plurality of optical fibers having second exit ends arranged in a second array and second entrance ends configured for receiving the electromagnetic waves from the exposure device, wherein the first plurality of optical fibers are configured such that the electromagnetic waves emitted by the exposure device travel through the first plurality of optical fibers and exit the exit ends of the first array directed

toward the first exposure site, and the second plurality of optical fibers are configured such that the electromagnetic waves emitted by the exposure device travel through the second plurality of optical fibers and exit the exit ends of the second array directed toward the second exposure site.

16. The deposition mechanism of claim 15, wherein the exposure device comprises a plurality of LEDs, wherein each of the first plurality of optical fibers and each of the second plurality of optical fibers is associated with one of the plurality of LEDs.

17. The deposition mechanism of claim 15, wherein the exit ends of the first array and the exit ends of the second array are positioned within the primary roller, and wherein the primary roller is permeable to the electromagnetic waves, and the exposure device is configured such that the electromagnetic waves pass through the primary roller in traveling to the first exposure site and the second exposure site.

18. The deposition mechanism of claim 13, wherein the deposition mechanism further comprises a resin removal mechanism positioned between the first exposure site and the second exposure site and configured for removing excess unsolidified resin from the layer between the first and second exposure sites.

19. The deposition mechanism of claim 18, wherein the resin removal mechanism comprises first and second cleaning rollers positioned between the first exposure site and the second exposure site on opposite sides of the second exposure site, wherein the first and second cleaning rollers are configured such that the first cleaning roller is configured for rotating in contact with a surface of the layer to remove the excess unsolidified resin from the layer between the first and second exposure sites when the deposition mechanism is moving in a first direction and the second cleaning roller is configured for rotating in contact with the surface of the layer to remove the excess unsolidified resin from the layer between the first and second exposure sites when the deposition mechanism is moving in a second direction opposite the first direction.

20. The deposition mechanism of claim 19, wherein the first and second cleaning rollers are configured such that the first cleaning roller is configured for contacting the primary roller to function as a first transfer verification sensor when the deposition mechanism is moving in the second direction and the second cleaning roller is configured for contacting the primary roller to function as a second transfer verification sensor when the deposition mechanism is moving in the first direction.

21. The deposition mechanism of claim 13, wherein the deposition mechanism further comprises a first lens array positioned between the exposure device and the first exposure site and a second lens array positioned between the exposure device and the second exposure site, wherein the first and second lens arrays are configured to focus the electromagnetic waves directed toward the first exposure site and the second exposure site.

22. The deposition mechanism of claim 13, wherein the carriage is configured to be mounted on a track for movement through the build area, and wherein the carriage is further configured for autonomous movement separate from the track.

23. An apparatus comprising the deposition mechanism according to claim 13 and a support assembly having the build platform with the build area defined adjacent to the build platform.

24. A method comprising:

providing an apparatus according to any of claims 1-23;

selectively activating the exposure device to emit the electromagnetic waves to the first exposure site to at least partially solidify the layer of the resin;

rotating the roller to carry the layer of the resin to the application site within the build area for application to produce the three-dimensional object as the carriage passes through the build area; and

selectively activating the exposure device to emit the electromagnetic waves to the second exposure site within the build area to apply the layer to produce the three-dimensional object.

25. An assembly for supplying a flowable material, comprising:

a supply vat configured to contain the flowable material, the supply vat having first and second inner support walls located at opposite ends of the supply vat;

a first outer support wall positioned outward of the first inner support wall and located outside the supply vat, such that a first space is defined between the first inner support wall and the first outer support wall, wherein the first inner support wall has a first opening therethrough extending between the supply vat and the first space;

a roller positioned at least partially within the supply vat and configured to be in contact with the flowable material, wherein the roller extends through the first opening and is positioned at least partially within the first space;

a first seal engaged with the roller around an entire periphery of the roller and positioned adjacent the first opening to resist most leakage of the flowable material through the first opening; and

a drainage system configured to remove portions of the flowable material that pass through the first opening from the first space.

26. The assembly of claim 25, wherein the drainage system is further configured to return the portions of the flowable material to the supply vat.

27. The assembly of claim 25, further comprising:

a second outer support wall positioned outward of the second inner support wall and located outside the supply vat, such that a second space is defined between the second inner support wall and the second outer support wall, wherein the second inner support wall has a second opening therethrough extending between the supply vat and the second space, wherein the roller extends through the second opening and is positioned at least partially within the second space; and

a second seal engaged with the roller around an entire periphery of the roller and positioned adjacent the second opening to resist most leakage of the flowable material through the second opening,

wherein the drainage system is further configured to remove additional portions of the flowable material that pass through the second opening from the second space.

28. The assembly of claim 25, wherein the supply vat has a bottom wall that extends between the first and second inner support walls and further extends between the first inner support wall and the first outer support wall across the first space, and wherein the drainage system comprises a drain hole in the bottom wall within the first space.

29. The assembly of claim 25, wherein the drainage system further comprises a drain hole within the first space and a reservoir in communication with the drain hole, and wherein the drainage system is configured such that the portions of the flowable material are removed by flowing through the drain hole and into the reservoir.

30. The assembly of claim 29, wherein the drainage system further comprises a pumping mechanism configured for pumping the flowable material from the reservoir into the supply vat.

31. The assembly of claim 30, wherein a bottom wall of the supply vat has an opening in communication with the pumping mechanism, such that the pumping mechanism is configured

to pump the flowable material into the supply vat through the opening, and wherein the bottom wall of the supply vat is sloped downward toward the opening.

32. The assembly of claim 25, further comprising a first bearing connected to the first outer support wall and engaging the roller to rotatably support the roller.

33. A deposition mechanism configured for producing a three-dimensional object on a build platform using a resin in a layer-by-layer technique, with a build area defined adjacent to the build platform, the deposition mechanism comprising:

a carriage configured for movement through the build area;

a supply vat mounted on the carriage and configured to contain the flowable material, the supply vat having first and second inner support walls located at opposite ends of the supply vat;

a first outer support wall positioned outward of the first inner support wall and located outside the supply vat, such that a first space is defined between the first inner support wall and the first outer support wall, wherein the first inner support wall has a first opening therethrough extending between the supply vat and the first space;

a roller mounted on the carriage and positioned at least partially within the supply vat and configured to be in contact with the flowable material, wherein the roller extends through the first opening and is positioned at least partially within the first space, and wherein the roller is configured for rotating to carry the layer of the resin to an application site within the build area for application to produce the three-dimensional object as the carriage passes through the build area;

a first seal engaged with the roller around an entire periphery of the roller and positioned adjacent the first opening to resist most leakage of the flowable material through the first opening;

a drainage system configured to remove portions of the flowable material that pass through the first opening from the first space; and

an exposure device mounted on the carriage and configured for emitting electromagnetic waves to an exposure site within the build area to apply the layer to produce the three-dimensional object.