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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MBOT-0002-P04
		Application Number	
Title of Invention	NETWORKED THREE-DIMENSIONAL PRINTING		
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	Nathaniel	B.	Pettis		
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City	Brooklyn	State/Province	NY	Country of Residence i	US
Citizenship under 37 CFR 1.41(b) i		US			
Mailing Address of Applicant:					
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Address 2					
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Postal Code	11217	Countryi	US		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					Add

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Application Information:

Title of the Invention	NETWORKED THREE-DIMENSIONAL PRINTING		
Attorney Docket Number	MBOT-0002-P04	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	6	Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MBOT-0002-P04
		Application Number	
Title of Invention	NETWORKED THREE-DIMENSIONAL PRINTING		

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

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Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	13/314337	2011-12-08
Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
13/314337	Continuation in part of	12/858622	2010-08-18
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

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Application Number	Country i	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			☒ Yes ☐ No
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MBOT-0002-P04	
		Application Number		
Title of Invention	NETWORKED THREE-DIMENSIONAL PRINTING			

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Signature	/John Nortrup/		Date (YYYY-MM-DD)	2012-01-12
First Name	John	Last Name	Nortrup	Registration Number
				59063

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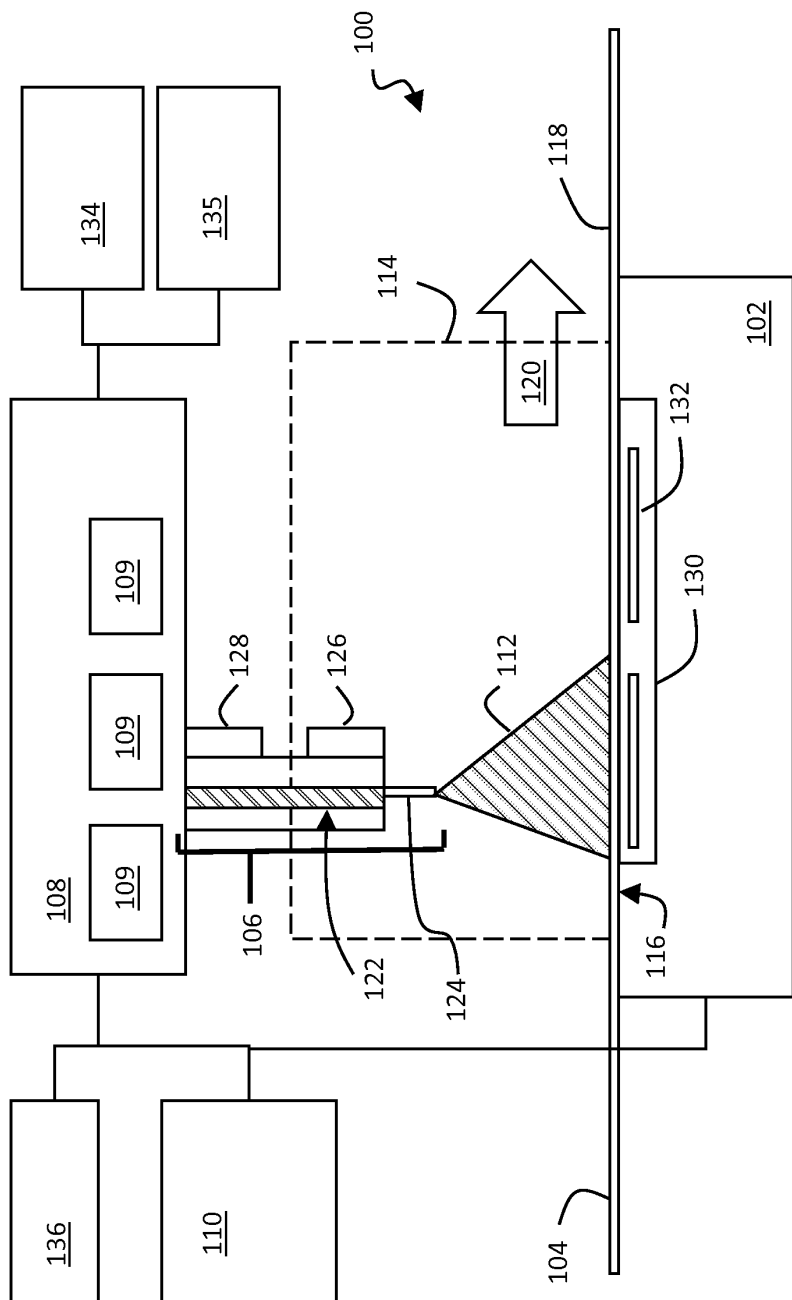


Fig. 1

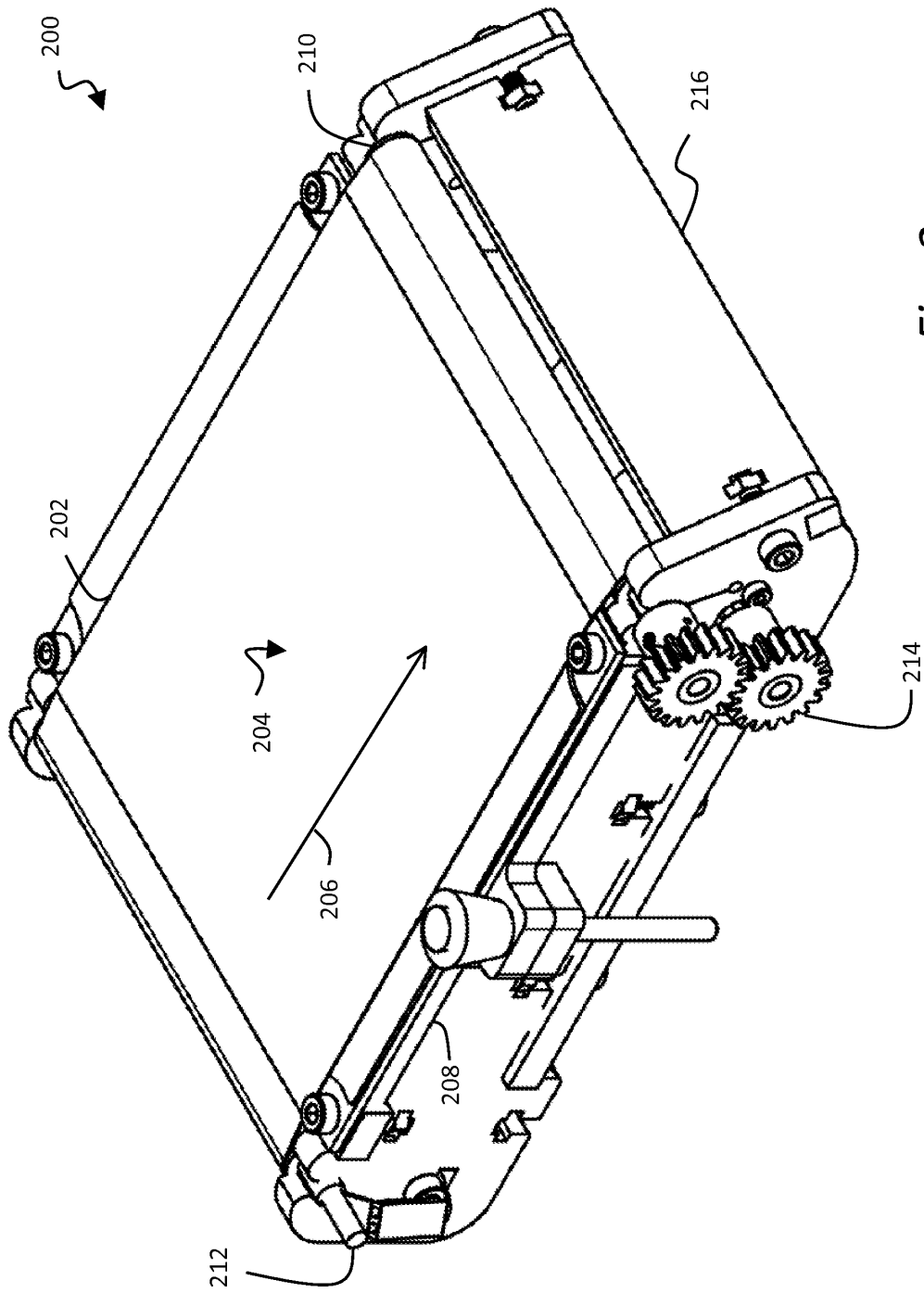


Fig. 2

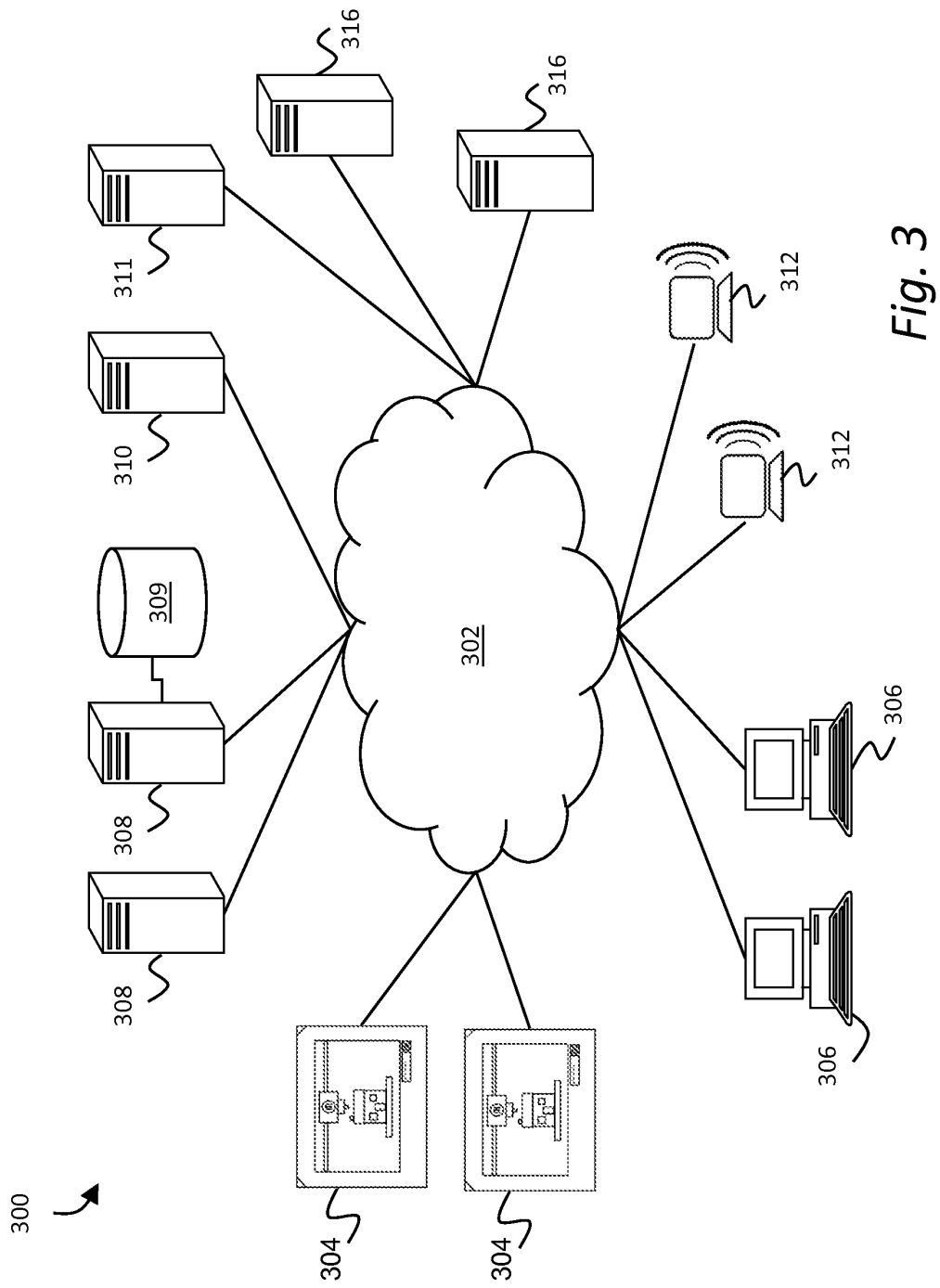


Fig. 3

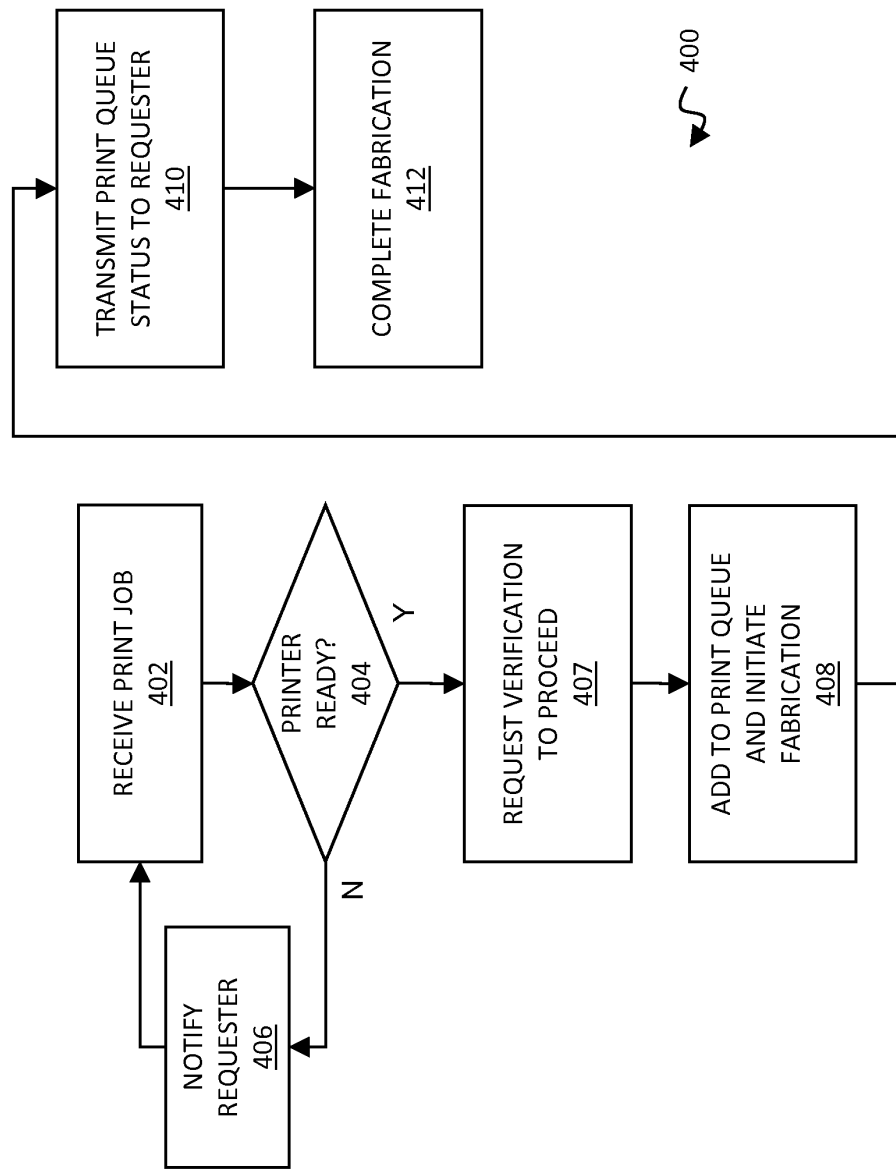


Fig. 4

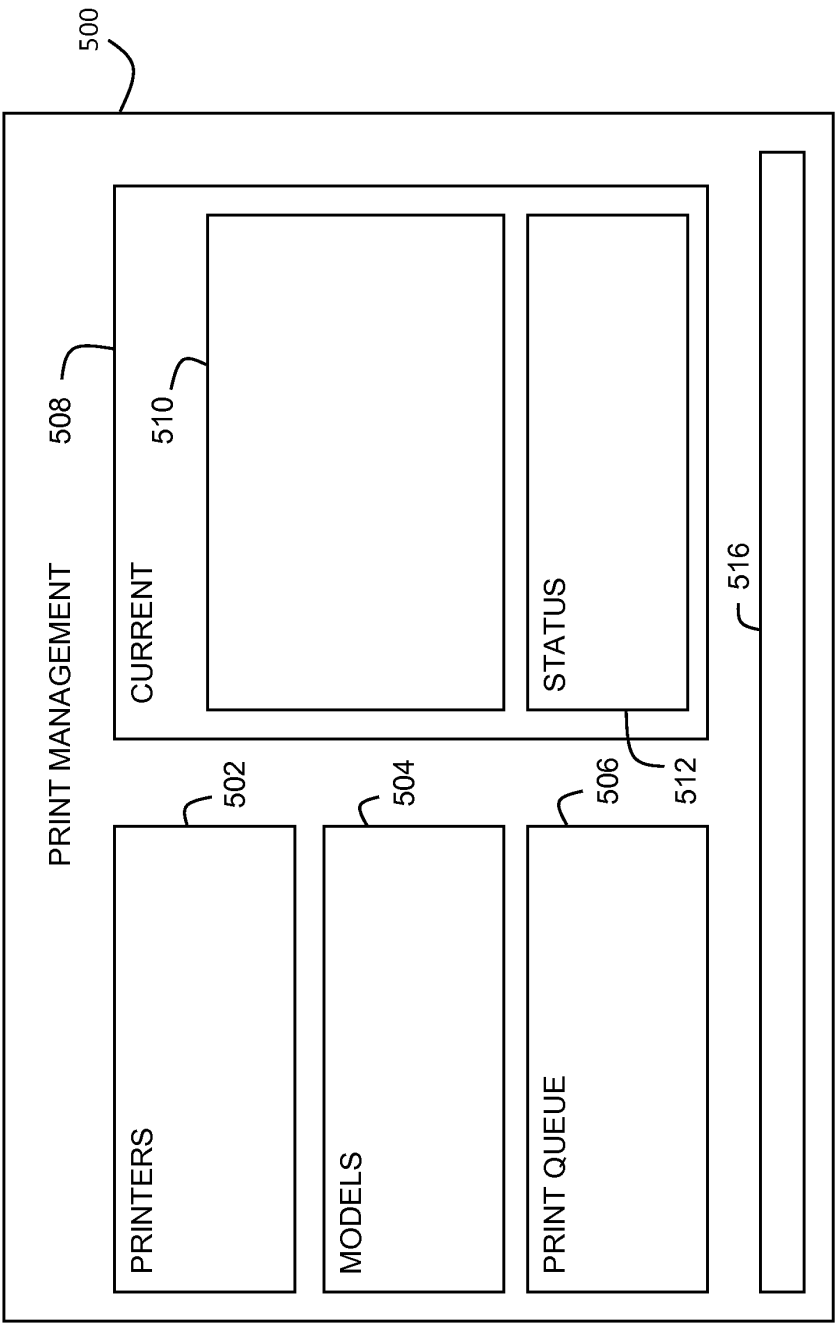


Fig. 5

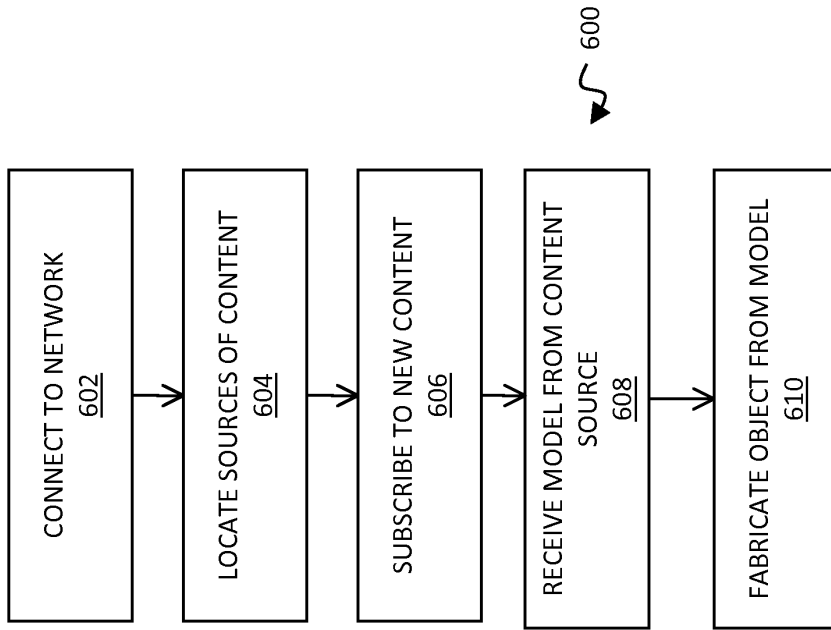


Fig. 6

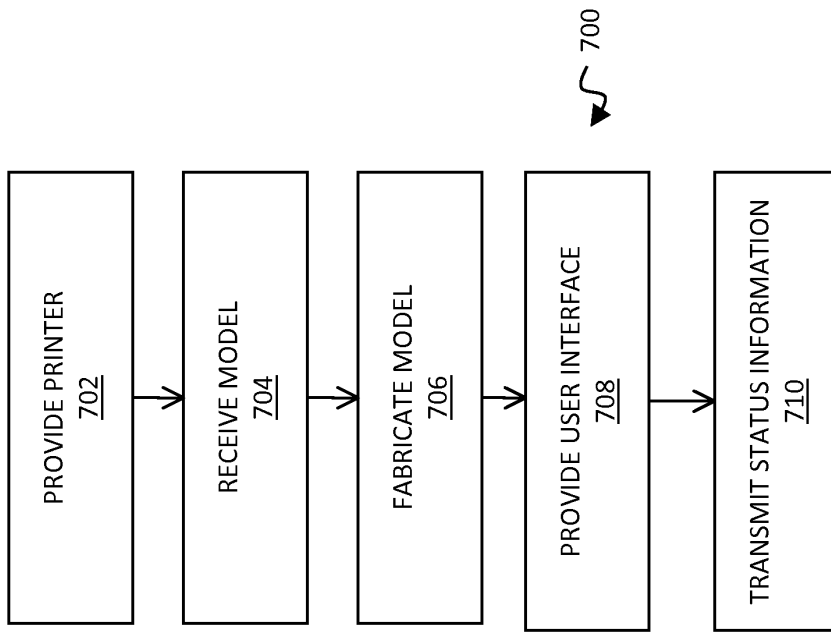


Fig. 7

United States Patent Application

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor I hereby declare with respect to the U.S. patent application entitled

NETWORKED THREE-DIMENSIONAL PRINTING.

the specification of which was filed on December 8, 2011 as application serial no. 13/314,337 that:

(a) my residence, post office address, and citizenship are as stated below next to my name;

(b) I believe I am the original, sole inventor of the subject matter which is claimed and for which a patent is sought; and

(c) I have reviewed and understood the contents of the specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application as defined in 37 C.F.R. § 1.56 (attached hereto). I also acknowledge my duty to disclose all information known to be material to patentability which became available between a filing date of a prior application and the national or PCT international filing date in the event this is a Continuation-In-Part application in accordance with 37 C.F.R. § 1.63(e).

