

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	
Kenneth TYLER	)	Group Art Unit: 1742
	)	
Application No.: 15/267,956	)	Examiner: Stella Kim YI
	)	
Filed: September 16, 2016	)	Confirmation No.: 1088
	)	
For: METHOD AND APPARATUS FOR	)	
CONTINUOUS COMPOSITE	)	
THREE-DIMENSIONAL PRINTING	)	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

REPLY TO OFFICE ACTION

In reply to the Office Action mailed December 12, 2017 (“Office Action”), please amend and reconsider the above-identified application in view of the following.

Claim Amendments begin on page 2 of this Reply.

Remarks follow the Claim Amendment section of this Reply.

CLAIMS LISTING:

The following listing of claims represents a current status of all claims in the application, including all amendments previously made to the claims:

1. (Original) A method of manufacturing of a three-dimensional object, comprising:
 - directing a curable liquid material to a nozzle;
 - directing a continuous strand material to the nozzle;
 - discharging from the nozzle a path of composite material containing the continuous strand material at least partially coated with the curable liquid material;
 - bonding an end point of the path of composite material to an anchor; and
 - moving the nozzle away from the anchor during discharging to pull the path of composite material out of the nozzle.
2. (Original) The method of claim 1, wherein bonding the end point of the path of composite material to the anchor includes:
 - placing the end point of the path of composite material on the anchor; and
 - aiming a curing device at the path of composite material on the anchor.
3. (Original) The method of claim 2, wherein aiming the curing device includes aiming at least one UV light.
4. (Original) The method of claim 3, wherein aiming the at least one UV light includes aiming a plurality of lights from different angles around the nozzle.
5. (Original) The method of claim 3, wherein aiming the at least one UV light includes aiming the at least one UV light from only a trailing side of the nozzle.
6. (Original) The method of claim 1, wherein discharging from the nozzle the path of composite material includes discharging the path of composite material through a nozzle orifice having a diameter of about 2 mm.

7. (Original) The method of claim 6, wherein the continuous strand material includes a plurality of strands arranged in at least one of a tow, a roving, and a weave.

8. (Original) The method of claim 1, wherein directing the curable liquid material to the nozzle includes directing a filler material at least partially coated in the curable liquid material to the nozzle.

9. (Original) The method of claim 8, wherein the filler material includes pieces of fibers.

10. (Original) The method of claim 1, wherein the continuous strand material is hollow.

11. (Original) The method of claim 1, further including:
curing a first portion of the path of composite material;
overlapping the first portion of the path of composite material with a second portion of the path of composite material that is uncured; and
curing the second portion of the path of composite material while the first and second portions of the path of composite material are overlapped.

12. (Original) The method of claim 1, wherein the overlapping includes wrapping the second portion of the path of composite material around the first portion of the path of composite material.

13. (Currently Amended) A method of manufacturing of a three-dimensional object, comprising:

directing a curable liquid material to a nozzle;
directing a continuous strand material to the nozzle;
discharging from the nozzle a path of composite material containing the continuous strand material at least partially coated with the curable liquid material;
bonding an end point of the path of composite material to an anchor;
moving the nozzle during discharging to cause the path of composite material to extend away from the anchor; and

~~curing~~ exposing the curable liquid material in the path of composite material to a cure energy while the nozzle is moving such that the path of composite material is hardened at a fixed location in three-dimensional space without support at locations between the anchor and the nozzle.

14. (Original) A method of manufacturing of a three-dimensional object, comprising:

- directing a curable liquid material to a nozzle;
- directing a continuous strand material to the nozzle;
- discharging from the nozzle a path of composite material containing the continuous strand material at least partially coated with the curable liquid material;
- curing the curable liquid material in the path of composite material; and
- moving the nozzle during discharging to create tension in the continuous strand material that remains after curing of the composite material.

15. (Original) A method of manufacturing of a three-dimensional object, comprising:

- directing a curable liquid material to a nozzle;
- directing a continuous strand material to the nozzle;
- directing a filler material to the nozzle;
- discharging from the nozzle a path of composite material containing the continuous strand material and the filler material at least partially coated with the curable liquid material;
- moving the nozzle during discharging to create the three-dimensional object; and
- curing the curable liquid material in the path of composite material.

16. (Original) A method of manufacturing of a three-dimensional object, comprising:

- directing a curable liquid material to a nozzle;
- directing a continuous strand material to the nozzle;
- discharging from the nozzle a path of composite material containing the continuous strand material at least partially coated with the curable liquid material;

aiming a curing device at the path of composite material to cure the curable liquid material;

moving the nozzle during discharging to create the three-dimensional object; and
moving the curing device together with the nozzle.

17. (Original) A method of manufacturing a three-dimensional object comprising:

directing a curable liquid material to a nozzle;
directing a continuous strand material to the nozzle;
discharging from the nozzle a path of composite material containing the continuous strand material at least partially coated with the curable liquid material;
curing the curable liquid material in the path of composite material;
moving the nozzle during discharging to create the three-dimensional object; and
selectively cutting the continuous strand material before the continuous strand material reaches the nozzle such that at least one portion of the path discharging from the nozzle contains only the curable liquid material.

18. (Original) A method of manufacturing of a three-dimensional object, comprising:

directing a curable liquid material to a nozzle;
directing a continuous strand material to the nozzle;
discharging from the nozzle a path of composite material containing the continuous strand material at least partially coated with the curable liquid material;
adjusting a trajectory of the path of composite material after discharge from the nozzle; and
curing the curable liquid material in the path of composite material after adjusting.

19. (Currently Amended) A method of manufacturing a three-dimensional object comprising:

discharging from a nozzle a first path of composite material and a second path of composite material, the composite material of each of the first and second paths

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