I hereby appoint the following attorney(s) and/or patent agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith, I hereby authorize them to act and rely on instructions from and communicate directly with the person/assignee/attorney/agent/firm/organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

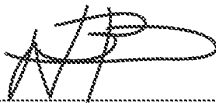
Full Name of inventor: Nathaniel B. Pettis

Citizenship: US

Residence: Brooklyn, NY

Post Office Address: 495 Pacific St. #2
Brooklyn, NY 11217

Signature: _____



Date: 1/3/2012

Nathaniel B. Pettis

§ 1.56 Duty to disclose information material to patentability.

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is canceled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) prior art cited in search reports of a foreign patent office in a counterpart application, and
- (2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
- (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (i) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

- (1) Each inventor named in the application;
- (2) Each attorney or agent who prepares or prosecutes the application; and
- (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

(e) In any continuation-in-part application, the duty under this section includes the duty to disclose to the Office all information known to the person to be material to patentability, as defined in paragraph (b) of this section, which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

NETWORKED THREE-DIMENSIONAL PRINTING

RELATED APPLICATIONS

[0001] This application is a continuation of U.S. Patent Application No. 13/314,337 filed December 8, 2011, which is a continuation-in-part of U.S. Patent Application No. 12/858,622, filed on August 18, 2010, the entire content of each of these applications is hereby incorporated by reference.

BACKGROUND

[0002] The invention relates to three-dimensional fabrication using networked resources.

[0003] A variety of three-dimensional fabrication techniques have been devised to support rapid prototyping from computer models. These techniques have been refined over the years to increase accuracy, working volume, and the variety of build materials available in a rapid prototyping environment. While these increasingly sophisticated and expensive machines appear regularly in commercial design and engineering settings, a more recent trend has emerged toward low-cost three-dimensional prototyping devices suitable for hobbyists and home users. As these resources become more readily and widely available, a need has emerged for networking capabilities and network management for three-dimensional printers.

SUMMARY

[0004] Three-dimensional fabrication resources are improved by adding networking capabilities to three-dimensional printers and providing a variety of tools for networked use of three-dimensional printers. Web-based servers or the like can provide a single point of access for remote users to manage access to distributed content on one hand, and to manage use of distributed fabrication resources on the other.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The foregoing and other objects, features and advantages of the invention will be apparent from the following description of particular embodiments thereof, as illustrated in the accompanying drawings. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention.

[0006] Fig. 1 is a block diagram of a three-dimensional printer.

[0007] Fig. 2 is an isometric view of a conveyer for an automated build process.

[0008] Fig. 3 depicts a networked three-dimensional printing environment.

[0009] Fig. 4 is a flowchart of a method for using a three-dimensional printer, such as any of the three-dimensional printers described above, when coupled to a data network.

[0010] Fig. 5 depicts a user interface for management of networked printing.

[0011] Fig. 6 is a flowchart of a method for operating a three-dimensional printer coupled to a network.

[0012] Fig. 7 is a flowchart of a method for operating a three-dimensional printer coupled to a network.

DETAILED DESCRIPTION

[0013] Described herein are devices and methods for using networked three-dimensional printers. It will be understood that while the exemplary embodiments below emphasize fabrication techniques using extrusion, the principles of the invention may be adapted to a wide variety of three-dimensional fabrication processes, and in particular additive fabrication processes including without limitation selective laser sintering, fused deposition modeling, three-dimensional printing, and the like. All such variations that can be adapted to use with a networked fabrication resource as described herein are intended to fall within the scope of this disclosure. It should also be understood that any reference herein to a fabrication process such as printing or three-dimensional printing is intended to refer to any and all such additive fabrication process unless a different meaning is explicitly stated or otherwise clear from the context. Thus by way of example and not of

limitation, a three-dimensional printer (or simply “printer”) is now described that may be used in a networked three-dimensional printing environment.

[0014] Fig. 1 is a block diagram of a three-dimensional printer. In general, the printer 100 may include a build platform 102, a conveyor 104, an extruder 106, an x-y-z positioning assembly 108, and a controller 110 that cooperate to fabricate an object 112 within a working volume 114 of the printer 100.

[0015] The build platform 102 may include a surface 116 that is rigid and substantially planar. The surface 116 may support the conveyor 104 in order to provide a fixed, dimensionally and positionally stable platform on which to build the object 112.

[0016] The build platform 102 may include a thermal element 130 that controls the temperature of the build platform 102 through one or more active devices 132 such as resistive elements that convert electrical current into heat, Peltier effect devices that can create a heating or cooling effect, or any other thermoelectric heating and/or cooling devices. Thus the thermal element 130 may be a heating element that provides active heating to the build platform 102, a cooling element that provides active cooling to the build platform 102, or a combination of these. The heating element 130 may be coupled in a communicating relationship with the controller 110 in order for the controller 110 to controllably impart heat to or remove heat from the surface 116 of the build platform 102. Thus the thermal element 130 may include an active cooling element positioned within or adjacent to the build platform 102 to controllably cool the build platform 102.

[0017] It will be understood that a variety of other techniques may be employed to control a temperature of the build platform 102. For example, the build platform 102 may use a gas cooling or gas heating device such as a vacuum chamber or the like in an interior thereof, which may be quickly pressurized to heat the build platform 102 or vacated to cool the build platform 102 as desired. As another example, a stream of heated or cooled gas may be applied directly to the build platform 102 before, during, and/or after a build process. Any device or combination of devices suitable for controlling a temperature of the build platform 102 may be adapted to use as the thermal element 130 described herein.

[0018] The conveyer 104 may be formed of a sheet 118 of material that moves in a path 120 through the working volume 114. Within the working volume 114, the path 120 may pass proximal to the surface 116 of the build platform 102 – that is, resting directly on or otherwise supported by the surface 116 -- in order to provide a rigid, positionally stable working surface for a build. It will be understood that while the path 120 is depicted as a unidirectional arrow, the path 120 may be bidirectional, such that the conveyer 104 can move in either of two opposing directions through the working volume 114. It will also be understood that the path 120 may curve in any of a variety of ways, such as by looping underneath and around the build platform 102, over and/or under rollers, or around delivery and take up spools for the sheet 118 of material. Thus, while the path 120 may be generally (but not necessarily) uniform through the working volume 114, the conveyer 104 may move in any direction suitable for moving completed items from the working volume 114. The conveyer may include a motor or other similar drive mechanism (not shown) coupled to the controller 110 to control movement of the sheet 118 of material along the path 120. Various drive mechanisms are shown and described in further detail below.

[0019] In general, the sheet 118 may be formed of a flexible material such as a mesh material, a polyamide, a polyethylene terephthalate (commercially available in bi-axial form as MYLAR), a polyimide film (commercially available as KAPTON), or any other suitably strong polymer or other material. The sheet 118 may have a thickness of about three to seven thousandths of an inch, or any other thickness that permits the sheet 118 to follow the path 120 of the conveyer 104. For example, with sufficiently strong material, the sheet 118 may have a thickness of one to three thousandths of an inch. The sheet 118 may instead be formed of sections of rigid material joined by flexible links.

[0020] A working surface of the sheet 118 (e.g., an area on the top surface of the sheet 118 within the working volume 114) may be treated in a variety of manners to assist with adhesion of build material to the surface 118 and/or removal of completed objects from the surface 118. For example, the working surface may be abraded or otherwise textured (e.g., with grooves, protrusions, and the like) to improve adhesion between the working surface and the build material.

[0021] A variety of chemical treatments may be used on the working surface of the sheet 118 of material to further facilitate build processes as described herein. For example, the chemical treatment may include a deposition of material that can be chemically removed from the conveyor 104 by use of water, solvents, or the like. This may facilitate separation of a completed object from the conveyor by dissolving the layer of chemical treatment between the object 112 and the conveyor 104. The chemical treatments may include deposition of a material that easily separates from the conveyor such as a wax, mild adhesive, or the like. The chemical treatment may include a detachable surface such as an adhesive that is sprayed on to the conveyor 104 prior to fabrication of the object 112.

[0022] In one aspect, the conveyor 104 may be formed of a sheet of disposable, one-use material that is fed from a dispenser and consumed with each successive build.

[0023] In one aspect, the conveyor 104 may include a number of different working areas with different surface treatments adapted for different build materials or processes. For example, different areas may have different textures (smooth, abraded, grooved, etc.). Different areas may be formed of different materials. Different areas may also have or receive different chemical treatments. Thus a single conveyor 104 may be used in a variety of different build processes by selecting the various working areas as needed or desired.

[0024] The extruder 106 may include a chamber 122 in an interior thereof to receive a build material. The build material may, for example, include acrylonitrile butadiene styrene (“ABS”), high-density polyethylene (“HDPE”), polylactic acid, or any other suitable plastic, thermoplastic, or other material that can usefully be extruded to form a three-dimensional object. The extruder 106 may include an extrusion tip 124 or other opening that includes an exit port with a circular, oval, slotted or other cross-sectional profile that extrudes build material in a desired cross-sectional shape.

[0025] The extruder 106 may include a heater 126 to melt thermoplastic or other meltable build materials within the chamber 122 for extrusion through an extrusion tip 124 in liquid form. While illustrated in block form, it will be understood that the heater 124 may include, e.g., coils of resistive wire wrapped about the extruder 106, one or more

heating blocks with resistive elements to heat the extruder 106 with applied current, an inductive heater, or any other arrangement of heating elements suitable for creating heat within the chamber 122 to melt the build material for extrusion. The extruder 106 may also or instead include a motor 128 or the like to push the build material into the chamber 122 and/or through the extrusion tip 126.

[0026] In general operation (and by way of example rather than limitation), a build material such as ABS plastic in filament form may be fed into the chamber 122 from a spool or the like by the motor 128, melted by the heater 126, and extruded from the extrusion tip 124. By controlling a rate of the motor 128, the temperature of the heater 126, and/or other process parameters, the build material may be extruded at a controlled volumetric rate. It will be understood that a variety of techniques may also or instead be employed to deliver build material at a controlled volumetric rate, which may depend upon the type of build material, the volumetric rate desired, and any other factors. All such techniques that might be suitably adapted to delivery of build material for fabrication of a three-dimensional object are intended to fall within the scope of this disclosure. As noted above, other techniques may be employed for three-dimensional printing, including extrusion-based techniques using a build material that is curable and/or a build material of sufficient viscosity to retain shape after extrusion.

[0027] The x-y-z positioning assembly 108 may generally be adapted to three-dimensionally position the extruder 106 and the extrusion tip 124 within the working volume 114. Thus by controlling the volumetric rate of delivery for the build material and the x, y, z position of the extrusion tip 124, the object 112 may be fabricated in three dimensions by depositing successive layers of material in two-dimensional patterns derived, for example, from cross-sections of a computer model or other computerized representation of the object 112. A variety of arrangements and techniques are known in the art to achieve controlled linear movement along one or more axes. The x-y-z positioning assembly 108 may, for example, include a number of stepper motors 109 to independently control a position of the extruder within the working volume along each of an x-axis, a y-axis, and a z-axis. More generally, the x-y-z positioning assembly 108 may include without limitation various combinations of stepper motors, encoded DC motors,

gears, belts, pulleys, worm gears, threads, and so forth. Any such arrangement suitable for controllably positioning the extruder 106 within the working volume 114 may be adapted to use with the printer 100 described herein.

[0028] By way of example and not limitation, the conveyor 104 may be affixed to a bed that provides x-y positioning within the plane of the conveyor 104, while the extruder 106 can be independently moved along a z-axis. As another example, the extruder 106 may be stationary while the conveyor 104 is x, y, and z positionable. As another example, the extruder 106 may be x, y, and z positionable while the conveyor 104 remains fixed (relative to the working volume 114). In yet another example, the conveyor 104 may, by movement of the sheet 118 of material, control movement in one axis (e.g., the y-axis), while the extruder 106 moves in the z-axis as well as one axis in the plane of the sheet 118. Thus in one aspect, the conveyor 104 may be attached to and move with at least one of an x-axis stage (that controls movement along the x-axis), a y-axis stage (that controls movement along a y-axis), and a z-axis stage (that controls movement along a z-axis) of the x-y-z positioning assembly 108. More generally, any arrangement of motors and other hardware controllable by the controller 110 may serve as the x-y-z positioning assembly 108 in the printer 100 described herein. Still more generally, while an x, y, z coordinate system serves as a convenient basis for positioning within three dimensions, any other coordinate system or combination of coordinate systems may also or instead be employed, such as a positional controller and assembly that operates according to cylindrical or spherical coordinates.

[0029] The controller 110 may be electrically coupled in a communicating relationship with the build platform 102, the conveyor 104, the x-y-z positioning assembly 108, and the other various components of the printer 100. In general, the controller 110 is operable to control the components of the printer 100, such as the build platform 102, the conveyor 104, the x-y-z positioning assembly 108, and any other components of the printer 100 described herein to fabricate the object 112 from the build material. The controller 110 may include any combination of software and/or processing circuitry suitable for controlling the various components of the printer 100 described herein including without limitation microprocessors, microcontrollers, application-

specific integrated circuits, programmable gate arrays, and any other digital and/or analog components, as well as combinations of the foregoing, along with inputs and outputs for transceiving control signals, drive signals, power signals, sensor signals, and so forth. In one aspect, the controller 110 may include a microprocessor or other processing circuitry with sufficient computational power to provide related functions such as executing an operating system, providing a graphical user interface (e.g., to a display coupled to the controller 110 or printer 100), convert three-dimensional models into tool instructions, and operate a web server or otherwise host remote users and/or activity through the network interface 136 described below.

[0030] A variety of additional sensors may be usefully incorporated into the printer 100 described above. These are generically depicted as sensor 134 in Fig. 1, for which the positioning and mechanical/electrical interconnections with other elements of the printer 100 will depend upon the type and purpose of the sensor 134 and will be readily understood and appreciated by one of ordinary skill in the art. The sensor 134 may include a temperature sensor positioned to sense a temperature of the surface of the build platform 102. This may, for example, include a thermistor or the like embedded within or attached below the surface of the build platform 102. This may also or instead include an infrared detector or the like directed at the surface 116 of the build platform 102 or the sheet 118 of material of the conveyer 104. Other sensors that may be usefully incorporated into the printer 100 as the sensor 134 include a heat sensor, a volume flow rate sensor, a weight sensor, a sound sensor, and a light sensor. Certain more specific examples are provided below by way of example and not of limitation.

[0031] The sensor 134 may include a sensor to detect a presence (or absence) of the object 112 at a predetermined location on the conveyer 104. This may include an optical detector arranged in a beam-breaking configuration to sense the presence of the object 112 at a location such as an end of the conveyer 104. This may also or instead include an imaging device and image processing circuitry to capture an image of the working volume 114 and analyze the image to evaluate a position of the object 112. This sensor 134 may be used for example to ensure that the object 112 is removed from the conveyor 104 prior to beginning a new build at that location on the working surface such

as the surface 116 of the build platform 102. Thus the sensor 134 may be used to determine whether an object is present that should not be, or to detect when an object is absent. The feedback from this sensor 134 may be used by the controller 110 to issue processing interrupts or otherwise control operation of the printer 100.

[0032] The sensor 134 may include a sensor that detects a position of the conveyer 104 along the path. This information may be obtained from an encoder in a motor that drives the conveyer 104, or using any other suitable technique such as a visual sensor and corresponding fiducials (e.g., visible patterns, holes, or areas with opaque, specular, transparent, or otherwise detectable marking) on the sheet 118.

[0033] The sensor 134 may include a heater (instead of or in addition to the thermal element 130) to heat the working volume 114 such as a radiant heater or forced hot air to maintain the object 112 at a fixed, elevated temperature throughout a build. The sensor 134 may also or instead include a cooling element to maintain the object 112 at a predetermined sub-ambient temperature throughout a build.

[0034] The sensor 134 may also or instead include at least one video camera. The video camera may generally capture images of the working volume 114, the object 112, or any other hardware associated with the printer 100. The video camera may provide a remote video feed through the network interface 136, which feed may be available to remote users through a user interface maintained by, e.g., remote hardware such as the print servers described below with reference to Fig. 3, or within a web page provided by a web server hosted by the three-dimensional printer 100. Thus in one aspect there is disclosed herein a user interface adapted to present a video feed from at least one video camera of a three-dimensional printer to a remote user through a user interface.

[0035] The sensor 134 may include may also include more complex sensing and processing systems or subsystems, such as a three-dimensional scanner using optical techniques (e.g., stereoscopic imaging, or shape from motion imaging), structured light techniques, or any other suitable sensing and processing hardware that might extract three-dimensional information from the working volume 114. In another aspect, the sensor 134 may include a machine vision system that captures images and analyzes image content to obtain information about the status of a job, working volume 114, or an

object 112 therein. The machine vision system may support a variety of imaging-based automatic inspection, process control, and/or robotic guidance functions for the three-dimensional printer 100 including without limitation pass/fail decisions, error detection (and corresponding audible or visual alerts), shape detection, position detection, orientation detection, collision avoidance, and so forth.

[0036] Other components, generically depicted as other hardware 135, may also be included, such as input devices including a keyboard, touchpad, mouse, switches, dials, buttons, motion sensors, and the like, as well as output devices such as a display, a speaker or other audio transducer, light emitting diodes, and so forth. Other hardware 135 may also or instead include a variety of cable connections and/or hardware adapters for connecting to, e.g., external computers, external hardware, external instrumentation or data acquisition systems, and so forth.

[0037] The printer 100 may include, or be connected in a communicating relationship with, a network interface 136. The network interface 136 may include any combination of hardware and software suitable for coupling the controller 110 and other components of the printer 100 to a remote computer in a communicating relationship through a data network. By way of example and not limitation, this may include electronics for a wired or wireless Ethernet connection operating according to the IEEE 802.11 standard (or any variation thereof), or any other short or long range wireless networking components or the like. This may include hardware for short range data communications such as BlueTooth or an infrared transceiver, which may be used to couple into a local area network or the like that is in turn coupled to a data network such as the Internet. This may also or instead include hardware/software for a WiMax connection or a cellular network connection (using, e.g., CDMA, GSM, LTE, or any other suitable protocol or combination of protocols). Consistently, the controller 110 may be configured to control participation by the printer 100 in any network to which the network interface 136 is connected, such as by autonomously connecting to the network to retrieve printable content, or responding to a remote request for status or availability. Networked uses of the printer 100 are discussed in greater detail below.

[0038] Fig. 2 is an isometric view of a conveyer for an automated build process. The conveyer 200 may include a sheet 202 of material that provides a working surface 204 for three-dimensional fabrication. As depicted, the conveyer may form a continuous path 206 about a build platform 208 by arranging the sheet 202 as a belt or the like. Thus for example, the path 206 may move parallel to the surface of the build platform 208 along the top of the build platform 208 (from left to right in Fig. 2). The sheet 202 may then curve downward and around a roller 210 and reverse direction underneath the build platform 208, returning again at an opposing roller 212 to form a loop about the build platform 208.

[0039] The roller 210 may be coupled by gears 214 or the like to a motor (not shown) to move the sheet 202 of material. The motor may be controlled by a controller (such as the controller 110 described above) to control movement of the sheet 202 of material in a build process.

[0040] The conveyer 200 may include a scraper 216 to physically separate a completed object from the conveyer 200 based upon a relative movement of the sheet 202 of material of the conveyer 200 to the scraper 216. In general, adhesion of an object to a working surface maintains the object within the coordinate system of the printer during a build in order to facilitate the build process. Where good adhesion is achieved during a build, dislodging the completed object from the working surface may require significant force. Thus in order to ensure the availability of a continuous working surface, the conveyer 200 may enforce physical separation of the object from the working surface by passing the sheet 202 of material by the scraper 216 to dislodge the object. While the scraper 216 is depicted below the working surface of the sheet 202, it will be readily understood that a variety of positions and orientations of the scraper 216 may achieve similar results. Thus for example, the scraper 216 may extend vertically above or below the sheet 202, horizontally from the sheet 202, or in any other suitable orientation. It will also be appreciated that while the scraper 216 is depicted in an orientation perpendicular to the path 206, the scraper 216 may be angled in order to also urge a completed object off the sheet 202 in any desired direction, such as to a side of the working surface where a chute or receptacle may be provided to catch and store the completed object. In some

embodiments, the conveyor 200 may transport the object to a side of the printer 100, or alternatively the entire conveyor 200 assembly may be moved outside the printer, so that urging the completed object off the sheet 202 also causes the completed object to depart the printer 100. The term ‘scraper’ should be understood as referring in a non-limiting sense to any physical fixture that might be employed to remove an object from the sheet 202, and that many other shapes, sizes, orientations, and the like may also or instead be employed as the scraper 216 described herein without departing from the scope of this disclosure.

[0041] In one aspect, the conveyor 200 may support networked use of the printer 100 by permitting fabrication of multiple, consecutive parts under control by a remote computer without user intervention.

[0042] Fig. 3 depicts a networked three-dimensional printing environment. In general, the environment 300 may include a data network 302 interconnecting a plurality of participating devices in a communicating relationship. The participating devices may, for example, include any number of three-dimensional printers 304 (also referred to interchangeably herein as “printers”), client devices 306, print servers 308, content sources 310, mobile devices 314, and other resources 316.

[0043] The data network 302 may be any network(s) or internetwork(s) suitable for communicating data and control information among participants in the environment 300. This may include public networks such as the Internet, private networks, telecommunications networks such as the Public Switched Telephone Network or cellular networks using third generation (e.g., 3G or IMT-2000), fourth generation (e.g., LTE (E-UTRA) or WiMax-Advanced (IEEE 802.16m), as well as any of a variety of corporate area or local area networks and other switches, routers, hubs, gateways, and the like that might be used to carry data among participants in the environment 300.

[0044] The three-dimensional printers 304 may be any computer-controlled devices for three-dimensional fabrication, including without limitation any of the three-dimensional printers or other fabrication or prototyping devices described above. In general, each such device may include a network interface comprising, e.g., a network interface card, which term is used broadly herein to include any hardware (along with

software, firmware, or the like to control operation of same) suitable for establishing and maintaining wired and/or wireless communications. The network interface card may include without limitation wired Ethernet network interface cards (“NICs”), wireless 802.11 networking cards, wireless 802.11 USB devices, or other hardware for wireless local area networking. The network interface may also or instead include cellular network hardware, wide area wireless network hardware or any other hardware for centralized, ad hoc, peer-to-peer, or other radio communications that might be used to carry data. In another aspect, the network interface may include a serial or USB port used to directly connect to a computing device such as a desktop computer that, in turn, provides more general network connectivity to the data network 302.

[0045] Client devices 306 may in general be devices within the environment 300 operated by users to initiate and monitor print jobs at the three-dimensional printers 304. This may include desktop computers, laptop computers, network computers, tablets, or any other computing device that can participate in the environment 300 as contemplated herein. Each client device 306 generally provides a user interface, which may include a graphical user interface and/or text or command line interface to control operation of remote three-dimensional printers 304. The user interface may be maintained by a locally executing application on one of the client devices 306 that receives data and status information from, e.g., the printers 304 and print servers 308 concerning pending or executing print jobs, and creates a suitable display on the client device 306 for user interaction. In other embodiments, the user interface may be remotely served and presented on one of the client devices 306, such as where a print server 308 or one of the three-dimensional printers 304 includes a web server that provides information through one or more web pages or the like that can be displayed within a web browser or similar client executing on one of the client devices 306.

[0046] The print servers 308 may include data storage, a network interface, and a processor or other processing circuitry. In the following description, where the functions or configuration of a print server 308 are described, this is intended to include corresponding functions or configuration (e.g., by programming) of a processor of the print server 308. In general, the print servers 308 (or processors thereof) may perform a

variety of processing tasks related to management of networked printing. For example, the print servers 308 may manage print jobs received from one or more of the client devices 306, and provide related supporting functions such as content search and management. A print server 308 may also include a web server that provides web-based access by the client devices 306 to the capabilities of the print server 308. A print server 308 may also communicate periodically with three-dimensional printers 304 in order to obtain status information concerning, e.g., availability of printers and/or the status of particular print jobs, any of which may be subsequently presented to a user through the web server. A print server 308 may also maintain a list of available three-dimensional printers 304, and may automatically select one of the three-dimensional printers 304 for a user-submitted print job, or may permit a user to specify a single printer, or a group of preferred printers, for fabricating an object. Where the print server 308 selects the printer automatically, any number of criteria may be used such as geographical proximity, printing capabilities, current print queue, fees (if any) for use of a particular three-dimensional printer 304, and so forth. Where the user specifies criteria, this may similarly include any relevant aspects of three-dimensional printers 304, and may permit use of absolute criteria (e.g., filters) or preferences, which may be weighted preferences or unweighted preferences, any of which may be used by a print server 308 to allocate a print job to a suitable resource.

[0047] Other user preferences may be usefully stored at the print server 308 to facilitate autonomous, unsupervised fabrication of content from content sources 310. For example, a print server 308 may store a user's preference on handling objects greater than a build volume of a printer. These preferences may control whether to resize the object, whether to break the object into multiple sub-objects for fabrication, and whether to transmit multiple sub-objects to a single printer or multiple printers. In addition, user preferences or requirements may be stored, such as multi-color printing capability, build material options and capabilities, and so forth. More generally, the print queue may be managed by a print server 308 according to one or more criteria from a remote user requesting a print job. The print server 308 may also store user preferences or criteria for filtering content, e.g., for automatic printing or other handling. While this is described

below as a feature for autonomous operation of a printer (such as a printer that locally subscribes to a syndicated model source), any criteria that can be used to identify models of potential interest by explicit type (e.g., labeled in model metadata), implicit type (e.g., determined based on analysis of the model), source, and so forth, may be provided to the print server 308 and used to automatically direct new content to one or more user-specified ones of the three-dimensional printers 304.

[0048] In one aspect, the processor of the print server may be configured to store a plurality of print jobs submitted to the web server in a log and to provide an analysis of print activity based on the log. This may include any type of analysis that might be useful to participants in the environment 300. For example, the analysis may include tracking of the popularity of particular objects, or of particular content sources. The analysis may include tracking of which three-dimensional printers 304 are most popular or least popular, or related statistics such as the average backlog of pending print jobs at a number of the three-dimensional printers 304. More generally, any statistics or data may be obtained, and any analysis may be performed, that might be useful to users (e.g., when requesting prints), content sources (e.g., when choosing new printable objects for publication), providers of fabrication resources (e.g., when setting fees), or network facilitators such as the print servers 308.

[0049] A print server 308 may also maintain a database 309 of content, along with an interface for users at client devices 306 to search the database 309 and request fabrication of objects in the database 309 using any of the three-dimensional printers 304. Thus in one aspect, a print server 308 (or any system including the print server 308) may include a database 309 of three-dimensional models, and the print server 308 may act as a server that provides a search engine for locating a particular three-dimensional model in the database 309. The search engine may be a text-based search engine using keyword text queries, plain language queries, and so forth. The search engine may also or instead include an image-based search engine configured to identify three-dimensional models similar to a two-dimensional or three-dimensional image provide by a user.

[0050] In another aspect, the printer server 308 may periodically search for suitable content at remote locations on the data network, which content may be retrieved

to the database 309, or have its remote location (e.g., a URL or other network location identifier) stored in the database 309. In another aspect, the print server 308 may provide an interface for submission of objects from remote users, along with any suitable metadata such as a title, tags, creator information, descriptive narrative, pictures, recommended printer settings, and so forth. In one aspect, the database 309 may be manually curated according to any desired standards. In another aspect, printable objects in the database 309 may be manually or automatically annotated according to content type, popularity, editorial commentary, and so forth.

[0051] The print server 308 may more generally provide a variety of management functions. For example, the print server 304 may store a predetermined alternative three-dimensional printer to execute a print job from a remote user in the event of a failure by the one of the plurality of three-dimensional printers 304. In another aspect, the print server 308 may maintain exclusive control over at least one of the plurality of three-dimensional printers 304, such that other users and/or print servers cannot control the printer. In another aspect, the print server 308 may submit a print job to a first available one of the plurality of three-dimensional printers 304.

[0052] In another aspect, a print server 308 may provide an interface for managing subscriptions to sources of content. This may include tools for searching existing subscriptions, locating or specifying new sources, subscribing to sources of content, and so forth. In one aspect, a print server 308 may manage subscriptions and automatically direct new content from these subscriptions to a three-dimensional printer 304 according to any user-specified criteria. Thus while it is contemplated that a three-dimensional printer 304 may autonomously subscribe to sources of content through a network interface and receive new content directly from such sources, it is also contemplated that this feature may be maintained through a remote resource such as a print server 308.

[0053] A print server 308 may maintain print queues for participating three-dimensional printers 304. This approach may advantageously alleviate backlogs at individual printers 304, which may have limited memory capacity for pending print jobs. More generally, a print server 308 may, by communicating with multiple three-

dimensional printers 304, obtain a view of utilization of multiple networked resources that permits a more efficient allocation of print jobs than would be possible through simple point-to-point communications among users and printers. Print queues may also be published by a print server 308 so that users can view pending queues for a variety of different three-dimensional printers 304 prior to selecting a resource for a print job. In one aspect, the print queue may be published as a number of print jobs and size of print jobs so that a requester can evaluate likely delays. In another aspect, the print queue may be published as an estimated time until a newly submitted print job can be initiated.

[0054] In one aspect, the print queue of one of the print servers 308 may include one or more print jobs for one of the plurality of three-dimensional printers 304. The print queue may be stored locally at the one of the plurality of three-dimensional printers. In another aspect, the print queue may be allocated between the database 309 and a local memory of the three-dimensional printer 304. In another aspect, the print queue may be stored, for example, in the database 309 of the print server 308. As used here, the term ‘print queue’ is intended to include print data (e.g., the three-dimensional model or tool instructions to fabricate an object) for a number of print job (which may be arranged for presentation in order of expected execution), as well as any metadata concerning print jobs. Thus, a portion of the print queue such as the metadata (e.g., size, status, time to completion) may be usefully communicated to a print server 308 for sharing among users while another portion of the print queue such as the model data may be stored at a printer in preparation for execution of a print job.

[0055] Print queues may implement various user preferences on prioritization. For example, for a commercial enterprise, longer print jobs may be deferred for after normal hours of operation (e.g., after 5:00 p.m.), while shorter print jobs may be executed first if they can be completed before the end of a business day. In this manner, objects can be identified and fabricated from within the print queue in a manner that permits as many objects as possible to be fabricated before a predetermined closing time. Similarly, commercial providers of fabrication services may charge explicitly for prioritized fabrication, and implement this prioritization by prioritizing print queues in a corresponding fashion.

[0056] In another aspect, a print server 308 may provide a virtual workspace for a user. In this virtual workspace, a user may search local or remote databases of printable objects, save objects of interest (or links thereto), manage pending prints, specify preferences for receiving status updates (e.g., by electronic mail or SMS text), manage subscriptions to content, search for new subscription sources, and so forth. In one aspect, the virtual workspace may be, or may include, web-based design tools or a web-based design interface that permits a user to create and modify models. In one aspect, the virtual workspace may be deployed on the web, while permitting direct fabrication of a model developed within that environment on a user-specified one of the three-dimensional printers 304, thus enabling a web-based design environment that is directly coupled to one or more fabrication resources.

[0057] The content sources 310 may include any sources of content for fabrication with a three-dimensional printer 304. This may, for example, include databases of objects accessible through a web interface or application programming interface. This may also or instead include individual desktop computers or the like configured as a server for hosted access, or configured to operate as a peer in a peer-to-peer network. This may also or instead include content subscription services, which may be made available in an unrestricted fashion, or may be made available on a paid subscription basis, or on an authenticated basis based upon some other relationship (e.g., purchase of a related product or a ticket to an event). It will be readily appreciated that any number of content providers may serve as content sources 310 as contemplated herein. By way of non-limiting example, the content sources 310 may include destinations such as amusement parks, museums, theaters, performance venues, or the like, any of which may provide content related to users who purchase tickets. The content sources 310 may include manufacturers such as automobile, computer, consumer electronics, or home appliance manufacturers, any of which may provide content related to upgrades, maintenance, repair, or other support of existing products that have been purchased. The content sources 310 may include artists or other creative enterprises that sell various works of interest. The content sources 310 may include engineering or architectural firms that provide marketing or advertising pieces to existing or prospective

customers. The content sources 310 may include marketing or advertising firms that provide promotional items for clients. More generally, the content sources 310 may be any individual or enterprise that provides single or serial objects for fabrication by the three-dimensional printers 304 described herein.

[0058] One or more web servers 311 may provide web-based access to and from any of the other participants in the environment 300. While depicted as a separate network entity, it will be readily appreciated that a web server 311 may be logically or physically associated with one of the other devices described herein, and may, for example, provide a user interface for web access to one of the three-dimensional printers 304, one of the print servers 308 (or databases 309 coupled thereto), one of the content sources 310, or any of the other resources 316 described below in a manner that permits user interaction through the data network 302, e.g., from a client device 306 or mobile device 312.

[0059] The mobile devices 312 may be any form of mobile device, such as any wireless, battery-powered device, that might be used to interact with the networked printing environment 300. The mobile devices 312 may, for example, include laptop computers, tablets, thin client network computers, portable digital assistants, messaging devices, cellular phones, smart phones, portable media or entertainment devices, and so forth. In general, mobile devices 312 may be operated by users for a variety of user-oriented functions such as to locate printable objects, to submit objects for printing, to monitor a personally owned printer, and/or to monitor a pending print job. A mobile device 312 may include location awareness technology such as Global Positioning System (“GPS”), which may obtain information that can be usefully integrated into a printing operation in a variety of ways. For example, a user may select an object for printing and submit a model of the object to a print server, such as any of the print servers described above. The print server may determine a location of the mobile device 312 initiating the print job and locate a closest printer for fabrication of the object.

[0060] In another aspect, a printing function may be location-based, using the GPS input (or cellular network triangulation, proximity detection, or any other suitable location detection techniques). For example, a user may be authorized to print a model

only when the user is near a location (e.g., within a geo-fenced area or otherwise proximal to a location), or only after a user has visited a location. Thus a user may be provided with printable content based upon locations that the user has visited, or while within a certain venue such as an amusement park, museum, theater, sports arena, hotel, or the like.

[0061] The other resources 316 may include any other software or hardware resources that may be usefully employed in networked printing applications as contemplated herein. For example, the other resources 316 may include payment processing servers or platforms used to authorize payment for content subscriptions, content purchases, or printing resources. As another example, the other resources 316 may include social networking platforms that may be used, e.g., to share three-dimensional models and/or fabrication results according to a user's social graph. In another aspect, the other resources 316 may include certificate servers or other security resources for third party verification of identity, encryption or decryption of three-dimensional models, and so forth. In another aspect, the other resources 316 may include online tools for three-dimensional design or modeling, as well as databases of objects, surface textures, build supplies, and so forth. In another aspect, the other resources 316 may include a desktop computer or the like co-located (e.g., on the same local area network with, or directly coupled to through a serial or USB cable) with one of the three-dimensional printers 304. In this case, the other resource 316 may provide supplemental functions for the three-dimensional printer 304 in a networked printing context such as maintaining a print queue or operating a web server for remote interaction with the three-dimensional printer 304. More generally, any resource that might be usefully integrated into a networked printing environment may be one of the resources 316 as contemplated herein.

[0062] It will be readily appreciated that the various components of the networked printing environment 300 described above may be arranged and configured to support networked printing in a variety of ways. For example, in one aspect there is disclosed herein a networked computer with a print server and a web interface to support networked three-dimensional printing. This device may include a print server, a database,

and a web server as discussed above. The print server may be coupled through a data network to a plurality of three-dimensional printers and configured to receive status information from one or more sensors for each one of the plurality of three-dimensional printers. The print server may be further configured to manage a print queue for each one of the plurality of three-dimensional printers. The database may be coupled in a communicating relationship with the print server and configured to store print queue data and status information for each one of the plurality of three-dimensional printers. The web server may be configured to provide a user interface over the data network to a remote user, the user interface adapted to present the status information and the print queue data for one or more of the plurality of three-dimensional printers to the user and the user interface adapted to receive a print job from the remote user for one of the plurality of three-dimensional printers.

[0063] The three-dimensional printer 304 described above may be configured to autonomously subscribe to syndicated content sources and periodically receive and print objects from those sources. Thus in one aspect there is disclosed herein a device including any of the three-dimensional printers described above; a network interface; and a processor (which may without limitation include the controller for the printer). The processor may be configured to subscribe to a plurality of sources of content (such as the content sources 310 described above) selected by a user for fabrication by the three-dimensional printer through the network interface. The processor may be further configured to receive one or more three-dimensional models from the plurality of content sources 310, and to select one of the one or more three-dimensional models for fabrication by the three-dimensional printer 304 according to a user preference for prioritization. The user preference may, for example, preferentially prioritize particular content sources 310, or particular types of content (e.g., tools, games, artwork, upgrade parts, or content related to a particular interest of the user).

[0064] The memory of a three-dimensional printer 304 may be configured to store a queue of one or more additional three-dimensional models not selected for immediate fabrication. The processor may be programmed to periodically re-order or otherwise alter the queue according to pre-determined criteria or manual user input. For

example, the processor may be configured to evaluate a new three-dimensional model based upon a user preference for prioritization, and to place the new three-dimensional model at a corresponding position in the queue. The processor may also or instead be configured to retrieve content from one of the content sources 310 by providing authorization credentials for the user, which may be stored at the three-dimensional printer or otherwise accessible for presentation to the content source 310. The processor may be configured to retrieve content from at least one of the plurality of content sources 310 by authorizing a payment from the user to a content provider. The processor may be configured to search a second group of sources of content (such as any of the content sources 310 described above) according to one or more search criteria provide by a user. This may also or instead include demographic information for the user, contextual information for the user, or any other implicit or explicit user information.

[0065] In another aspect, there is disclosed herein a system for managing subscriptions to three-dimensional content sources such as any of the content sources 310 described above. The system may include a web server configured to provide a user interface over a data network, which user interface is adapted to receive user preferences from a user including a subscription to a plurality of sources of a plurality of three-dimensional models, a prioritization of content from the plurality of sources, and an identification of one or more fabrication resources coupled to the data network and suitable for fabricating objects from the plurality of three-dimensional models. The system may also include a database to store the user preferences, and to receive and store the plurality of three-dimensional models as they are issued by the plurality of sources. The system may include a processor (e.g., of a print server 308, or alternatively of a client device 306 interacting with the print server 308) configured select a selected one of the plurality of three-dimensional models for fabrication based upon the prioritization. The system may include a print server configured to communicate with the one or more fabrication resources through the data network, to determine an availability of the one or more fabrication resources, and to transmit the selected one of the plurality of three-dimensional models to one of the one or more fabrication resources.

[0066] In another aspect, there is disclosed herein a network of three-dimensional printing resources comprising: a plurality of three-dimensional printers, each one of the plurality of three-dimensional printers including a network interface; a server configured to manage execution of a plurality of print jobs by the plurality of three-dimensional printers; and a data network that couples the server and the plurality of three-dimensional printers in a communicating relationship.

[0067] In general as described above, the server may include a web-based user interface configured for a user to submit a new print job to the server and to monitor progress of the new print job. The web-based user interface may permit video monitoring of each one of the plurality of three-dimensional printers, or otherwise provide information useful to a remote user including image-based, simulation-based, textual-based or other information concerning status of a current print. Details of a suitable user interface are discussed in further detail with reference to Fig. 5.

[0068] The fabrication resources may, for example, include any of the three-dimensional printers 304 described above. One or more of the fabrication resources may be a private fabrication resource secured with a credential-based access system. The user may provide, as a user preference and prior to use of the private fabrication resource, credentials for accessing the private fabrication resource. In another aspect, the one or more fabrication resources may include a commercial fabrication resource. In this case the user may provide an authorization to pay for use of the commercial fabrication resource in the form of a user preference prior to use of the commercial fabrication resource.

[0069] Many current three-dimensional printers require significant manufacturing time to fabricate an object. At the same time, certain printers may include a tool or system to enable multiple, sequential object prints without human supervision or intervention, such as the conveyor belt described above. In this context, prioritizing content may be particularly important to prevent crowding out of limited fabrication resources with low priority content that arrives periodically for autonomous fabrication. As a significant advantage, the systems and methods described herein permit prioritization using a variety of user-specified criteria, and permit use of multiple

fabrication resources in appropriate circumstances. Thus prioritizing content as contemplated herein may include any useful form of prioritization. For example, this may include prioritizing the content according to source. The content sources 310 may have an explicit type that specifies the nature of the source (e.g., commercial or paid content, promotional content, product support content, non-commercial) or the type of content provided (e.g., automotive, consumer electronics, radio control hobbyist, contest prizes, and so forth). Prioritizing content may include prioritizing the content according to this type. The three-dimensional models themselves may also or instead include a type (e.g., tool, game, home, art, jewelry, replacement part, upgrade part, etc.), and prioritizing the content may include prioritizing the content according to this type.

[0070] In one aspect, the processor may be configured to select two or more of the plurality of three-dimensional models for concurrent fabrication by two or more of the plurality of fabrication resources based upon the prioritization when a priority of the two or more of the plurality of three-dimensional models exceeds a predetermined threshold. That is, where particular models individually have a priority above the predetermined threshold, multiple fabrication resources may be located and employed to fabricate these models concurrently. The predetermined threshold may be evaluated for each model individually, or for all of the models collectively such as on an aggregate or average basis.

[0071] In one aspect, the processor may be configured to adjust prioritization based upon a history of fabrication when a number of objects fabricated from one of the plurality of sources exceeds a predetermined threshold. Thus, for example, a user may limit the number of objects fabricated from a particular source, giving subsequent priority to content from other sources regardless of an objectively determined priority for a new object from the particular source. This prevents a single source from overwhelming a single fabrication resource, such as a personal three-dimensional printer operated by the user, in a manner that crowds out other content from other sources of possible interest. At the same time, this may enable content sources 310 to publish on any convenient schedule, without regard to whether and how subscribers will be able to fabricate objects.

[0072] In another aspect, the processor may be configured to identify one or more additional sources of content based upon a similarity to one of the plurality of sources of content. For example, where a content source 310 is an automotive manufacturer, the processor may perform a search for other automotive manufactures, related parts suppliers, mechanics, and so forth. The processor may also or instead be configured to identify one or more additional sources of content based upon a social graph of the user. This may, for example, include analyzing a social graph of relationships from the user to identify groups with common interests, shared professions, a shared history of schools or places of employment, or a common current or previous residence location, any of which may be used to locate other sources of content that may be of interest to the user.

[0073] Fig. 4 depicts a method for operating a three-dimensional printer, such as any of the three-dimensional printers described above, when coupled to a data network. As contemplated above, the three-dimensional printer may include a network interface for coupling to the data network, as well as any number of sensors that provide status information for various aspects of the three-dimensional printer, which status information may be communicated over the data network to a remote user or other automated or manual resource in order to monitor submission, progress, and completion of a print job. In general, the printer may operate as an autonomous network device coupled directly to the Internet through a cable mode, router, hub, or the like. In another aspect, the printer may use a computer or other computing resource coupled to the printer through a local area network or the like for steps requiring intensive computation (e.g., converting from a stereolithography or other computer automated design format into tool instructions), substantial storage (e.g., print queue management), or other hardware (e.g., cameras, environmental sensors, and so forth).

[0074] As shown in step 402, the method 400 may begin with receiving a print job over the data network, which may include any of the data networks described above. The print job may be received from a requester, which may for example include a remote device (or user of the remote device) such as a laptop or other computer. The requester may be coupled in a communicating relationship to the three-dimensional printer through the data network in a host-client relationship, a peer-to-peer relationship, a mutually

hosted relationship (e.g., with both devices hosted by a third networked device) or any other relationship capable of supporting communications and data transfer between the requester and the three-dimensional printer. In another aspect, a user may communicate indirectly with the three-dimensional printer, such as by interacting over the data network with a print server, subscription content source, or any other resource or service that facilitates managed access to the three-dimensional printer over the data network, and acts as the requester to submit the print job.

[0075] As shown in step 404, the method 400 may include evaluating an availability of the three-dimensional printer for the print job. This may be based upon a signal from any of the sensors associated with the three-dimensional printer. It will be understood that this evaluation may be performed locally at the three-dimensional printer, with an availability indicator transmitted back to the requester, or this evaluation may be performed remotely by a device that receives sensor data in raw or processed form from the sensor(s) of the three-dimensional printer.

[0076] A wide variety of evaluations may be performed. For example, the evaluation may relate to the status of a current job executing on the three-dimensional printer, or an analysis of one or more other jobs in a local queue of the three-dimensional printer, any of which might result in the three-dimensional printer being unavailable. For example, where the printer has a substantial number of queued jobs that will require several hours to fabricate, or that uses all available local memory of the printer, then the printer may be identified as unavailable for additional print jobs. As another example, the evaluation may be based upon other sensors such as thermostats, motion or position error detectors, or optical sensors, any of which might permit inferences concerning the ability of the three-dimensional printer to execute a print job. For example, if an optical sensor detects an object within a working volume of the three-dimensional printer, or if a thermal sensor detects that a print head is not at a suitable temperature (or is not responding correctly to a heating command), the printer may not be ready and a corresponding evaluation may be provided. As another example, a sensor may detect a quantity of build material available to the printer, and a processor on the printer may determine if the supply is inadequate for the requested print job. Thus evaluating the

availability of the three-dimensional printer may include accepting the print job only if a supply of build material available for the three-dimensional printer exceeds an amount of build material required for the print job and one or more additional jobs ahead of the requested print job in the queue.

[0077] Similarly, any of a variety of status checks for normal, error-free functioning of the three-dimensional printer may be undertaken prior to accepting (or transmitting from a requester) a new print job. More generally, a variety of sensors and other inputs (including, e.g., data that may be stored locally in a memory of the three-dimensional printer) may provide useful information for assessing the availability of the device, and may be used as the sensor(s) contemplated herein to evaluate availability of the three-dimensional printer for a print job.

[0078] In one aspect, the evaluation may be based on a receiving state of the three-dimensional printer. The receiving state may be inferred based on various sensor signals and/or data indicative of whether the three-dimensional printer is currently engaged in a print. In another aspect, the receiving state may be explicitly provided by an owner or administrator of the three-dimensional printer, thus providing an opportunity for the administrator to control what level of access to the printing resource will be provided to external users who might connect to the printer over the data network. Thus the receiving state may be selected from a group including, e.g., open, closed, or authenticated. In general, the open receiving state may permit access to any remote user, while the closed receiving state does not permit access to any remote users (such as where the owner wishes to connect to the data network to retrieve remote content, but does not wish to make the three-dimensional printer publicly available). The authenticated receiving state may permit remote access conditioned upon receipt of appropriate credentials. Thus in one aspect, availability may be based upon an identity of a user – the requester -- associated with the print job. In this case, evaluating availability of the three-dimensional printer may include assessing an identity of the user, which may be determined, e.g., using access credentials such as a user name and password, a digital certificate, or any other techniques for securely identifying the user, either locally or with reference to a trusted external resource such as a certificate server or the like.

[0079] In another aspect, the print job itself may be secured for communication to the three-dimensional printer using, e.g., encryption of print or model data. The printer may in turn conditionally authorize printing according to any related access credentials. Thus in one aspect the method may include securing the print job using a digital rights management technique that restricts execution of the print job to one or more predetermined three-dimensional printers or to a printer having suitable credentials. In this context, evaluating the availability of the three-dimensional printer may include determining whether the three-dimensional printer is one of the one or more predetermined three-dimensional printers, or whether the three-dimensional printer has appropriate credentials. This technique may be particularly useful, for example, where the print job includes purchased content or the like for which the content creator (or distributor) wishes to retain control of fabrication, e.g., by limiting who, where, when, or how many times the print job can be fabricated.

[0080] The evaluation may also or instead be based on a variety of sensor measurements and/or other data or information about the processing status of the three-dimensional printer. By way of example and not of limitation, evaluating the availability of the three-dimensional printer may include determining a percentage completion of a current print job at the three-dimensional printer. Evaluating the availability of the three-dimensional printer may include estimating a wait time until the three-dimensional printer will be available and transmitting the wait time to the requester. Evaluating the availability of the three-dimensional printer may include determining whether the three-dimensional printer is immediately available.

[0081] It will also be appreciated that a wide variety of sensors may usefully be employed in this evaluation. By way of non-limiting example, the plurality of sensors may include a video camera directed toward a working volume of the three-dimensional printer. The plurality of sensors may include an optical sensor that detects obstructions within a working volume of the three-dimensional printer. The plurality of sensors may include a sensor that detects a quantity of build material available. The plurality of sensors may include a sensor that detects a presence of build material in a material supply feed.

[0082] As shown in step 406, when the three-dimensional printer is not available for a print job, the method 400 may include electronically notifying the requester that the print job has been rejected. This may, for example, include a notification such as a textual message or graphic displayed within a user interface used by the requester to submit the print job, or this may include a notification using any suitable communication medium such as an SMS text message or electronic mail communication to the requester.

[0083] When the three-dimensional printer is not available for the print job, additional processing may be performed prior to notifying the requester, such as a search for additional, suitable printing resources and/or redirection of the print job. Thus in one aspect, the method may include identifying one or more alternative three-dimensional printers coupled to the data network as resources available for the print job when the three-dimensional printer is not available. In another aspect, when the three-dimensional printer is not available, the method may include identifying an alternative three-dimensional printer coupled to the data network and redirecting the requester to the alternative three-dimensional printer. The redirecting may include automatically redirecting the print job without user intervention, or the redirecting may include transmitting a suggestion to the requester to use the alternative three-dimensional printer. More generally, any suitable information about other available resources and/or redirection of the request may be transmitted to the requester when the three-dimensional printer that received the print job is determined to be unavailable. This may also include information about an expected wait time until the printer will be available, when such information is provided by the printer or can be reasonably inferred from other information.

[0084] As shown in step 407, a manual verification may be optionally requested, even where the three-dimensional printer is otherwise determined to be available, before adding the print job to the print queue. The request for manual verification by the requester may be provided, for example, along with contextual information such as an expected time before the print job can begin fabrication, or a current image of the three-dimensional printer (e.g., of the working volume or supply of build material). Thus in one aspect, evaluating the availability of the three-dimensional printer may include

transmitting an image of the three-dimensional printer to the requester, and receiving a manual confirmation to proceed with the print job from the requester.

[0085] As shown in step 408, when the three-dimensional printer is available, the method 400 may include adding the print job to a queue for the three-dimensional printer and initiating fabrication of an object according to the queue. It will be understood that the three-dimensional printer may only have storage for a current print job, in which case the print queue, or more specifically, the local print queue, may consist of a currently active print job containing zero or one print jobs at all times. In another aspect, the three-dimensional printer may have adequate storage and processing capabilities to locally manage a substantial queue of print jobs, or alternatively, may be coupled to a local resource such as a co-located desktop or laptop computer or networked-attached storage that can operate as a local print queue resource for the three-dimensional printer. When the print job is accepted, a notification may be sent to the requester using, e.g., any of the notification techniques described above.

[0086] It will be appreciated that certain print jobs may include multiple, separate physical objects. These objects may be generally unrelated, e.g., where a requester simply decides to build multiple objects at one time, or these objects may be related. Related objects may include structurally related objects, such as where an object larger than a build volume is constructed from several smaller pieces, where the object has several independent moving parts. Related objects may also or instead be contextually related, as with a collection of game pieces such as pieces for a chess board. When a request includes multiple objects, adding these objects to the print queue may include additional processing to allocate the objects among a number of suitable fabrication resources. Thus in one aspect where the print job includes a plurality of objects, the method may include identifying a plurality of printers in proximity to the three-dimensional printer and allocating the plurality of objects for concurrent fabrication among the plurality of printers. This allocation may be managed by the three-dimensional printer that received the request (e.g., by having the printer act as a requester for several other proximate resources), or this allocation may be managed by a remote print server that identifies and

coordinates operation of a number of physically proximate or otherwise suitable resources.

[0087] As shown in step 410, the method 400 may include providing information about a queue for the three-dimensional printer to the requester. This may include transmitting a print queue status to the requester for display in a user interface or within the body of an electronic mail message or text message, or more generally using any suitable communication medium. Although depicted in Fig. 4 as occurring after a print job is added to the print queue, it will be understood that the print queue status may be usefully shared with the requester at any time before or during processing of the print job, and/or periodically while the print job is pending or executing.

[0088] As shown in step 412, the method 400 may include completing fabrication, after which the requester may be notified and the object retrieved using any suitable online and/or offline techniques.

[0089] Print queue status information as contemplated above may also include information relating to operation of the three-dimensional printer. For example, the method may include transmitting status information from one or more of the plurality of sensors to the requester during an execution of the print job. The method may include notifying the requester of a successful completion of the print job, or the method may include notifying the requester if the print job fails to complete. In this communication of status information, the three-dimensional printer may also request further user input, such as by inquiring whether to try printing the object again, or whether to forward an unsuccessful print job to another resource. In one aspect, the status information may include at least one photograph captured, e.g., from a video camera or digital still camera associated with the printer, which may be transmitted directly to the requester, or to some other location such as a social networking platform. In one aspect, the social networking platform may include one or more of Flickr, Twitter, LinkedIn, Google+, and Facebook, or any other website or the like where the requester can share the at least one photograph with others using tools available within the social networking platform.

[0090] It will be readily appreciated that the above steps are provided by way of example and not limitation, and that numerous variations are possible including

additions, omissions, and or variations of the steps recited above. All such variations as would be appreciated by one of ordinary skill in the art are intended to fall within the scope of this disclosure. In particular, the various step described above may be performed by a networked printer that directly hosts a connection with a remote user, or by a print server or the like that mediates print job administration between users and fabrication resources. Thus the various steps may be performed in a distributed manner among two or more of a user, by a print server, and/or by a three-dimensional printer depending upon the specific network of devices performing the method. By way of example, a three-dimensional model may be transmitted directly from a three-dimensional scanner to a three-dimensional printer for fabrication. The scanner and the printer may be locally coupled to one another, or remotely coupled through a print server or the like, or connected through a network using a peer-to-peer or similar relationship.

[0091] It will also be understood that this disclosure includes apparatus for performing the methods described above. Thus in one aspect there is disclosed a three-dimensional printer including a network interface configured to receive a print job from a requester over a data network, a plurality of sensors that provide status information for a plurality of aspects of the three-dimensional printer; and a processor configured to evaluate an availability of the three-dimensional printer for the print job based upon a signal from at least one of the plurality of sensors. The processor may include any suitable processing circuitry such as any controller, microcontroller, microprocessor and/or other circuitry used to control the three-dimensional printer, and/or any similar processing circuitry in a co-located computer or the like. Where processing is distributed, e.g., among multiple printers, a print server, a requester device, and so forth, the various steps may be distributed in any suitable fashion consistent with networked printing as contemplated herein.

[0092] In another aspect, the method steps may be embodied in computer executable code stored in a non-transitory computer readable medium such as a computer memory. Thus there is disclosed herein a computer program product embodied in a non-transitory computer readable medium that, when executing on one or more computing devices, performs any of the steps described above. In one aspect, this may include the

steps of: receiving a print job from a requester over a data network at a three-dimensional printer, the three-dimensional printer including a plurality of sensors that provide status information for a plurality of aspects of the three-dimensional printer; and evaluating an availability of the three-dimensional printer for the print job based upon a signal from at least one of the plurality of sensors.

[0093] Fig. 5 depicts a user interface for networked three-dimensional printing. The user interface 500 may be a web page or other remotely created and executed interface supported, e.g., by one of the print servers or web servers described above. In another embodiment, the user interface 500 may be served by one of the three-dimensional printers described above, which may execute a web server for remote access to administrative or fabrication functions of the three-dimensional printer. In another embodiment, the user interface 500 may be created by a local application that retrieves data, images, print queue information, models, and so forth from a variety of remote applications and other resources, while also formatting outbound commands from the client device to the various resources so that the remote resources can be integrated within a single workspace on a client device. The user interface 500 may in general be rendered on a display or similar hardware on a client device or mobile device, and may permit user interaction through any suitable controls to permit local control and administration of remote fabrication resources. In general, the user interface 500 may be an interface for management of a variety of remote fabrication resources as generally described above.

[0094] For example, the user interface 500 may include a first display area 502 that shows a list of available online three-dimensional printers or other fabrication resources. This display area may be interactive, and may permit, e.g., sorting of fabrication resources, searching for new fabrication resources, and the like. The first display area 502 may also or instead provide status information for each listed fabrication resource, such as information about availability, recent print activity, a current queue of objects for printing at that resource, and so forth. In one aspect where the user interface 500 is a web page for remote users to manage fabrication, the first display area 502 may

be adapted to receive a manual selection of one of the plurality of three-dimensional printers from the remote user to execute a print job.

[0095] The user interface 500 may also or instead include a second display area 504 that shows a list of available models for fabrication by the fabrication resources. This may include any of a variety of interactive features such as search capabilities for models, and links to information about models such as cost, user reviews, complexity and print time, model renderings, descriptions, notes from a content provider, and so forth. This may also include an interface tool to permit a user to fabricate a model. The second display area 504 may be adapted to receive a batch print job from a remote user, the batch print job including a plurality of related print jobs. For example, a user may select an object displayed in the second display area 504 that includes multiple parts, or the user may select multiple items listed in the second display area 504 (using, e.g., a conventional control key and mouse click, or any other suitable user interface controls/techniques) for batch processing. This may also permit the remote user to provide additional, related information, such as a permissible allocation of the plurality of related print jobs among the plurality of three-dimensional printers, which permissible allocation may include general preferences (e.g., high-speed printers or local printers), specific preferences (e.g., use printer xyz), or firm requirements (e.g., use only printer xyz, or only printers selected from a specific group).

[0096] The user interface 500 may also or instead include a third display area 506 that shows a print queue. This may include a local print queue for a specific fabrication resource, or this may include a print queue stored at a print server for a user, along with information about where and when each object is scheduled for fabrication. The user interface 500 may permit one-click drag-and-drop print queue management of three-dimensional printing jobs. For example, a user may simply drag an object from the second display area 504 (objects) into the third display area 506 (print queue) where the object may be automatically or manually prioritized for execution. Alternatively, the user may drag an object from the second display area 504 into the first display area 502 (printers) to request (with a single operation) fabrication of the object by a specific printer. More generally, the user interface 500 may facilitate control over fabrication of

models from a variety of content sources using a variety of fabrication resources, some or all of which may be remote from a current user manipulating the user interface 500.

[0097] The user interface 500 may include a fourth display area 508 that displays information for a currently active print job. This area may usefully include any information related to the print job such as status, time to completion, source, current time, etc. Additionally, this area may include a control or group of controls for manual operation of the three-dimensional printer by a remote user. Thus for example a user may remotely stop fabrication, restart fabrication, cancel fabrication, change fabrication settings, perform a test extrusion, and so forth, as though the user were locally controlling the printer.

[0098] The fourth display area 506 may include a visualization area 510 that displays a visual representation of the print job. For example, the visualization area 510 may display a current tool path of the printer that is executing the print job, such as a two-dimensional layer of the object showing a path of a print head as it traverses that layer. The visualization area 510 may also or instead show a simulated print object, such as a rendering of a three-dimensional model depicting a current state of the completion of an object being fabricated according to a print job. The visualization area 510 may also or instead show an image of a working volume of a three-dimensional printer or other fabrication resource captured during execution of the print job. This may, for example, include a digital still image (which may be updated periodically) or a video image captured from a video camera at the three-dimensional printer. Thus a user may visually monitor progress or status of a remote print job through the user interface 500. A status area 512 may also be provided that shows current status information (e.g., percentage completion, time until start, time until completion, and so forth) for the active resource.

[0099] The user interface 500 may also include a menu bar 516 or the like for other functions not otherwise accounted for within the other active areas. This may include file information, search tools, help menus, user or account information, and so forth. This may include controls to share information about print activity. For example, the user interface may include at least one control to capture a frame of data from the video camera as a video image and to transmit the video image to a remote location

through the data network. The remote location may, for example, be a social networking site such as any of the social network platforms described above. In another aspect, the device may be configured to transmit the video image in an electronic mail communication to, e.g., the user or one or more recipients identified by the user. In another aspect, the user interface may include a control to capture a stop-motion animation of a fabrication of an object using the video camera. This may include user controls for a frame rate, duration, or other parameters of the stop-motion animation so that an animation of desired length and detail can be created for sharing or other use.

[00100] Fig. 6 is a flowchart of a method for operating a three-dimensional printer on a network. In particular, the method 600 of Fig. 6 emphasizes autonomous operation of the three-dimensional printer using content available through the data network.

[00101] The method 600 may begin with coupling a three-dimensional printer to a data network, as shown in step 602.

[00102] As shown in step 604, the method 600 may include locating one or more sources of content for fabrication by the three-dimensional printer on the data network according to one or more user-provided criteria. The sources of content may, for example, include any of the content sources described above, which may provide content on a syndicated basis using any suitable protocol (such as RSS or the like) so that the three-dimensional printer can identify new content from the content sources as the new content becomes available.

[00103] As shown in step 606, the method 600 may include subscribing to new content from the one or more sources of content.

[00104] As shown in step 608, the method may include receiving at least one three-dimensional model of new content from one of the one or more sources of content. This may occur in a variety of ways. For example, where the three-dimensional printer has subscribed to an RSS feed provided by the content source, a new item in the RSS feed (or media enclosure or similar content embedded in the feed) may provide a URL or the like that identifies a network location for a three-dimensional model, along with any metadata that the three-dimensional printer might use (or present to a user for evaluation)

to determine whether to retrieve the three-dimensional model. It will be understood that while RSS (“RDF Site Summary,” a.k.a., “Really Simple Syndication”) provides one useful platform for syndicating content including three-dimensional models, any suitable technology or combination of technologies may also or instead be employed, including ‘push’ technologies that forward notifications to clients and/or ‘pull’ technologies that explicitly request updates on any suitable regular or ad hoc basis.

[00105] It will be understood that fabrication of a single model using certain techniques may take a substantial amount of time, regardless of the rate at which individual models or groups of models are published from different sources. As such, a method as contemplated herein may advantageously apply local prioritization to ensure that more desirable content is not crowded out of limited fabrication resources by less desirable content. Receiving content as shown in step 608 may also include receiving a plurality of three-dimensional models and prioritizing fabrication of the plurality of three-dimensional models into an order of fabrication.

[00106] As shown in step 610, the method may include fabricating an object from the at least one three-dimensional model. As noted above, this may include fabricating a plurality of three-dimensional models in an order determined by a local prioritization scheme. Additional features may be usefully provided. For example, the model may be locally analyzed by a printer and automatically scaled according to the printer’s build volume, or the model may alternatively be divided into multiple, separate objects, each fitting within the build volume, and all capable of being assembled into the original object. This approach may be particularly advantageous where a printer is autonomously receiving and fabricating multiple objects in succession without user supervision.

[00107] Thus, in one aspect there is disclosed a three-dimensional printer configured for autonomous operation to retrieve and fabricate content published to a network. While the method 600 described above is generally local in nature, it will be appreciated that other collocated resources may be used, such as a desktop computer or the like coupled to a three-dimensional printer, which desktop computer may subscribe to content, prioritize new content, and then direct the content to the local three-dimensional

printer. In another aspect, the various steps may be performed by a print server or the like which couples remote content sources to remote three-dimensional printers according to any user criteria. More generally, a variety of additions, omissions, rearrangements and modifications to the steps described above may be employed without departing from the scope of this disclosure.

[00108] Fig. 7 is a flowchart of a method for operating a three-dimensional printer with a video camera and a network interface. In particular, the method 700 of Fig. 7 emphasizes incorporation of data from the video camera into operation and management of the three-dimensional printer.

[00109] As shown in step 702, the method 700 may begin with providing a three-dimensional printer including a build volume, a network interface coupled to a data network, and a video camera positioned to capture video of the build volume from a point of view, such as from above or in front a side of the build volume. This may, for example, include any of the three-dimensional printers described above.

[00110] As shown in step 704, the method 700 may include receiving a three-dimensional model through the network interface using, e.g., any of the techniques for locating and retrieving models as described above. By way of example, this may include direct access to a content source, syndicated access to a feed of content, and/or use of a print server or other remote print management tool.

[00111] As shown in step 706, the method 700 may include fabricating the three-dimensional model as an object within the build volume of the three-dimensional printer, all as generally contemplated above.

[00112] As shown in step 708, the method 700 may include providing a user interface to a remote user accessing the device through the network interface, wherein the user interface presents an image of the build volume from the camera and a two-dimensional projection of the three-dimensional model from the point of view of the video camera. This may be any of the user interfaces described above, or any other suitable interface for conveying visual information such as a video image and/or model projection. It will be understood that a variety of user interface technologies and techniques are well known in the art, any of which may be suitably adapted to providing

the user interface as contemplated herein. The two-dimensional projection may be any suitable rendering, simulation, or other visualization of the model and its current state of completion. Thus for example the two-dimensional projection may be obtained from a three-dimensional scanner or other data acquisition device coupled to a processor of the three-dimensional printer. The two-dimensional projection may be an image of the object as simulated based upon operation of the three-dimensional printer, using, e.g., a tool path history or a current state of completion. The two-dimensional projection may be dynamically updated to correspond to a state of physical completion of the object in order to provide real time, or quasi-real time visual status information. In one aspect, the two-dimensional projection may simply be a video image from the video camera.

[00113] As shown in step 710, the method 700 may include transmitting status information over the data network upon completion of the object. This may, for example, include data presented through the user interface, or any other status information or summary thereof. For example, the status information may include a digital image from the video camera, which may be transmitted with an electronic mail communication confirming completion of the object. More generally, status information may include any of the status information described above, and may be transmitted to a user through an electronic mail communication, instant messaging text message, or any other suitable communication medium.

[00114] It will be readily appreciated that a device such as a three-dimensional printer may be configured to perform the steps described above. Thus in one aspect there is disclosed herein a device including: a three-dimensional printer having a build volume; a network interface coupled to a data network; a video camera positioned to capture video of the build volume from a point of view; and a processor configured to receive a three-dimensional model through the network interface, and to control operation of the three-dimensional printer to fabricate the three-dimensional model as an object within the build volume of the three-dimensional printer, the processor further configured to provide a user interface to a remote user accessing the device through the network interface, and to present in the user interface an image of the build volume from the camera and a two-

dimensional projection of the three-dimensional model from the point of view of the video camera.

[00115] The processor may be configured to monitor operation of the three-dimensional printer based upon a comparison of the two-dimensional projection with the image of the build volume. Using this type of image analysis, it may be possible to track actual progress against predicted progress to identify equipment malfunctions or other interference that might cause the physical object to deviate from the model used to fabricate the physical object. For example, a temperature change in an extruder, an air bubble in a path of melted supply material, or a tool misstep might cause an unrecoverable error in a fabrication process. By comparing actual to expected two-dimensional or three-dimensional results, a fabrication process can be expeditiously aborted and restarted or otherwise addressed without waiting for completion and physical inspection of the constructed object. In addition, more subtle fabrication errors such as misalignment of layers, surface holes, inaccurate material build-ups or deposits, rotational distortion, and so forth may also be detected and address prior to completion of a build. More generally, a variety of machine vision functions may be implemented locally, or with cooperation between a local printer and a remote print server, using a video camera or digital still camera as a source of visual input.

[00116] As generally described above, the three-dimensional printer may be configured with a variety of tools and functions to facilitate networked use. For example, the processor may be configured to provide credential-based access to a user interface of the three-dimensional printer. As another example, the user interface may provide status information for the three-dimensional printer. This may include status information for a build process executing on the three-dimensional printer currently, or an anticipated build. The user interface may usefully display a two-dimensional tool path for the three-dimensional printer, the two-dimensional tool path corresponding to a current layer of the object during a fabrication of the object by the three-dimensional printer, or any other useful two-dimensional information. In one aspect, the processor may be configured to couple the three-dimensional printer in a communicating relationship with a remote print

server through the data network, such as to facilitate networked use or management of the three-dimensional printer through the remote print server.

[00117] The three-dimensional printer may also be configured for a variety of diagnostic and technical support functions. For example, the user interface may support remote access for technical support during local operation of the three-dimensional printer. Thus for example, technical support personnel may connect to the three-dimensional printer and employ the user interface to configure, troubleshoot, reprogram or update the three-dimensional printer from a remote location. The process may be programmed for supporting functions. For example, the processor may be configured to fabricate a test object, capture an image of the test object, and compare the image to the test object to validate operation of the three-dimensional printer.

[00118] Many of the above systems, devices, methods, processes, and the like may be realized in hardware, software, or any combination of these suitable for the control, data acquisition, and data processing described herein. This includes realization in one or more microprocessors, microcontrollers, embedded microcontrollers, programmable digital signal processors or other programmable devices or processing circuitry, along with internal and/or external memory, any of which may serve as the controller described above or supplement processing of the controller with additional circuitry. This may also, or instead, include one or more application specific integrated circuits, programmable gate arrays, programmable array logic components, or any other device(s) that may be configured to process electronic signals. It will further be appreciated that a realization of the processes or devices described above may include computer-executable code created using a structured programming language such as C, an object oriented programming language such as C++, or any other high-level or low-level programming language (including assembly languages, hardware description languages, and database programming languages and technologies) that may be stored, compiled or interpreted to run on one of the above devices, as well as heterogeneous combinations of processors, processor architectures, or combinations of different hardware and software. At the same time, processing may be distributed across devices such as the various systems described above, or all of the functionality may be integrated

into a dedicated, standalone device. All such permutations and combinations are intended to fall within the scope of the present disclosure.

[00119] In other embodiments, disclosed herein are computer program products comprising computer-executable code or computer-usable code that, when executing on one or more computing devices (such as the devices/systems described above), performs any and/or all of the steps described above. The code may be stored in a computer memory, which may be a memory from which the program executes (such as random access memory associated with a processor), or a storage device such as a disk drive, flash memory or any other optical, electromagnetic, magnetic, infrared or other device or combination of devices. In another aspect, any of the processes described above may be embodied in any suitable transmission or propagation medium carrying the computer-executable code described above and/or any inputs or outputs from same.

[00120] It will be appreciated that the methods and systems described above are set forth by way of example and not of limitation. Numerous variations, additions, omissions, and other modifications will be apparent to one of ordinary skill in the art. Thus, the order or presentation of method steps in the description and drawings above is not intended to require this order of performing the recited steps unless a particular order is expressly required or otherwise clear from the context.

[00121] While particular embodiments of the present invention have been shown and described, it will be apparent to those skilled in the art that various changes and modifications in form and details may be made therein without departing from the spirit and scope of the invention as defined by the following claims. The claims that follow are intended to include all such variations and modifications that might fall within their scope, and should be interpreted in the broadest sense allowable by law.

CLAIMS

What is claimed is:

1. A device comprising:
 - a three-dimensional printer including a build volume;
 - a network interface coupled to a data network;
 - a video camera positioned to capture video of the build volume from a point of view; and
 - a processor configured to receive a three-dimensional model through the network interface, and to control operation of the three-dimensional printer to fabricate the three-dimensional model as an object within the build volume of the three-dimensional printer, the processor further configured to provide a user interface to a remote user accessing the device through the network interface, and to present in the user interface an image of the build volume from the camera and a two-dimensional projection of the three-dimensional model from the point of view of the video camera.
2. The device of claim 1 wherein the two-dimensional projection is obtained from a three-dimensional scanner coupled to the processor.
3. The device of claim 1 wherein the two-dimensional projection is simulated based upon operation of the three-dimensional printer.
4. The device of claim 3 wherein the processor is configured to monitor operation of the three-dimensional printer based upon a comparison of the two-dimensional projection with the image of the build volume.
5. The device of claim 1 wherein the two-dimensional projection is dynamically updated to correspond to a state of physical completion of the object.

6. The device of claim 1 wherein the two-dimensional projection is a video image from the video camera.
7. The device of claim 1 wherein the user interface provides at least one control for manual operation of the three-dimensional printer by the remote user.
8. The device of claim 1 wherein the processor is configured to provide credential-based access to the user interface.
9. The device of claim 1 wherein the user interface provides status information for the three-dimensional printer.
10. The device of claim 1 wherein the user interface provides status information for a build process executing on the three-dimensional printer.
11. The device of claim 1 wherein the user interface displays a two-dimensional tool path for the three-dimensional printer, the two-dimensional tool path corresponding to a current layer of the object during a fabrication of the object by the three-dimensional printer.
12. The device of claim 1 wherein the user interface supports remote access for technical support during local operation of the three-dimensional printer.
13. The device of claim 1 wherein the processor is configured to fabricate a test object, capture an image of the test object, and compare the image to the test object to validate operation of the three-dimensional printer.
14. The device of claim 1 wherein the user interface includes at least one control to capture a frame of data from the video camera as a video image and to transmit the video image to a remote location through the data network.

15. The device of claim 14 wherein the remote location is a social networking site.
16. The device of claim 14 wherein the device is configured to transmit the video image in an electronic mail communication.
17. The device of claim 1 wherein the user interface includes at least one control to capture a stop-motion animation of a fabrication of the object using the video camera.
18. The device of claim 1 wherein the processor is configured to couple the three-dimensional printer in a communicating relationship with a remote print server through the data network.
19. A method comprising:
 - providing a three-dimensional printer including a build volume, a network interface coupled to a data network, and a video camera positioned to capture video of the build volume from a point of view;
 - receiving a three-dimensional model through the network interface;
 - fabricating the three-dimensional model as an object within the build volume of the three-dimensional printer; and
 - providing a user interface to a remote user accessing the device through the network interface, wherein the user interface presents an image of the build volume from the camera and a two-dimensional projection of the three-dimensional model from the point of view of the video camera.
20. The method of claim 19 further comprising transmitting status information over the data network upon completion of the object.
21. The method of claim 20 wherein the status information includes data presented through the user interface.

22. The method of claim 20 wherein the status information includes a digital image from the video camera.

23. The method of claim 22 wherein the digital image is transmitted with an electronic mail communication confirming completion of the object.

ABSTRACT

[00122] Three-dimensional fabrication resources are improved by adding networking capabilities to three-dimensional printers and providing a variety of tools for networked use of three-dimensional printers. Web-based servers or the like can provide a single point of access for remote users to manage access to distributed content on one hand, and to manage use of distributed fabrication resources on the other.

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		NETWORKED THREE-DIMENSIONAL PRINTING		
First Named Inventor/Applicant Name:		Nathaniel B. Pettis		
Filer:		John H. Nortrop		
Attorney Docket Number:		MBOT-0002-P04		
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility application filing	1011	1	380	380
Utility Search Fee	1111	1	620	620
Utility Examination Fee	1311	1	250	250
Pages:				
Claims:				
Claims in excess of 20	1202	3	60	180
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1430

Electronic Acknowledgement Receipt	
EFS ID:	11820951
Application Number:	13348896
International Application Number:	
Confirmation Number:	7161
Title of Invention:	NETWORKED THREE-DIMENSIONAL PRINTING
First Named Inventor/Applicant Name:	Nathaniel B. Pettis
Customer Number:	43520
Filer:	John H. Nortrop
Filer Authorized By:	
Attorney Docket Number:	MBOT-0002-P04
Receipt Date:	12-JAN-2012
Filing Date:	
Time Stamp:	14:00:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$1430
RAM confirmation Number	109
Deposit Account	504262
Authorized User	
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File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	MBOT-0002-P04_011212_ADS.pdf	1357804	no	4
			1e2634b34df314fc18904f9427e7107320ca4c37		
Warnings:					
Information:					
2	Drawings-only black and white line drawings	MBOT-0002-P04_011212_Drawings.pdf	166923	no	6
			f25d14f8db18c89f73ddfb8ebdb112fbdb2603d6		
Warnings:					
Information:					
3	Oath or Declaration filed	MBOT-0002-P04_011212_ExecutedDecPOA.pdf	1912077	no	3
			2a334c7bf47ee5f0b522baee82cda1b8e0fbeca		
Warnings:					
Information:					
4		MBOT-0002-P04_011212_Specification.pdf	176777	yes	47
	b0f6f4f9ad69cfeddaff2d95576c1f58c42161c				
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	42	
	Claims		43	46	
	Abstract		47	47	
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	36524	no	2
			d6004b793d8ad6ad8e03da269c194e8e6905505f		
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National Stage of an International Application under 35 U.S.C. 371

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New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 13/348,896				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	380			
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	620			
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	250			
TOTAL CLAIMS (37 CFR 1.16(i))	23	minus 20 = *	3			x 60 =	180			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2	minus 3 = *				x 250 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL		TOTAL	1430			
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
TOTAL ADD'L FEE								TOTAL ADD'L FEE		
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
TOTAL ADD'L FEE								TOTAL ADD'L FEE		
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	TOT CLAIMS	IND CLAIMS
13/348,896	01/12/2012	1742	1430	MBOT-0002-P04	23	2

CONFIRMATION NO. 7161

43520
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C/O CPA Global
P.O. BOX 52050
MINNEAPOLIS, MN 55402

FILING RECEIPT



OC000000052205027

Date Mailed: 01/27/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Nathaniel B. Pettis, Brooklyn, NY;

Power of Attorney: The patent practitioners associated with Customer Number 43520

Domestic Priority data as claimed by applicant

This application is a CON of 13/314,337 12/08/2011
which is a CIP of 12/858,622 08/18/2010

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)

If Required, Foreign Filing License Granted: 01/25/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/348,896**

Projected Publication Date: 05/03/2012

Non-Publication Request: No

Early Publication Request: No

Title

NETWORKED THREE-DIMENSIONAL PRINTING

Preliminary Class

264

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	Not Yet Known
Sheet 1 of 4	Attorney Docket No.	MBOT-0002-P04

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-6841116 B2		Jan 11, 2005	Schmidt, Kris A.	
		US-6129872		Oct 10, 2000	Jang, Justin	
		US-5730817		Mar 24, 1998	Feygin, Michael et al.	
		US-5637175		Jun 10, 1997	Feygin, Michael et al.	
		US-5192559		Mar 9, 1993	Hull, Charles W., et al.	
		US-4097566		Jun 27, 1978	Bertin, Michael C., et al.	

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-2012004 6779A1		Feb 23, 2012	Pax, Charles et al.	

FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number ³	Cnty Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	NPL-4	ONAGORUWA, SEYI et al., "Fused Deposition of Ceramics (FDC) and Composites", School of Mechanical and Materials Engineering Washington State University Pullman, WA 99164-2920 amitband@wsu.edu 2001 , 224-231	
	NPL-10	, "Fabbaloo Personal Manufacturing and 3D Printing, http://fabbaloo.com/blog/2012/1/6/kraftwurxs-patent-available.html ", http://fabbaloo.com/blog/2012/1/6/kraftwurxs-patent-available.html 1/29/2012 , all	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	Not Yet Known
Sheet 2 of 4	Attorney Docket No.	MBOT-0002-P04

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	NPL-1	PAX, CHARLES E. , "Awesome August Hack-a-thon", http://charlespax.com/2009/08/18/awesome-august-hack-a-thon/[8/5/2010 12:13:01 PM] Open Source 3D printing research and design 08/18/2009 , all	
	NPL-2	PAX, CHARLES E. , "Motorized Conveyor Belt Sneak Peak", http://charlespax.com/2010/04/27/motorized-conveyor-belt-sneak-peek/ Open Source 3D printing research and design 04/27/2010 , 1-10	
	NPL-8	PAX, CHARLES E. , "MakerBot Thoughts", http://charlespax.com/2009/04/22/makerbot-thoughts/[8/5/2010 12:10:55 PM] Open Source 3D printing research and design 04/22/2009 , all	
	NPL-3	PAX, CHARLES E. , "Heated Conveyor Belt Build Platform", http://charlespax.com/2010/04/20/heated-conveyor-belt-build-platform/[8/5/2010 12:17:26 PM] Open Source 3D printing research and design 04/20/10 , 1-3	
	NPL-6	BROCKMEIER, OIVIND , "Automated Loading and Unloading of the Stratasys FDM 1600 Rapid Prototyping System", Thesis submitted to the Faculty of Virginia Polytechnic Institute and State University March 2000 03/2000 , all	
	NPL-7	PAX, CHARLES E. , "MakerBot Conveyor Belt", http://charlespax.com/2010/03/17/makerbot-conveyor-belt/[8/5/2010 12:14:05 PM] Open Source 3D printing research and design 03/17/2010 , all	
	NPL-5	PAX, CHARLES E. , "MakerBot Thoughts 3", http://charlespax.com/2010/01/27/makerbot-thoughts-3/[8/5/2010 12:13:39 PM] Open Source 3D printing research and design 01/27/10 , all	
	NPL-12	, "Application Serial No. 12/858,622 (Atty Ref MBOT-0001-P01) , Non-Final Office Action mailed 02-14-12" , , 21	

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	Not Yet Known
Sheet 3 of 4	Attorney Docket No.	MBOT-0002-P04

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

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OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ Applicant believes that no fees are required with this filing. However, if an Office Action on the merits has been mailed, or a fee is otherwise required, the Commissioner is hereby authorized to charge any fees due under 37 C.F.R. §§1.16 or 1.17, or to credit any overpayments, to Deposit Account No. 50-4262 in order to have this information disclosure statement considered.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Robert Mazzaresse/	Date (YYYY-MM-DD)	2012-03-02
Name/Print	Robert A. Mazzaresse	Registration Number	42,852

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	Not Yet Known
Sheet 4 of 4	Attorney Docket No.	MBOT-0002-P04

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Electronic Acknowledgement Receipt	
EFS ID:	12211069
Application Number:	13348896
International Application Number:	
Confirmation Number:	7161
Title of Invention:	NETWORKED THREE-DIMENSIONAL PRINTING
First Named Inventor/Applicant Name:	Nathaniel B. Pettis
Customer Number:	43520
Filer:	Robert A. Mazzaresse/Paula Ng
Filer Authorized By:	Robert A. Mazzaresse
Attorney Docket Number:	MBOT-0002-P04
Receipt Date:	02-MAR-2012
Filing Date:	12-JAN-2012
Time Stamp:	13:03:38
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	MBOT-0002-P04_030212_Form1449.pdf	85494 fd58870e9959dbf23e4f802c658e75958a59f3ea	no	4

Warnings:

Information:

This is not an USPTO supplied IDS fillable form					
2	Non Patent Literature	NPL-4_Onagoruwa_2001.pdf	3805973 8841896ccbd337583db53f1eb3982eb3a85886ba	no	8
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Information:					
3	Non Patent Literature	NPL-10_Fabbaloo-DailyNewsOn3DPrinting.pdf	629544 de35af53c6e86298c2eb33fa27a444d3839a3e9	no	11
Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
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4	Non Patent Literature	NPL-1_AwesomeAugustHackathon_042910.pdf	38187 03d9ad5199bc70000f177a1692a453ec8958ae54	no	2
Warnings:					
Information:					
5	Non Patent Literature	NPL-2_MotorizedConveyorBelt_042910.pdf	1212455 190b85e5d0d8d41f186a5e2fe9e0beaac460d52b	no	10
Warnings:					
Information:					
6	Non Patent Literature	NPL-8_MakerBotThoughts_04209.pdf	36158 2575c28eeaa889920bfd7be04a11e8d962098630	no	2
Warnings:					
Information:					
7	Non Patent Literature	NPL-3_HeatedConveyorBelt_042010.pdf	41295 ead759c8cbb00b5fe0f3a7e2855a7eff7feab0eb	no	3
Warnings:					
Information:					
8	Non Patent Literature	NPL-6_Brockmeier_2000.pdf	1194884 516e806cb7c78c8b8d0a5ed17c537597ace7b085	no	79
Warnings:					
Information:					
9	Non Patent Literature	NPL-7_MakerBotConveyorBelt_031710.pdf	70482 8657b4c260bd51c34fb3b48e04e03fb29c3d444d	no	5
Warnings:					
Information:					

10	Non Patent Literature	NPL-5_MakerBotThoughts3_01 2710.pdf	35513 6d987adaef6838abb82a3ee4172b6d67137 bd0ab	no	2
Warnings:					
Information:					
11	Non Patent Literature	NPL-12_SN12858622_NFOA-02 1412.pdf	768337 f0e53da0d0fe50621910c8306ffe21ddb8db 8aff	no	21
Warnings:					
Information:					
Total Files Size (in bytes):			7918322		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/348,896	01/12/2012	Nathaniel B. Pettis	MBOT-0002-P04

CONFIRMATION NO. 7161

43520
STRATEGIC PATENTS P.C..
C/O CPA Global
P.O. BOX 52050
MINNEAPOLIS, MN 55402

PUBLICATION NOTICE



Title:NETWORKED THREE-DIMENSIONAL PRINTING

Publication No.US-2012-0105903-A1

Publication Date:05/03/2012

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

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Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1742
	Examiner Name	Not Yet Known
Sheet 1 of 2	Attorney Docket No.	MBOT-0002-P04

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-20120113457A1		May 10, 2012	Pettis, N	
		US-20120113473A1		May 10, 2012	Pettis, N	
		US-20120092724A1		Apr 19, 2012	Pettis, Nathaniel B.	

FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number ³	Cnty Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			
¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.			

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	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1742
	Examiner Name	Not Yet Known
Sheet 2 of 2	Attorney Docket No.	MBOT-0002-P04

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☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ Applicant believes that no fees are required with this filing. However, if an Office Action on the merits has been mailed, or a fee is otherwise required, the Commissioner is hereby authorized to charge any fees due under 37 C.F.R. §§1.16 or 1.17, or to credit any overpayments, to Deposit Account No. 50-4262 in order to have this information disclosure statement considered.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/John Nortrup/	Date (YYYY-MM-DD)	2012-06-06
Name/Print	John Nortrup	Registration Number	59,063

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Electronic Acknowledgement Receipt	
EFS ID:	12953275
Application Number:	13348896
International Application Number:	
Confirmation Number:	7161
Title of Invention:	NETWORKED THREE-DIMENSIONAL PRINTING
First Named Inventor/Applicant Name:	Nathaniel B. Pettis
Customer Number:	43520
Filer:	John H. Nortrop/Elizabeth Nortrup
Filer Authorized By:	John H. Nortrop
Attorney Docket Number:	MBOT-0002-P04
Receipt Date:	06-JUN-2012
Filing Date:	12-JAN-2012
Time Stamp:	19:10:46
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	MBOT-0002-P04_060612_Form1449.pdf	78086 a035ea16f38b1bd68f4391be3553439600283637	no	2

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Total Files Size (in bytes):

78086

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New Applications Under 35 U.S.C. 111

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	BROWN II, David N.
Sheet 1 of 2	Attorney Docket No.	MBOT-0002-P04

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-8282380		Oct 9, 2012	Pax, Charles et al.	

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-2004/0232601		Nov 25, 2004	Kundinger, J. et al.	

FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number ³	Cnty Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	NPL-17	, "Application Serial No. 12/858,622 (Atty Ref MBOT-0001-P01) Notice of Allowance mailed 08/02/12", SN:12858622 NPL-17 8/2/2012 , 13 pages	

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	
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¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.			

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	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	BROWN II, David N.
Sheet 2 of 2	Attorney Docket No.	MBOT-0002-P04

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☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

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SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/John Nortrup/	Date (YYYY-MM-DD)	2012-10-11
Name/Print	John Nortrup	Registration Number	59,063

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Electronic Acknowledgement Receipt	
EFS ID:	13959117
Application Number:	13348896
International Application Number:	
Confirmation Number:	7161
Title of Invention:	NETWORKED THREE-DIMENSIONAL PRINTING
First Named Inventor/Applicant Name:	Nathaniel B. Pettis
Customer Number:	43520
Filer:	John H. Nortrop/Elizabeth Nortrup
Filer Authorized By:	John H. Nortrop
Attorney Docket Number:	MBOT-0002-P04
Receipt Date:	11-OCT-2012
Filing Date:	12-JAN-2012
Time Stamp:	11:30:18
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	MBOT-0002-P04_101112_Form1449.pdf	77082 3f34c981c418ded62ef42d181d237e219d7de2b8	no	2

Warnings:

Information:

This is not an USPTO supplied IDS fillable form					
2	Non Patent Literature	NPL-17_SN12858622_NoA-080 212.pdf	672870 4d9d56ea7d7fa8011292ffa60d10b52573f7 3c4c	no	13
Warnings:					
Information:					
Total Files Size (in bytes):			749952		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

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	Filing Date	Jan 12, 2012
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	Art Unit	1743
	Examiner Name	BROWN II, David N.
Sheet 1 of 3	Attorney Docket No.	MBOT-0002-P04

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-8286236		Oct 9, 2012	Jung, Edward K., et al.	

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-20120286453		Nov 15, 2012	Pettis, N. B.	
		US-20120287259		Nov 15, 2012	Pettis, N. B.	
		US-20120287459		Nov 15, 2012	Pettis, N. B.	
		US-20120287470		Nov 15, 2012	Pettis, N. B.	
		US-20120287472		Nov 15, 2012	Pettis, N. B.	
		US-20120287473		Nov 15, 2012	Pettis, N. B.	

FOREIGN PATENT DOCUMENTS							
Examiner Initial*	Cite No	Foreign Document Number ³	Cnty Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
							T ⁵

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵

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	Art Unit	1743
	Examiner Name	BROWN II, David N.
Sheet 2 of 3	Attorney Docket No.	MBOT-0002-P04

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			
¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.			

CERTIFICATION STATEMENT			
Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):			
☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (1).			
OR			
☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).			
☐ See attached certification statement.			
☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.			
☒ Applicant believes that no fees are required with this filing. However, if an Office Action on the merits has been mailed, or a fee is otherwise required, the Commissioner is hereby authorized to charge any fees due under 37 C.F.R. §§1.16 or 1.17, or to credit any overpayments, to Deposit Account No. 50-4262 in order to have this information disclosure statement considered.			
SIGNATURE			
A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.			
Signature	/John Nortrup/	Date (YYYY-MM-DD)	2012-12-04
Name/Print	John Nortrup	Registration Number	59,063

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	BROWN II, David N.
Sheet 3 of 3	Attorney Docket No.	MBOT-0002-P04

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Electronic Acknowledgement Receipt	
EFS ID:	14378455
Application Number:	13348896
International Application Number:	
Confirmation Number:	7161
Title of Invention:	NETWORKED THREE-DIMENSIONAL PRINTING
First Named Inventor/Applicant Name:	Nathaniel B. Pettis
Customer Number:	43520
Filer:	John H. Nortrop/Elizabeth Nortrup
Filer Authorized By:	John H. Nortrop
Attorney Docket Number:	MBOT-0002-P04
Receipt Date:	04-DEC-2012
Filing Date:	12-JAN-2012
Time Stamp:	14:30:40
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	MBOT-0002-P04_120412_Form1449.pdf	79370 1211098ac4d686e219bfd54e518cc666476c5a4	no	3

Warnings:

Information:

This is not an USPTO supplied IDS fillable form

Total Files Size (in bytes):

79370

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/348,896	01/12/2012	Nathaniel B. Pettis	MBOT-0002-P04	7161
43520 7590 01/22/2013 STRATEGIC PATENTS P.C.. C/O CPA Global P.O. BOX 52050 MINNEAPOLIS, MN 55402			EXAMINER SULTANA, NAHIDA	
			ART UNIT 1743	PAPER NUMBER
			NOTIFICATION DATE 01/22/2013	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@cpaglobal.com
patents@stratpat.com

Office Action Summary	Application No.	Applicant(s)	
	13/348,896	PETTIS, NATHANIEL B.	
	Examiner	Art Unit	
	NAHIDA SULTANA	1743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on 12 January 2012.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.

4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5) ☒ Claim(s) 1-23 is/are pending in the application.
 5a) Of the above claim(s) ____ is/are withdrawn from consideration.

6) ☐ Claim(s) ____ is/are allowed.

7) ☒ Claim(s) 1-23 is/are rejected.

8) ☐ Claim(s) ____ is/are objected to.

9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10) ☐ The specification is objected to by the Examiner.

11) ☒ The drawing(s) filed on 12 January 2012 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

 2) ☒ Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date 03/02/2012;06/06/2012;10/11/2012;12/04/2012

3) ☐ Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____
 4) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. **Claims 1, 2-3, 5-7, 9-11, and 19-23** are rejected under 35 U.S.C. 102(b) as being anticipated by Taminger et al. (US 7,168,935 B1, hereinafter Taminger).

For claim 1, Taminger teaches: a device comprising: a three-dimensional printer including a build volume (see col. 2. Lines 30-65 describe a three-dimensional printer; also see Figure 1 shows a three-dimensional printer with a build volume at 14).

Taminger teaches the device comprising a video camera positioned to capture video of the build volume from a point of view (“visual monitoring” “video camera” see col. 4. Lines 55-65; col. 11. Lines 5 to col. 12. Lines 65).

Taminger also teaches “means for networking” (a network interface) coupled to a data network (see col. 11. Lines 20 and onward) and a processor configured to receive a three-dimensional model through the network interface (col. 11. Lines 25 -65 suggest using the wireless network to distribute either to individual computer or central processing station), and to control operation of the three-dimensional printer to fabricate the three- dimensional model as an object within the build volume of the three-dimensional printer (col. 11. Lines 25 to col. 12. Lines 10 suggests commanding and controlling the fabrication process within the build volume by user interface remotely).

Taminger further teaches the processor further configured to provide a user interface to a remote user accessing the device through the network interface (col. 11. Lines 20 to col. 12. Lines 10 suggests having “user interface”), and to present in the user interface an image of the build volume from the camera and a two-dimensional projection of the three-dimensional model from the point of view of the video camera (col. 11. Lines 20 to col. 12. Lines 10 teaches that user interface used to command and control the processing).

As for claims 2-3, Taminger further suggest using still images to be obtained by the three-dimensional scanner (see col. 11. lines 25-35 which describes still imaging cameras which inherently scans and takes image) and furthermore the above apparatus is capable of simulating two dimensional projections based on the operation of the three-dimensional printer, since it includes all the elements to the claimed invention as described (as described above; also see col. 11. Lines 1 to col. 12. Lines 65).

As for claims 5-7 and 9-11, Taminger further teaches wherein the two-dimensional projection is dynamically updated to correspond to a state of physical completion of the object (col. 11. Lines 1-65 states various means for measuring and recording physical state of the object is used and networking means is used to transfer such data wirelessly to a remote user); wherein the two-dimensional projection is a video image from the video camera (col. 11. Lines 25-35 uses the video imaging); wherein the user interface provides at least one control for manual operation of the three-dimensional printer by the remote user (col. 11. Lines 20 to col. 12. Lines 10); wherein the user interface provides status information for the three-dimensional printer

(any information is an status information and details and such details are provided, see col. 11. lines 60 to col. 12. lines 15). Taminger further teaches wherein the user interface provides status information for a build process executing on the three-dimensional printer (col. 11. Lines 1-30) and wherein the user interface is capable of displaying a two-dimensional tool path for the three-dimensional printer (video image, still image, thermal image; see col. 11. lines 25-35), the two-dimensional tool path corresponding to a current layer of the object during a fabrication of the object by the three-dimensional printer (see col. 11. Lines 20-65).

As for claim 19, Taminger teaches a method comprising:
providing a three-dimensional printer including a build volume (Figure 1 shows three-dimensional printer for forming 3D objects, and build volume at 14), a network interface coupled to a data network (col. 11. Lines 5-65), and a video camera positioned to capture video of the build volume from a point of view (col. 11. Lines 35 -55, and col. 12. lines 50-65); receiving a three-dimensional model through the network interface (col. 11. Lines 5 to col. 12. Lines 20); fabricating the three-dimensional model as an object within the build volume of the three-dimensional printer (col. 11. Lines 60 to col. 12. Lines 15); and providing a user interface to a remote user accessing the device through the network interface (col. 11. Lines 25 to col. 12. Lines 65), wherein the user interface presents an image of the build volume from the camera and a two-dimensional projection of the three-dimensional model from the point of view of the video camera (col. 11. lines 20 to col. 12. lines 65).

As for claims 20-23, Taminger further teaches transmitting status information over the data network upon completion of the object (image and video; see col. 11. Lines 1-65); wherein the status information includes data presented through the user interface (col. 11. Lines 25-35); wherein the status information includes a digital image from the video camera (Col. 11. Lines 20-35); wherein the digital image is capable of being transmitted with an electronic mail communication confirming completion of the object (col. 11. lines 25 to 65).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

- Determining the scope and contents of the prior art.
- Ascertaining the differences between the prior art and the claims at issue.
- Resolving the level of ordinary skill in the pertinent art.
- Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taminger et al. (US 7,168,935 B1) in view of Jung et al. (US 8,286,236 B2; with the filing date Jan. 31, 2008, as provided by the IDS).

As for claim 8, Taminger teach all the limitation to the claimed invention as discussed above, however, does not explicitly teach wherein the processor is configured to provide credential- based access to the user interface.

The examiner notes that it is well known in the art that most processor are configured to provide credential-based access to the user interface, for the benefit of providing extra security for information. For example, in the same field of endeavor, pertaining to network interface and user interface, Jung et al. teach wherein the processor is configured to provide credential- based access to the user interface (see abstract), for the benefit of enabling user who is assigned for further benefit of enabling better security of the process control.

5. **Claims 4 and 12-18** rejected under 35 U.S.C. 103(a) as being unpatentable over Taminger et al. (US 7,168,935 B1).

As for claim 4, Taminger teaches all the limitation to the claimed invention as discussed above, however, does not explicitly teach wherein the processor is configured to monitor operation of the three-dimensional printer based upon a comparison of the two-dimensional projection with the image of the build volume.

Because Taminger suggest having specific control and evaluating means (see col. 11. Lines 65 to col. 12. Lines 10), it would have been obvious to one ordinary skilled in the art at the time of the applicant's invention to modify above and to program such processor to monitor and compare between two dimensional projection with the image

of the build volume, for the benefit of accurately forming a three dimensional object according to the design specification.

As for claims 12-13, Taminger teaches all the limitation to the claimed invention as discussed above, however, does not explicitly teach wherein the user interface supports remote access for technical support during local operation of the three-dimensional printer; wherein the processor is configured to fabricate a test object, capture an image of the test object, and compare the image to the test object to validate operation of the three-dimensional printer.

The examiner notes that remote technical support during location operation of the three-dimensional object is well known in order to fix any problem, or configure the apparatus to desirable standards (such as testing/measuring condition and controlling the conditions appropriately; see col. 11. lines 1-25). Lastly, any first sample process may be considered a test object, and image would be captured similarly as taught earlier and comparison of the image to the test object to validate operation would have been obvious depending on the specification/process control.

As for claims 14 -16, Taminger teach all the limitation to the claimed invention as discussed above, however, does not explicitly teach wherein the user interface includes at least one control to capture a frame of data from the video camera as a video image and to transmit the video image to a remote location through the data network; wherein the remote location is a social networking site; wherein the device is configured to transmit the video image in an electronic mail communication. The examiner notes that such modified control process and configuration to transmit image to social networking

and/or email, would have been obvious step to one skilled in the art, for the benefit of sharing processing information remotely, and/or possibly providing feedback from different users.

As for claims 17-18, Taminger teaches all the limitation to the claimed invention, however, does not explicitly teach wherein the user interface includes at least one control to capture a stop-motion animation of a fabrication of the object using the video camera; wherein the processor is configured to couple the three- dimensional printer in a communicating relationship with a remote print server through the data network. Because Taminger suggests taking still images (see col. 11. Lines 25-35), it would have been obvious to one skilled in the art to modify/configure the program above and setting the user interface to include at least one control to stop motion animation of a fabrication of the object using the video camera and lastly to remotely communicating the three dimensional printer with remote print server, in order to print to a remote location.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: US pub 2012/0280415 A1; 2008/0018018 A1; 2006/0192315 A1.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NAHIDA SULTANA whose telephone number is (571)270-1925. The examiner can normally be reached on Mon- Fri 9:00 Am -5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Del Sole can be reached on 571-272-1130. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NS

/Joseph S. Del Sole/
Supervisory Patent Examiner, Art Unit 1743

Notice of References Cited	Application/Control No. 13/348,896	Applicant(s)/Patent Under Reexamination PETTIS, NATHANIEL B.	
	Examiner NAHIDA SULTANA	Art Unit 1743	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-7,168,935 B1	01-2007	Taminger et al.	425/174.4
*	B	US-2012/0280415 A1	11-2012	Halford, Ben	264/40.1
*	C	US-2006/0192315 A1	08-2006	Farr et al.	264/113
*	D	US-2008/0018018 A1	01-2008	Nielsen et al.	264/308
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

EAST Search History**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1004	(264/40.7).OCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:18
L2	819	(264/401).OCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:18
L3	1416	(264/310).OCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:18
L4	1164	(264/317).OCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:18
L5	1672	(425/174.4).OCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:18
L6	1576	(700/98,118,204).OCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:18
L7	1754	(425/140,150).OCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:18
L8	376	(425/173).OCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:18
L9	1003	(425/470).OCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:18
L10	187	(L1 L2 L3 L4 L5 L6 L7 L8 L9) and @pd> "20120906"	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:18
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L12	19	("20120287459" "20120287473" "4097566" "5730817" "6841116" "20120113473" "20120287472" "8286236" "20120046779" "20120287470" "20040232601"	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:41

		"5192559" "6129872" "20120092724" "8282380" "5637175" "20120113457" "20120286453" "20120287259").PN.				
L13	1080	264/308	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:44
L14	1297	(264/308).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:44
L15	475	(425/375).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 15:44
L16	10	remote with print\$4 and 12	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 16:13
L17	2	remote with print\$4 same three\$4dimens\$4	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 16:14
L18	94	(remot\$4 with print\$4) and three\$4dimens\$4	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 16:15
L19	176251	("264").CLAS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 16:15
L20	119923	("425").CLAS.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 16:15
L21	1	18 and (19 or 20)	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 16:15
L22	34	("4575330" "4844144" "5031120" "5176188" "5204055" "5216616" "5256340" "5364889" "5387380" "5555176" "5616293" "5728345" "5866058" "6007318" "6110602" "6132665" "6193923" "6238613" "6261506" "6270335" "6305769" "6309581").PN. OR ("6936212").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 16:16
L23	83397	(interface near4 user) and (three\$4dimension\$4 or three near2 dimension\$4 or "3D")	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 16:18
L24	101	23 and (19 and 20)	US-PGPUB; USPAT; USOCR	OR	OFF	2013/01/08 16:19

EAST Search History (Interference)

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1/ 8/ 2013 4:29:21 PM

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Receipt date: 12/04/2012

13348896 - GAU: 1743

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) FieldSUBSTITUTE PTO/SB/08 (01-10)
SPPC v1.5 011712

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	BROWN II, David N.
Sheet 1 of 3	Attorney Docket No.	MBOT-0002-P04

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-8286236		Oct 9, 2012	Jung, Edward K., et al.	

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-20120286453		Nov 15, 2012	Pettis, N. B.	
		US-20120287259		Nov 15, 2012	Pettis, N. B.	
		US-20120287459		Nov 15, 2012	Pettis, N. B.	
		US-20120287470		Nov 15, 2012	Pettis, N. B.	
		US-20120287472		Nov 15, 2012	Pettis, N. B.	
		US-20120287473		Nov 15, 2012	Pettis, N. B.	

FOREIGN PATENT DOCUMENTS							
Examiner Initial*	Cite No	Foreign Document Number ³	Cnty Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
							T ⁵

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵

/Nahida Sultana/

01/08/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.S./

Receipt date: 03/02/2012

13348896 - GAU: 1743

Doc code: IDS
 Doc description: Information Disclosure Statement (IDS) Field

SUBSTITUTE PTO/SB/08 (01-10)
 SPPC v1.5 011712

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	Not Yet Known
Sheet 1 of 4	Attorney Docket No.	MBOT-0002-P04

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-6841116 B2		Jan 11, 2005	Schmidt, Kris A.	
		US-6129872		Oct 10, 2000	Jang, Justin	
		US-5730817		Mar 24, 1998	Feygin, Michael et al.	
		US-5637175		Jun 10, 1997	Feygin, Michael et al.	
		US-5192559		Mar 9, 1993	Hull, Charles W., et al.	
		US-4097566		Jun 27, 1978	Bertin, Michael C., et al.	

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-2012004 6779A1		Feb 23, 2012	Pax, Charles et al.	

FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number ³	Cnty Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	NPL-4	ONAGORUWA, SEYI et al., "Fused Deposition of Ceramics (FDC) and Composites", School of Mechanical and Materials Engineering Washington State University Pullman, WA 99164-2920 amitband@wsu.edu 2001 , 224-231	
	NPL-10	, "Fabbaloo Personal Manufacturing and 3D Printing, http://fabbaloo.com/blog/2012/1/6/kraftwurxs-patent-available.html ", http://fabbaloo.com/blog/2012/1/6/kraftwurxs-patent-available.html 1/29/2012 , all	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.S./

Receipt date: 03/02/2012

13348896 - GAU: 1743

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

SUBSTITUTE PTO/SB/08 (01-10)
SPPC v1.5 011712

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	Not Yet Known
Sheet 2 of 4	Attorney Docket No.	MBOT-0002-P04

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	NPL-1	PAX, CHARLES E. , "Awesome August Hack-a-thon", http://charlespax.com/2009/08/18/awesome-august-hack-a-thon/ [8/5/2010 12:13:01 PM] Open Source 3D printing research and design 08/18/2009 , all	
	NPL-2	PAX, CHARLES E. , "Motorized Conveyor Belt Sneak Peak", http://charlespax.com/2010/04/27/motorized-conveyor-belt-sneak-peek/ Open Source 3D printing research and design 04/27/2010 , 1-10	
	NPL-8	PAX, CHARLES E. , "MakerBot Thoughts", http://charlespax.com/2009/04/22/makerbot-thoughts/ [8/5/2010 12:10:55 PM] Open Source 3D printing research and design 04/22/2009 , all	
	NPL-3	PAX, CHARLES E. , "Heated Conveyor Belt Build Platform", http://charlespax.com/2010/04/20/heated-conveyor-belt-build-platform/ [8/5/2010 12:17:26 PM] Open Source 3D printing research and design 04/20/10 , 1-3	
	NPL-6	BROCKMEIER, OIVIND , "Automated Loading and Unloading of the Stratasys FDM 1600 Rapid Prototyping System", Thesis submitted to the Faculty of Virginia Polytechnic Institute and State University March 2000 03/2000 , all	
	NPL-7	PAX, CHARLES E. , "MakerBot Conveyor Belt", http://charlespax.com/2010/03/17/makerbot-conveyor-belt/ [8/5/2010 12:14:05 PM] Open Source 3D printing research and design 03/17/2010 , all	
	NPL-5	PAX, CHARLES E. , "MakerBot Thoughts 3", http://charlespax.com/2010/01/27/makerbot-thoughts-3/ [8/5/2010 12:13:39 PM] Open Source 3D printing research and design 01/27/10 , all	
	NPL-12	, "Application Serial No. 12/858,622 (Atty Ref MBOT-0001-P01) , Non-Final Office Action mailed 02-14-12" , , 21	

EXAMINER SIGNATURE			
Examiner Signature	/Nahida Sultana/	Date Considered	01/08/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.S./

Receipt date: 06/06/2012

13348896 - GAU: 1743

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) FieldSUBSTITUTE PTO/SB/08 (01-10)
SPPC v1.5 011712

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1742
	Examiner Name	Not Yet Known
Sheet 1 of 2	Attorney Docket No.	MBOT-0002-P04

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-20120113457A1		May 10, 2012	Pettis, N	
		US-20120113473A1		May 10, 2012	Pettis, N	
		US-20120092724A1		Apr 19, 2012	Pettis, Nathaniel B.	

FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number ³	Cnty Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵

NON-PATENT LITERATURE DOCUMENTS			
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EXAMINER SIGNATURE			
Examiner Signature	/Nahida Sultana/	Date Considered	01/08/2013
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			
¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.			

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.S./

Receipt date: 10/11/2012

13348896 - GAU: 1743

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) FieldSUBSTITUTE PTO/SB/08 (01-10)
SPPC v1.5 011712

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	BROWN II, David N.
Sheet 1 of 2	Attorney Docket No.	MBOT-0002-P04

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-8282380		Oct 9, 2012	Pax, Charles et al.	

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-2004/0232601		Nov 25, 2004	Kundinger, J. et al.	

FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number ³	Cnty Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	NPL-17	, "Application Serial No. 12/858,622 (Atty Ref MBOT-0001-P01) Notice of Allowance mailed 08/02/12", SN:12858622 NPL-17 8/2/2012 , 13 pages	

EXAMINER SIGNATURE			
Examiner Signature	/Nahida Sultana/	Date Considered	01/08/2013

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.S./

<i>Search Notes</i> 	Application/Control No. 13348896	Applicant(s)/Patent Under Reexamination PETTIS, NATHANIEL B.
	Examiner NAHIDA SULTANA	Art Unit 1743

SEARCHED			
Class	Subclass	Date	Examiner
264	40.7.401-405, 308	1/8/2013	NS
425	174.4,140,375	1/8/2013	NS
700	98,118,204	1/8/2013	NS

SEARCH NOTES		
Search Notes	Date	Examiner
East Search (see search history attached for details)	1/8/2013	NS
Inventor search	1/8/2013	NS
Consulted David Brown	1/8/2013	NS
Consulte Del Sole, Joseph regarding similar case #12/884982	1/8/2013	NS
Consulted Dimple Bodawala, regarding similar case #12/884982	1/8/2013	NS

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

/NAHIDA SULTANA/ Examiner.Art Unit 1743	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	SULTANA, NAHIDA
Sheet 1 of 4	Attorney Docket No.	MBOT-0002-P04

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-20090164379		Jun 25, 2009	Jung, Edward K., et al.	
		US-7168935		Jan 30, 2007	Taminger, Karen M., et al.	
		US-20060127153		Jun 15, 2006	Menchik, Guy et al.	
		US-20040175450		Sep 9, 2004	Yanagisawa, Kenji et al.	
		US-6490496		Dec 3, 2002	Dacey, Edward J.	
		US-6195205		Feb 27, 2001	Faris, Sadeg	
		US-6193923		Feb 27, 2001	Leyden, Richard N., et al.	
		US-5738817		Apr 14, 1998	Danforth, Stephen C., et al.	

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-20110137578		Jun 9, 2011	DIETRICH, DAVID M., et al.	
		US-20110029591		Feb 3, 2011	Wood, Michael C., et al.	
		US-20100131584		May 27, 2010	Johnson, William J.	
		US-20080269939		Oct 30, 2008	KRITCHMAN, Eliahu M.	
		US-20080228434		Sep 18, 2008	Aratani, Shinichi et al.	
		US-20070172112		Jul 26, 2007	Paley, Eric B., et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	SULTANA, NAHIDA
Sheet 2 of 4	Attorney Docket No.	MBOT-0002-P04

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-20070124436		May 31, 2007	Shepherd, Michael D.	
		US-20070088640		Apr 19, 2007	Hyakutake, Shogo et al.	
		US-20070061393		Mar 15, 2007	Moore, James F.	
		US-20060111807		May 25, 2006	Gothait, Hanan et al.	
		US-20060095152		May 4, 2006	Loughran, Stephen A.	
		US-20060077413		Apr 13, 2006	Lum, Joey P., et al.	
		US-20060041443		Feb 23, 2006	Horvath, Charles W.	
		US-20050234577		Oct 20, 2005	Loughran, Stephen A., et al.	
		US-20040207662		Oct 21, 2004	Anderson, Daryl E., et al.	
		US-20040203872		Oct 14, 2004	Bajikar, Sundeep M.	

FOREIGN PATENT DOCUMENTS								
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	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	SULTANA, NAHIDA
Sheet 3 of 4	Attorney Docket No.	MBOT-0002-P04

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	NPL-29	KESNER, SAMUEL B. et al., "Design Principles for Rapid Prototyping Forces Sensors Using 3-D Printing", International Search Report and Written Opinion. IEEE/ASME transactions on mechatronics. vol 16 no. 5 October 2011, 10/2011 , Pages 866-870	
	NPL-25	, "Application Serial No. 13/348,728 (Atty Ref MBOT-0002-P02) Non-Final Office Action mailed 1/22/13", 15 pages	
	NPL-28	, "Application Serial No. 13/348,728 (Atty Ref MBOT-0002-P02) Notice of Allowance mailed 2/15/13", 6 pgs	
	NPL-24	, "Application Serial No. 13/348,863 (Atty Ref MBOT-0002-P03) Non-Final Office Action mailed 1/18/13", 14 pgs	
	NPL-27	, "Application Serial No. 13/348,863 (Atty Ref MBOT-0002-P03), Notice of Allowance mailed 2/11/13", 7 pages	
	NPL-30	, "International Application Serial No. PCT/US2012/68429, Search Report and Written Opinion mailed 02-21-2013", pages 1-36	
	NPL-31	WU, DAZHONG et al., "Towards a cloud-based design and manufacturing paradigm: looking backward, looking forward", International search report and written opinion. Proceedings of the ASME 2012 international design engineering technical conference. IDETC/CIE 2012. August 12-15, 2012 Chicago, Illinois, USA, pages 1-14	

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	SULTANA, NAHIDA
Sheet 4 of 4	Attorney Docket No.	MBOT-0002-P04

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (1).

OR

☒ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ Applicant believes that no fees are required with this filing. However, if an Office Action on the merits has been mailed, or a fee is otherwise required, the Commissioner is hereby authorized to charge any fees due under 37 C.F.R. §§1.16 or 1.17, or to credit any overpayments, to Deposit Account No. 50-4262 in order to have this information disclosure statement considered.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Robert Mazzaresse/	Date (YYYY-MM-DD)	2013-04-18
Name/Print	Robert A. Mazzaresse	Registration Number	42,852

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

From the INTERNATIONAL SEARCHING AUTHORITY

To:
JOHN H. NORTRUP
STRATEGIC PATENTS, P.C.
P.O. BOX 52050
MINNEAPOLIS, MN 55402

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing
(day/month/year)

21 FEB 2013

Applicant's or agent's file reference
MBOT0002PWO

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.
PCT/US 12/68429

International filing date
(day/month/year) **07 December 2012 (07.12.2012)**

Applicant **MAKERBOT INDUSTRIES, LLC**

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see PCT Applicant's Guide, International Phase, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the ISA/
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Authorized officer

Lee W. Young

PCT Helpdesk: 571-272-4300

Telephone No. PCT OSP: 571-272-7774

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference MBOT0002PWO	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US 12/68429	International filing date (<i>day/month/year</i>) 07 December 2012 (07.12.2012)	(Earliest) Priority Date (<i>day/month/year</i>) 08 December 2011 (08.12.2011)
Applicant MAKERBOT INDUSTRIES, LLC		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed.
☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant.
☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- ☒ the text is approved as submitted by the applicant.
☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 1
☒ as suggested by the applicant.
☐ as selected by this Authority, because the applicant failed to suggest a figure.
☐ as selected by this Authority, because this figure better characterizes the invention.
- b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 12/68429

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G06F 19/00 (2013.01)

USPC - 700/118

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
USPC: 700/118; IPC(8): G06F 19/00 (2013.01)Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 700/117, 118, 119; 707/600, 912; 715/700, 961, 965; IPC(8): G06F 19/00 (2013.01)Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase; PubWEST(PGPB,USPT,USOC,EPAB,JPAB); Google Scholar. Terms: SFF, fabricate, print, network, server, process, computer, video, feed, camera, image, sensor, volume, temperature, base, platform, surface, support, 3-D, three-dimensional, build, workspace, stereoscopic, structured, light, shape from motion, receive, job, order, model, unit, etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2005/0234577 A1 (Loughran et al.) 20 October 2005 (20.10.2005), entire document, especially Fig. 5; para [0001], [0019], [0028]-[0029], [0031], [0033]-[0034], [0037]-[0038], [0040]-[0041], [0044]-[0045], [0049], [0051], [0062], [0067], [0075], [0079], [0091]-[0092], [0099], [0111], [0115], [0120]-[0121], [0124], [0127]-[0128], [0142], [0150], [0154], [0156]-[0157], [0174], [0191]; claims 19, 23	47, 48, 143, 152, 203, 213 ----- 1-46, 49-142, 144-151, 153-182, 204-212, 214-222
Y	US 2006/0127153 A1 (Menchik et al.) 15 June 2006 (15.06.2006), entire document especially para [0001], [0021], [0030]-[0031], [0043], [0045], [0047], [0049]-[0053]	1-46, 115, 155, 156
Y	US 2009/0164379 A1 (Jung et al.) 25 June 2009 (25.06.2009), especially para [0032], [0054], [0060], [0062], [0094], [0096], [0103]-[0104]	3, 4, 26, 30, 54, 55, 60, 69-72, 87, 119
Y	US 2004/0175450 A1 (Yanagisawa et al.) 09 September 2004 (09.09.2004), entire document, especially para [0012], [0027], [0029], [0098]	8, 13, 24-25, 45, 49, 80-122, 160, 204, 214
Y	US 2006/0111807 A1 (Gothait et al.) 25 May 2006 (25.05.2006), entire document, especially para [0014], [0051], [0061], [0085], [0104]	12, 123-142, 183-202

☒ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

02 February 2013 (02.02.2013)

Date of mailing of the international search report

21 FEB 2013

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 12/68429

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2007/0061393 A1 (Moore) 15 March 2007 (15.03.2007), entire document, especially para [0059], [0061], [0088], [0089], [0243]	24, 25, 183-202
Y	US 2011/0137578 A1 (Dietrich et al.) 09 June 2011 (09.06.2011), especially Fig. 3; para [0005], [0019], [0044]-[0045], [0048], [0057]	43, 90
Y	US 2006/0077413 A1 (Lum et al.) 13 April 2006 (13.04.2006), entire document, especially Fig. 5, 12, 30, 31; Table 2; para [0047], [0052], [0060], [0066], [0083], [0089], [0162], [0169], [0172], [0186], [0192], [0194]-[0196], [0226]-[0229], [0236]-[0237], [0239], [0241]-[0243], [0268]-[0270], [0273]-[0274], [0277]-[0280]	50-79, 144-151, 157-159, 161, 162, 205-208, 211, 212, 215-218, 221, 222
Y	US 2007/0172112 A1 (Paley et al.) 26 July 2007 (26.07.2007), entire document, especially para [0031]	80-102, 123-142
Y	US 2006/0095152 A1 (Loughran) 04 May 2006 (04.05.2006), especially para [0002], [0015], [0083]	104, 105, 124, 125, 153, 154, 170, 171, 173, 189, 190, 209, 210, 219, 220
Y	US 6,193,923 B1 (Leyden et al.) 27 February 2001 (27.02.2001), especially col 7, ln 64-67; col 8 ln 54-57; col 11, ln 57 to col 12, ln 5	108, 156, 198
Y	US 6,195,205 B1 (Faris) 27 February 2001 (27.02.2001), especially col 1, ln 66 to col 2, ln 8	128
Y	US 2008/0228434 A1 (Aratani et al.) 18 September 2008 (18.09.2008), especially para [0264]	129
Y	US 2007/0124436 A1 (Shepherd) 31 May 2007 (31.05.2007), entire document, especially para [0003], [0007], [0010], [0016], [0019], [0034]	163-171, 174, 176, 179, 182
Y	US 2004/0203872 A1 (Bajikar) 14 October 2004 (14.10.2004), entire document, especially para [0012], [0020], [0027], [0029]-[0031], [0034]-[0035]	164, 168, 172-182
A	US 2008/0269939 A1 (Kritchman) 30 October 2008 (30.10.2008), entire document	1-222
A	US 5,738,817 A (Danforth et al.) 14 April 1998 (14.04.1998), entire document	1-222
A	US 2007/0088640 A1 (Hyakutake et al.) 19 April 2007 (19.04.2007), entire document	1-222
A	US 2010/0131584 A1 (Johnson) 27 May 2010 (27.05.2010), entire document	1-222
A	US 2004/0207662 A1 (Anderson et al.) 21 October 2004 (21.10.2004), entire document	1-222
A	US 6,490,496 B1 (Dacey) 03 December 2002 (03.12.2002), entire document	1-222
A	Kesner et al. "Design Principles for Rapid Prototyping Forces Sensors Using 3-D Printing." In: IEEE/ASME Transactions on Mechatronics, vol. 16, no. 5, October 2011, pages 866-870 [online] [retrieved on 02 February 2013 (02.02.2013)] Retrieved from the Internet <URL: http://biorobotics.harvard.edu/pubs/2011/journal/Kesner_TMECH_Online_2011.pdf >, entire document	1-222
A, P	Wu et al. "TOWARDS A CLOUD-BASED DESIGN AND MANUFACTURING PARADIGM: LOOKING BACKWARD, LOOKING FORWARD." In: Proceedings of the ASME 2012 International Design Engineering Technical Conference and Computers and Information in Engineering Conference (IDETC/CIE 2012), 12-15 August 2012, pages 1-14 [online] [retrieved on 02 February 2013 (02.02.2013)] Retrieved from the Internet <URL: http://www.srl.gatech.edu/Members/dwu/ASME2012-DETC.70780.pdf > entire document	1-222

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: JOHN H. NORTRUP
STRATEGIC PATENTS, P.C.
P.O. BOX 52050
MINNEAPOLIS, MN 55402

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year)

21 FEB 2013

Applicant's or agent's file reference
MBOT0002PWO

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/US 12/68429

International filing date (day/month/year)

07 December 2012 (07.12.2012)

Priority date (day/month/year)

08 December 2011 (08.12.2011)

International Patent Classification (IPC) or both national classification and IPC

IPC(8) - G06F 19/00 (2013.01)

USPC - 700/118

Applicant **MAKERBOT INDUSTRIES, LLC**

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 *bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
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Facsimile No. 571-273-3201

Date of completion of this opinion

03 February 2013 (03.02.2013)

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (July 2011)

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed.
 - ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:
 - a. (means)
 - ☐ on paper
 - ☐ in electronic form
 - b. (time)
 - ☐ in the international application as filed
 - ☐ together with the international application in electronic form
 - ☐ subsequently to this Authority for the purposes of search
4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-46, 49-142, 144-151, 153-202, 204-212, 214-222	YES
	Claims	47, 48, 143, 152, 203, 213	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-222	NO
Industrial applicability (IA)	Claims	1-222	YES
	Claims	None	NO

2. Citations and explanations:

Claims 47, 48, 143, 152, 203 and 213 lack novelty under PCT Article 33(2) as being anticipated by US 2005/0234577 A1 to Loughran et al. (hereinafter Loughran'4577).

Regarding claim 47, Loughran'4577 discloses a system comprising: a plurality of three-dimensional printers (para [0001], The scheduling of jobs on a machine such as a fabrication machine), each one of the plurality of three-dimensional printers including a network interface (para [0037], computer network configuration, or other device capable of supporting the programming logic needed for the system); a server configured to manage execution of a plurality of print jobs by the plurality of three-dimensional printers (para [0019], the jobs being scheduled, and the machines on which the jobs are being scheduled, can each be given the appropriate cognizance by the scheduling system); and a data network that couples the server and the plurality of three-dimensional printers in a communicating relationship (claim 23, wherein said job scheduling application is in communication with one or more fabrication machines).

Regarding claim 48, Loughran'4577 further discloses the server further comprising a web-based user interface configured for a user to submit a new print job to the server and to monitor progress of the new print job (para [0031], Common examples of interfaces 26 include operating systems, web browsers; para [0115], Job scheduling characteristics . . . a load time, a start time, a duration, a completion time, or any other attribute relating to the timing of the job that might be relevant for scheduling purposes).

Regarding claim 143, Loughran'4577 discloses a system comprising: a print server coupled through a data network to a plurality of three-dimensional printers (para [0001], The scheduling of jobs on a machine such as a fabrication machine; para [0037]-[0038], application device 30 is an application server; with scheduling application 32 it interacts with user interface 26 thus comprising a print server for the networked machines or printers), the print server configured to receive status information from each one of the plurality of three-dimensional printers (para [0033], status metrics; para [0099], machine maintenance characteristics . . . a maintenance status) and to manage a print queue for each one of the plurality of three-dimensional printers (para [0037]-[0038], together the application device and scheduling application comprise a print server which manages the queue or schedule 34); a database coupled in a communicating relationship with the print server and configured to store print queue data and status information for each one of the plurality of three-dimensional printers (para [0154], data mining tracks machines, users, schedules); a web server configured to provide a virtual workspace for a user (para [0031], interfaces 26 include operating systems, web browsers, and other types of application software; para [0040], the controller 44 could host the scheduling application 32, including a web view if desired), the virtual workspace including a web-based design interface that permits a user to create and modify a model (para [0045], However, it may be possible to modify or complete a design after the machine 40 has begun working on the particular job incorporating the design), and further configured to receive a user command to fabricate the model on one or more of the plurality of three-dimensional printers (para [0049], user 22 can submit build jobs . . . directly by interacting with the calendar view 38).

Regarding claim 152, Loughran'4577 further discloses that the web server receives a manual user selection of one of the plurality of three-dimensional printers to fabricate the model (para [0051], manual embodiments . . . the system 20 relies on a human being to implement the schedule 34).

-- See Supplemental Box --

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claims 124-142 contain typographic errors.

Each of claims 124-134, 137, 138 and 142 recites: "The system of claim 123" Claim 123 is directed to a printer.

Each of claims 135 and 136 recites: "The system of claim 134"

Each of claims 139-141 recites: "The system of claim 138"

Claims 134 and 138 depend from claim 123 and are therefore also directed to a printer.

For the purposes of this International Search Report, claims 124-142 have been interpreted as reading: "The printer of claim"

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 203, Loughran'4577 discloses a system comprising: a print server coupled through a data network to a plurality of three-dimensional printers (para [0001], The scheduling of jobs on a machine such as a fabrication machine; para [0037]-[0038], application device 30 is an application server; with scheduling application 32 it interacts with user interface 26 thus comprising a print server for the networked machines or printers), the print server configured to receive status information from each one of the plurality of three-dimensional printers (para [0033], status metrics; para [0099], machine maintenance characteristics . . . a maintenance status) and to manage a print queue for each one of the plurality of three-dimensional printers (para [0037]-[0038], together the application device and scheduling application comprise a print server which manages the queue or schedule 34), the print server coupled in a communicating relationship with one or more content sources of three-dimensional objects suitable for fabrication with one of the plurality of three-dimensional printers (para [0037]-[0038], application device 30 is an application server; with scheduling application 32 it interacts with user interface 26 thus comprising a print server for the networked machines or printers); and a processor configured to execute a user interface for the print server (para [0031], Common examples of interfaces 26 include operating systems, web browsers; para [0191], computer programming implies the processor), the user interface including a first display area showing available fabrication resources including the plurality of three-dimensional printers and a second display area showing one or more objects available from the one or more content sources (para [0031], e.g., interface 26 having multiple views; para [0033], resource availability indicator; para [0150], e.g., the machine is available because it has unscheduled time), wherein the user interface includes a tool for requesting a fabrication of one of the one or more objects by dragging one of the one or more objects from the second display area to the first display area (para [0091], In some embodiments, the interface 26 allows users 22 to drag-drop a CAD file (or other design 54) into an existing reservation on the calendar view 38 . . . with a choice of providers and/or machines 40, e.g., the choice of machines is emphasized).

Regarding claim 213, Loughran'4577 discloses a system comprising: a print server coupled through a data network to a plurality of three-dimensional printers (para [0001], The scheduling of jobs on a machine such as a fabrication machine; para [0037]-[0038], application device 30 is an application server; with scheduling application 32 it interacts with user interface 26 thus comprising a print server for the networked machines or printers), the print server configured to receive status information from each one of the plurality of three-dimensional printers (para [0033], status metrics) and to manage a print queue for each one of the plurality of three-dimensional printers (para [0037]-[0038], together the application device and scheduling application comprise a print server which manages the queue or schedule 34), the print server coupled in a communicating relationship with one or more content sources of three-dimensional objects suitable for fabrication with one of the plurality of three-dimensional printers (para [0037]-[0038], application device 30 is an application server; with scheduling application 32 it interacts with user interface 26 thus comprising a print server for the networked machines or printers); and a processor configured to execute a user interface for the print server (para [0031], Common examples of interfaces 26 include operating systems, web browsers; para [0191], computer programming implies the processor), the user interface including a first display area showing the print queue for one of the plurality of three-dimensional printers and a second display area showing one or more objects available from the one or more content sources (para [0031], e.g., interface 26 having multiple views including a queue-list view; para [0033], resource availability indicator; para [0150], e.g., the machine is available because it has unscheduled time), wherein the user interface includes a tool for requesting a fabrication of one of the one or more objects at the one of the plurality of three-dimensional printers by dragging one of the one or more objects from the second display area to the first display area (para [0091], In some embodiments, the interface 26 allows users 22 to drag-drop a CAD file (or other design 54) into an existing reservation on the calendar view 38 . . . with a choice of providers and/or machines 40, e.g., the queue or schedule is emphasized).

Claims 1, 2, 5-7, 9-11, 14-23, 27 and 28 lack an inventive step under PCT Article 33(3) as being obvious over US 2006/0127153 A1 to Menchik et al. (hereinafter Menchik) in view of Loughran'4577.

Regarding claim 1, Menchik discloses a method for operating a three-dimensional printer coupled to a data network (para [0001], three-dimensional object printing; para [0053], controller may be connectable to a computer and/or communications network), the method comprising: the three-dimensional printer including a plurality of sensors that provide status information for a plurality of aspects of the three-dimensional printer (para [0030], Controller 105 . . . determine the status of building material within a cartridge at any given time. One or more sensors, for example, weight sensors); and evaluating an availability of the three-dimensional printer for the print job based upon a signal from at least one of the plurality of sensors (para [0045], enable selective control over the usage of available building materials from the respective cartridges 250; e.g., availability of the printer inherently includes availability of building materials). Menchik further discloses communicating over a computer or network (para [0053]), but Menchik does not expressly disclose receiving a print job from a requester over the data network at the three-dimensional printer (para [0031], Common examples of interfaces 26 include operating systems, web browsers; para [0049], receive user 22 interactions. For example, the user 22 can submit build jobs; para [0091], interface 26 receives file/design, gives user choice of machines). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Menchik and Loughran'4577, because both references are directed to systems and methods for printing jobs. Furthermore, users benefit from methods that allow for communicating over a network in a bidirectional manner, including communicating for the purpose of receiving a print job, because such methods improve efficiency by permitting users to work remotely.

Regarding claim 2, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses that evaluating the availability includes evaluating the availability for the print job based upon an identity of a user associated with the print job (para [0075], take into consideration for scheduling purposes, the pertinent user affiliations; para [0127], only the person booking the reservation can submit a job to be included within particular reservation time).

-- See next Supplemental Box --

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 5, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses: when the three-dimensional printer is available, adding the print job to a queue for the three-dimensional printer (para [0079], various queue-list views 36, . . . the machine 40 could potentially be configured to automatically adjust to the particular context; para [0120], jobs and builds can be scheduled . . . when one or more operators 46 are available to perform the activity) and initiating fabrication of an object according to the queue (para [0174]. The scheduling subsystem 102 may or may not communicate directly with the machine 40 and controller 44); and when the three-dimensional printer is not available, electronically notifying the requester that the print job has been rejected (para [0041]. Notifications can be sent to users; para [0128], the system 20 can automatically cancel the reservation if the deadline for submission was missed by the user 22 or was not otherwise in the possession of the system 20).

Regarding claim 6, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses providing information about a queue for the three-dimensional printer to the requester (para [0031], allowing the user 22 to interact with the system 20 . . . provide multiple views, such as a queue-list view).

Regarding claim 7, in the combination of Menchik and Loughran'4577, Menchik further discloses that evaluating the availability of the three-dimensional printer includes accepting the print job only if a supply of build material available for the three-dimensional printer exceeds an amount of build material required for the print job and one or more additional jobs ahead of the print job in the queue (para [0049], sufficient to complete a three-dimensional object; para [0050]. During the printing process the controller may continue to monitor, for example, the status of the building material(s) remaining in one or more respective cartridge bags, the total amount of building material of each type still required to complete the construction of one or more three-dimensional objects, and the length of time remaining before each respective cartridge may need to be replaced by another cartridge in line etc.).

Regarding claim 9, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses that evaluating the availability of the three-dimensional printer includes determining a percentage completion of a current print job at the three-dimensional printer (para [0033], scheduling application . . . what percentage of the work has been completed).

Regarding claim 10, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses that evaluating the availability of the three-dimensional printer includes estimating a wait time until the three-dimensional printer will be available and transmitting the wait time to the requester (para [0033], a variety of status metrics identifying in terms of resources and/or time what percentage of the work has been completed and how much work remains yet to be performed; para [0041]. Notifications can be sent to users 22).

Regarding claim 11, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses that evaluating the availability of the three-dimensional printer includes determining whether the three-dimensional printer is immediately available (para [0124], induce operator activities when operators 46 are available . . . Similarly, spare time can be filled with low priority items; e.g., the designation spare time being synonymous with immediate availability).

Regarding claim 14, in the combination of Menchik and Loughran'4577, Menchik further discloses that the plurality of sensors includes a sensor that detects a quantity of build material available (para [0031]. Sensors 185 may gauge the mass of cartridge 250 or of a portion of cartridge 250 thereby indicating the mass of building material within cartridge 250).

Regarding claim 15, in the combination of Menchik and Loughran'4577, Menchik further discloses that the plurality of sensors includes a sensor that detects a presence of build material in a material supply feed (para [0051], instructions to close a valve of an empty cartridge, or a cartridge or source where, for example, there is not enough material to continue to extract).

Regarding claim 16, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses identifying one or more alternative three-dimensional printers coupled to the data network as resources available for the print job when the three-dimensional printer is not available (para [0142], encourage the user 22 to either seek another machine 40, or to have the priority value (which can also be referred to as a priority metric) changed for the particular build or job; para [0154], a single aggregated schedule 34 (made up of various individual sub-schedules 34) could be created for all of the machines 40 that are part of the scheduling system 20. The scheduling heuristics 56 can include machine selection if there are multiple machines 40 of the same type or function).

Regarding claim 17, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses when the three-dimensional printer is not available, identifying an alternative three-dimensional printer coupled to the data network (para [0154], if there are multiple machines 40 of the same type or function) and redirecting the requester to the alternative three-dimensional printer (para [0142]. If the scheduling application 32 cannot schedule a job so that the job is completed by the deadline, various warnings can be given to the user 22 through the interface 26. This can encourage the user 22 to either seek another machine 40, or to have the priority value (which can also be referred to as a priority metric) changed for the particular build or job).

Regarding claim 18, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses that redirecting includes automatically redirecting the print job without user intervention (para [0121], scheduling heuristic 56 . . . particularly beneficial when dealing with machines 40 that do not require substantial supervision when operating).

Regarding claim 19, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses that redirecting includes transmitting a suggestion to the requester to use the alternative three-dimensional printer (para [0142], various warnings can be given to the user 22 through the interface 26. This can encourage the user 22 to either seek another machine 40).

-- See next Supplemental Box --

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 20, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses that the print job includes a plurality of objects (Fig. 5, para [0157]. As seen in the figure, a build 74 can have multiple jobs 76), the method further comprising identifying a plurality of printers in proximity to the three-dimensional printer and allocating the plurality of objects for concurrent fabrication among the plurality of printers (para [0156], it can be beneficial to produce multiple jobs 76 (which may or may not be for a related purpose) at the same time). The combination of Menchik and Loughran'4577 does not expressly disclose that the plurality of printers is in proximity to the three-dimensional printer. However, one having ordinary skill in the art would have recognized that offices with many users often have multiple printers, with a higher quality printer such as a three-dimensional printer, typically being in proximity to at least one other lower quality printer such as a plain black-and-white printer.

Regarding claim 21, in the combination of Menchik and Loughran'4577, Menchik further discloses transmitting status information from one or more of the plurality of sensors to the requester during an execution of the print job (para [0050]-[0052]. During the printing process the controller may continue to monitor . . . total amount of building material of each type still required . . . controller may provide instructions . . . for example, the status of the building material(s) remaining in one or more respective cartridge bags).

Regarding claim 22, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses notifying the requester of a successful completion of the print job (para [0033], of potentially relevant metrics include but are not limited to: (a) a variety of status metrics identifying in terms of resources and/or time what percentage of the work has been completed; para [0041], Notifications can be sent to users 22).

Regarding claim 23, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses notifying the requester if the print job fails to complete (para [0034], Color-coded information . . . a job that will not be completed before a particular deadline (e.g. a late completion time indicator)).

Regarding claim 27, Menchik discloses a three-dimensional printer (para [0001], three-dimensional object printing) comprising: a plurality of sensors that provide status information for a plurality of aspects of the three-dimensional printer (para [0047], utilizing the data provided by the respective sensors and respective memory chips attached to the respective cartridges; para [0043], data received from sensor(s) 430, memory chip reader(s) 225, cartridge sensor 550, and any other suitable sensor elements); and a processor configured to evaluate an availability of the three-dimensional printer for the print job based upon a signal from at least one of the plurality of sensors (para [0047], e.g., printer controller computes parameters associated with sensing of building material weight).

Menchik does not expressly disclose a network interface configured to receive a print job from a requester over a data network. However, Loughran'4577 discloses a network interface configured to receive a print job from a requester over a data network (para [0031], Common examples of interfaces 26 include operating systems, web browsers; para [0049], receive user 22 interactions. For example, the user 22 can submit build jobs). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Menchik and Loughran'4577, because both references are directed to systems and methods for printing jobs. Furthermore, users benefit from printers that allow for communicating over a network in a bidirectional manner, including communicating for the purpose of receiving a print job, because such printers improve efficiency by permitting users to work remotely.

Regarding claim 28, Menchik discloses a computer program product embodied in a non-transitory computer readable medium (para [0021], Controller . . . processor . . . software code) that, when executing on one or more computing devices (para [0021], personal computer or workstation, or a processing unit), performs the steps of: (para [0030], Controller 105 . . . determine the status of building material within a cartridge at any given time. One or more sensors, for example, weight sensors); and evaluating an availability of the three-dimensional printer for the print job based upon a signal from at least one of the plurality of sensors (para [0045], enable selective control over the usage of available building materials from the respective cartridges 250; e.g., availability of the printer inherently includes availability of building materials). Menchik further discloses that the three-dimensional printer including a plurality of sensors that provide status information for a plurality of aspects of the three-dimensional printer (para [0030], weight sensors), but Menchik does not expressly disclose receiving a print job from a requester over a data network at a three-dimensional printer, the three-dimensional printer including a plurality of sensors that provide status information for a plurality of aspects of the three-dimensional printer. However, Loughran'4577 discloses receiving a print job from a requester over a data network at a three-dimensional printer (para [0031], Common examples of interfaces 26 include operating systems, web browsers; para [0049], receive user 22 interactions. For example, the user 22 can submit build jobs; para [0091], e.g., interface 26 receives file or design, and gives the user a choice of machines). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Menchik and Loughran'4577, because both references are directed to systems and methods for printing jobs. Furthermore, users benefit from computer program products with instructions for communicating over a network in a bidirectional manner, including communicating for the purpose of receiving a print job, because such computer program products improve efficiency by permitting users to work remotely.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Claims 29, 31-42, 44, 46 and 155 lack an inventive step under PCT Article 33(3) as being obvious over Loughran/4577 in view of Menchik.

Regarding claim 29, Loughran/4577 discloses a device comprising: a print server coupled through a data network to a plurality of three-dimensional printers (para [0001]. The scheduling of jobs on a machine such as a fabrication machine; para [0037]-[0038], e.g., application device 30 is an application server, and with scheduling application 32 it interacts with user interface 26 thus comprising a print server for the networked machines or printers); and the print server configured to manage a print queue for each one of the plurality of three-dimensional printers (para [0037]-[0038], e.g., together the application device and scheduling application comprise a print server which manages the queue or schedule 34); a database coupled in a communicating relationship with the print server and configured to store print queue data and status information for each one of the plurality of three-dimensional printers (para [0154], data mining tracks machines, users, schedules); and a web server configured to provide a user interface over the data network to a remote user (para [0031]. Common examples of interfaces 26 include operating systems, web browsers; e.g., without explicitly naming a web server, the use of web browsers implies that there is a server application in force through which the web browsers provide user interface to the data network), the user interface adapted to present the status information and the print queue data for one or more of the plurality of three-dimensional printers to the user (para [0029]. The access device 24 allows the user 22 to interact with and receive information from an interface 26; para [0067]. The scheduling application 32 sends output data 50 to the interface 26 where the output data 50 can be viewed and potentially responded to or interacted with, by the users 22) and the user interface adapted to receive a print job from the remote user for one of the plurality of three-dimensional printers (para [0091], interface 26 receives file/design, gives user choice of machines). Loughran/4577 does not expressly disclose that the print server is configured to receive status information from one or more sensors for each one of the plurality of three-dimensional printers. However, Menchik discloses that the print server is configured to receive status information from one or more sensors for each one of the plurality of three-dimensional printers (para [0030], status . . . One or more sensors, for example, weight sensors; para [0053], e.g., web server, communication network, etc., email). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran/4577 and Menchik, because both references are directed to systems and methods for printing jobs. Furthermore, users benefit from devices that allow for communicating sensor status over a network, because such devices permit a user to trouble-shoot the printer from a remote location such as his or her desk.

Regarding claim 31, in the combination of Loughran/4577 and Menchik, Loughran/4577 further discloses that the print queue is managed according to one or more criteria from the remote user for the print job (para [0049]. For example, the user 22 can submit build jobs with a priority value, a deadline, or other information relevant to the scheduling of the build directly by interacting with the calendar view 38. The system 20 can perform automated scheduling using one or more scheduling heuristics, described in greater detail below; para [0062], from a remote location).

Regarding claim 32, the combination of Loughran/4577 and Menchik does not expressly disclose that the one or more sensors include at least one video camera, the user interface adapted to present a video feed from the at least one video camera to the remote user through the user interface. However, one having ordinary skill in the art would have recognized that users benefit from remotely located video cameras providing a video feed, because such camera feeds allow the user to trouble-shoot the printer from the remote location, for example, to detect a jammed printer.

Regarding claim 33, in the combination of Loughran/4577 and Menchik, Menchik further discloses that the one or more sensors include one or more of: a heat sensor, a volume flow rate sensor, a sound sensor, a light sensor, and a weight sensor (para [0030], weight sensor).

Regarding claim 34, in the combination of Loughran/4577 and Menchik, Loughran/4577 further discloses that the print queue includes one or more print jobs for one of the plurality of three-dimensional printers (para [0044], queue-list view comprises order of tasks relating to printer) and that the print queue is stored in the database (para [0154], data mining, i.e., database includes scheduling system).

Regarding claim 35, in the combination of Loughran/4577 and Menchik, Loughran/4577 further discloses that the print queue includes one or more print jobs for one of the plurality of three-dimensional printers (para [0028]-[0029], [0037]-[0038], e.g., access device and scheduling) and that the print queue is stored locally at the one of the plurality of three-dimensional printers (para [0028]. In embodiments of the system 20 where the user 22 is also the operator 46 of the machine 40, the access device 24 can be the same device as the controller 44 for the machine 40).

Regarding claim 36, in the combination of Loughran/4577 and Menchik, Loughran/4577 further discloses that the print queue includes a plurality of print jobs for one of the plurality of three-dimensional printers (para [0028]-[0029], [0037]-[0038], e.g., access device and scheduling) and that the print queue is allocated between the database and a local memory of the one of the plurality of three-dimensional printers (para [0028], e.g., relating to one machine; para [0040], e.g., relating to integration over an office workflow system, when read together teach the balancing value of a distributed allocation consistent with the disclosure in para [0154]).

Regarding claim 37, in the combination of Loughran/4577 and Menchik, Loughran/4577 further discloses that the print server stores a predetermined alternative three-dimensional printer to execute the print job from the remote user in the event of a failure by the one of the plurality of three-dimensional printers (para [0154], a single aggregated schedule 34 (made up of various individual sub-schedules 34) could be created for all of the machines 40 that are part of the scheduling system 20. The scheduling heuristics 56 can include machine selection if there are multiple machines 40 of the same type or function).

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 38, the combination of Loughran'4577 and Menchik does not expressly disclose that the print server maintains exclusive control over at least one of the plurality of three-dimensional printers. However, one having ordinary skill in the art would have recognized that system administrators benefit from print servers capable of maintaining exclusive control over at least one printer, because exclusive control allow administrators to re-allocate resources among users for purposes such as load-balancing.

Regarding claim 39, in the combination of Loughran'4577 and Menchik, Loughran'4577 further discloses that the print server submits the print job to a first available one of the plurality of three-dimensional printers (para [0124], induce operator activities when operators 46 are available . . . Similarly, spare time can be filled with low priority items. The scheduling heuristics can schedule jobs and builds in such a fashion as to take into consideration the most limiting constraint; e.g., the designation spare time is synonymous with heuristically utilizing immediate availability).

Regarding claim 40, in the combination of Loughran'4577 and Menchik, Loughran'4577 further discloses that the user interface is adapted to receive a manual selection of one of the plurality of three-dimensional printers from the remote user to execute the print job (para [0075], Different users 22 and operators 46 can be affiliated with different machines 40; para [0091], The user 22 can then select the providers and/or machines, providing quality, delivery, and other relevant information at the time that the job is submitted).

Regarding claim 41, in the combination of Loughran'4577 and Menchik, Loughran'4577 further discloses that the user interface is adapted to adapted to receive a batch print job from the remote user, the batch print job including a plurality of related print jobs (para [0156], it can be beneficial to produce multiple jobs 76 (which may or may not be for a related purpose) at the same time; para [0157], As seen in the figure, a build 74 can have multiple jobs 76).

Regarding claim 42, in the combination of Loughran'4577 and Menchik, Loughran'4577 further discloses that the user interface is further adapted to receive a specification of permissible allocations of the plurality of related print jobs among the plurality of three-dimensional printers (para [0156], it can be beneficial to produce multiple jobs 76 (which may or may not be for a related purpose) at the same time; para [0157], As seen in the figure, a build 74 can have multiple jobs 76).

Regarding claim 44, the combination of Loughran'4577 and Menchik does not expressly disclose that the user interface is adapted to display a three-dimensional model depicting a current state of completion of an object fabricated according to the print job. However, one having ordinary skill in the art would have recognized that users benefit from a user interface adapted to display a current state of completion, because such an interface allows the user to detect potential modeling errors and perform accuracy measurements between the current state and the target final model as the modeling process progresses.

Regarding claim 46, the combination of Loughran'4577 and Menchik does not expressly disclose that the status information presented in the user interface includes a video image of a working volume of one of the three-dimensional printers that is executing the print job. However, one having ordinary skill in the art would have recognized that users benefit from status information in the form of a video image, because some printer status issues can be more easily viewed in visual as opposed to textual form, such as an overheating printer.

Regarding claim 155, Loughran'4577 does not expressly disclose that the web server displays status information from one or more sensors of the plurality of three-dimensional printer. However, Menchik discloses that the web server displays status information from one or more sensors of the plurality of three-dimensional printer (para [0030], status . . . One or more sensors, for example, weight sensors; para [0053], e.g., web server, communication network, etc., email). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Menchik, because both references are directed to systems and methods for printing jobs. Furthermore, users benefit from systems that allow for communicating sensor status over a network, because such systems permit a user to trouble-shoot the printer from a remote location such as his or her desk.

Claims 49, 160, 204 and 214 lack an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of US 2004/0175450 A1 to Yanagisawa et al. (hereinafter Yanagisawa).

Regarding claim 49, Loughran'4577 does not expressly disclose that the web-based user interface permits video monitoring of each one of the plurality of three-dimensional printers. However, Yanagisawa discloses that the web-based user interface permits video monitoring of each one of the plurality of three-dimensional printers (para [0098], CCD camera). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Yanagisawa, because both references are directed to systems and methods for shaping and viewing three-dimensional objects. Furthermore, users benefit from systems that allow for viewing a video feed over a network interface, because such systems increase the flexibility and utility of the system for a user working remotely from the object.

Regarding claim 160, Loughran'4577 does not expressly disclose that the web server is configured to display a video feed from at least one of the plurality of three-dimensional printers. However, Yanagisawa discloses that the web server is configured to display a video feed from at least one of the plurality of three-dimensional printers (para [0098], CCD camera). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Yanagisawa, because both references are directed to systems and methods for shaping and viewing three-dimensional objects. Furthermore, users benefit from systems that allow for viewing a video feed over a network interface, because such systems increase the flexibility and utility of the system for a user working remotely from the object.

-- See next Supplemental Box --

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 204, Loughran'4577 does not expressly disclose that the user interface includes a video feed from at least one of the plurality of three-dimensional printers. However, Yanagisawa discloses that the user interface includes a video feed from at least one of the plurality of three-dimensional printers (para [0098], CCD camera). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Yanagisawa, because both references are directed to systems and methods for shaping and viewing three-dimensional objects. Furthermore, users benefit from systems that allow for viewing a video feed over a network interface, because such systems increase the flexibility and utility of the system for a user working remotely from the object.

Regarding claim 214, Loughran'4577 does not expressly disclose that the user interface includes a video feed from at least one of the plurality of three-dimensional printers. However, Yanagisawa discloses that the user interface includes a video feed from at least one of the plurality of three-dimensional printers (para [0098], CCD camera). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Yanagisawa, because both references are directed to systems and methods for shaping and viewing three-dimensional objects. Furthermore, users benefit from systems that allow for viewing a video feed over a network interface, because such systems increase the flexibility and utility of the system for a user working remotely from the object.

Claims 50-52, 68, 73-79, 144-151, 157-159, 161, 162, 205-208, 211, 212, 215-218, 221 and 222 lack an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of US 2006/0077413 A1 to Lum et al. (hereinafter Lum).

Regarding claim 50, Loughran'4577 further discloses a database of three-dimensional models (para [0154], data mining), and a user interface (para [0031], Common examples of interfaces 26 include operating systems, web browsers). Loughran'4577 does not expressly disclose a user interface that comprises a search engine and that the server provides a search engine for locating a particular three-dimensional model in the database of three-dimensional models. However, Lum discloses that the server provides a search engine for locating a particular three-dimensional model in the database of three-dimensional models (Fig. 31 and para [0278], [0280], request; Fig. 5 and para [0194]-[0196]). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, users benefit from system architectures that comprise a database that can be queried using a web-based search engine, because such systems allow for scalability and flexibility, such as using mark-up language for search queries.

Regarding claim 51, in the combination of Loughran'4577 and Lum, Lum further discloses that the search engine is a text-based search engine (para [0194], [0297]).

Regarding claim 52, in the combination of Loughran'4577 and Lum, Lum further discloses that the search engine is an image-based search engine (Fig. 5 and para [0194]-[0196]).

Regarding claim 68, Loughran'4577 discloses a device comprising: a three-dimensional printer (para [0001], a fabrication machine); a network interface (para [0037], computer network configuration) and fabrication by the three-dimensional printer through the network interface (para [0001]). The scheduling of jobs on a machine such as a fabrication machine; para [0037], computer network configuration). Loughran'4577 does not expressly disclose processor configured to subscribe to a plurality of sources of content and to receive one or more three-dimensional models from the plurality of sources selected by a user, and to select one of the one or more three-dimensional models for fabrication by the three-dimensional printer according to a user preference for prioritization. However, Lum discloses a processor configured to subscribe to a plurality of sources of content (para [0243]). The subscribing application may then obtain 172, from the IDev, a list of reportable events that the IDev is capable of identifying for notification purposes) selected by a user (para [0277], subscriber preferences, which may be stored in subscriber database 335), to receive one or more three-dimensional models from the plurality of sources (para [0186], [0229], [0237], [0270], e.g., a relationship between centralized and distributed databases allowing for various system configurations), and to select one of the one or more three-dimensional models for fabrication by the three-dimensional printer according to a user preference for prioritization (para [0083], reprioritize or delete jobs; para [0273], e.g., relates processor-to-user interface functionality). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, users benefit from devices that allow for user selection based on preferences, because such devices improve the flexibility of the system without requiring a remote user to change printer settings at the printer apparatus.

Regarding claims 73, 74 and 75, the combination of Loughran'4577 and Lum does not expressly disclose that the processor is configured to search a second plurality of sources of content according to one or more search criteria provided by the user, which may include demographic information for the user or contextual information of the user. However, one having ordinary skill in the art would have recognized that the sources provided by the system may be so numerous that the user would need to search using search criteria. Furthermore, it would have been obvious to utilize search criteria associated with demographic or contextual information of the user, because users are inclined to utilize search terms common or familiar to them.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 76, Loughran'4577 discloses a method for operating a three-dimensional printer (para [0001], a fabrication machine) comprising: coupling the three-dimensional printer to a data network (claim 23, wherein said job scheduling application is in communication with one or more fabrication machines). Loughran'4577 does not expressly disclose: locating one or more sources of content for fabrication by the three-dimensional printer on the data network according to one or more user-provided criteria; subscribing to new content from the one or more sources of content; receiving at least one three-dimensional model from one of the one or more sources of content; and fabricating an object from the at least one three-dimensional model. However, Lum discloses: locating one or more sources of content for fabrication by the three-dimensional printer on the data network (para [0244], identifying an IDev and searching an external source for specific IDev data) according to one or more user-provided criteria (para [0277], subscriber preferences, which may be stored in subscriber database 335); subscribing to new content from the one or more sources of content (para [0242], The subscribing application may then supply 158 a job ID to the notification application); receiving at least one three-dimensional model from one of the one or more sources of content (para [0243], notify the subscribing application at the subscribing application address); and fabricating an object from the at least one three-dimensional model (para [0047], a multi-function peripheral device (MFP), which typically has the capability to perform a plurality of functions comprising a printer, scanner, copier and/or a facsimile machine or image transmitter/receiver, is a type of imaging device. Other MFP imaging devices may comprise other combinations of functions and still qualify as an IDev). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, the combination would extend the capabilities disclosed by Lum for printing images to include objects having three-dimensional features, such as images with depth perception and fabrication objects, as disclosed Loughran'4577.

Regarding claim 77, in the combination of Loughran'4577 and Lum, Loughran'4577 further discloses: receiving a plurality of three-dimensional models (para [0154], aggregated schedule); prioritizing fabrication of the plurality of three-dimensional models into an order of fabrication (para [0121], e.g., one prioritizing heuristic; para [0037], the user 22 can submit build jobs with a priority value); and fabricating the plurality of three-dimensional models in the order (para [0121], run large jobs).

Regarding claim 78, Loughran'4577 discloses a computer program product embodied in a non-transitory computer-readable medium (para [0040], more than one computer program and various code libraries) that, when executing on a three-dimensional printer (para [0001], a fabrication machine), performs the steps of: coupling the three-dimensional printer to a data network (para [0037], computer network configuration, or other device capable of supporting the programming logic needed for the system); receiving at least one three-dimensional model from one of the one or more sources of content (para [0045], the schedule 34 includes an electronic model or design); and fabricating an object from the at least one three-dimensional model (para [0092], users 22 can invoke a build function). Loughran'4577 does not expressly disclose locating one or more sources of content for fabrication by the three-dimensional printer on the data network according to one or more user-provided criteria; and subscribing to new content from the one or more sources of content. However, Lum discloses: locating one or more sources of content for fabrication by the three-dimensional printer on the data network according to one or more user-provided criteria (para [0241]-[0242], e.g., a subscription process based on event type and job ID); and subscribing to new content from the one or more sources of content (para [0243], The subscribing application may then obtain 172, from the IDev, a list of reportable events that the IDev is capable of identifying for notification purposes). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, users benefit from computer program products that locate and subscribe to new content to one or more sources, because such computer program products allow for users to quickly become aware of changes made by colleagues to other parts of the fabrication model that may require coordination among all users working on the model.

Regarding claim 79, in the combination of Loughran'4577 and Lum, Loughran'4577 further discloses code that performs the steps of: receiving a plurality of three-dimensional models (para [0154], the scheduling heuristic); prioritizing fabrication of the plurality of three-dimensional models into an order of fabrication (para [0121], prioritizing heuristic); and fabricating the plurality of three-dimensional models in the order (para [0056], Output is the end result of the process scheduled on the schedule 34 of the machine 40).

Regarding claim 144, Loughran'4577 does not expressly disclose that the virtual workspace includes a search tool for searching one or more databases of printable objects. However, Lum discloses that the virtual workspace includes a search tool for searching one or more databases of printable objects (Fig. 31 and para [0278], [0280], request; Fig. 5 and para [0194]-[0196]; Fig. 12 and para [0237], database 125). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, users benefit from system architectures that comprise databases that can be queried using a web-based search engine, because such systems allow for scalability and flexibility, such as using mark-up language for search queries.

Regarding claim 145, Loughran'4577 further discloses a queue-list view (para [0177]), but Loughran'4577 does not expressly disclose that the virtual workspace includes a queue management tool for managing one or more pending prints. However, Lum discloses that the virtual workspace includes a queue management tool for managing one or more pending prints (para [0268], job queue manager (JQM); para [0089], Job Status). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, users benefit from systems that allow for managing pending print jobs, because such systems allow users to cancel and re-prioritize pending jobs (Lum, para [0089]).

-- See next Supplemental Box --

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:
Box No. V.2 Citations and explanations:

Regarding claim 146, Loughran'4577 does not expressly disclose that the virtual workspace includes a status tool for receiving a user specification of one or more preferences for receiving status updates. However, Lum discloses that the virtual workspace includes a status tool for receiving a user specification of one or more preferences for receiving status updates (para [0277], subscriber preferences . . . used to select a transport mechanism for notification delivery). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, users benefit from systems that allow notifications, such as status updates, to be delivered using preferred means, because such systems enable users to change preferences to mobile means when users are away from their workstations.

Regarding claims 147 and 148, in the combination of Loughran'4577 and Lum, Lum further discloses that the one or more preferences include notification by electronic mail (para [0236], [0239]) and by instant text message (para [0052], [0236], [0239]).

Regarding claim 149, Loughran'4577 does not expressly disclose that the virtual workspace includes a tool for managing one or more subscriptions to content. However, Lum discloses that the virtual workspace includes a tool for managing one or more subscriptions to content (para [0226]-[0227]). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, users benefit from systems that include tools for managing subscriptions to content, because such systems allow the user to subscribe to content on an on-going basis, for the duration of a particular job, or based on other criteria (Lum, para [0228]).

Regarding claim 150, Loughran'4577 does not expressly disclose that the web server automatically selects one of the plurality of three-dimensional printers to fabricate the model according to the user command. However, Lum discloses that the web server automatically selects one of the plurality of three-dimensional printers to fabricate the model according to the user command (para [0162], Initiate Print; para [0169], Initiate Send; para [0172], DESTINATION). Lum further discloses that settings can be cleared (para [0066], Table 2). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, users benefit from the ability to select a destination printer and for the system to maintain the user selection until cleared by the user, because such systems reduce the amount of time spent by the user making selections on a repetitive basis.

Regarding claim 151, in the combination of Loughran'4577 and Lum, Lum further discloses that the user can reprioritize the job queue (para [0089]). Lum does not expressly disclose that the web server automatically selects one of the plurality of three-dimensional printers according to one or more user criteria for prioritization of resources. However, one having ordinary skill in the art would have recognized that the system would need to select a default priority from multiple levels of priority, else the user would not be able to manually reprioritize the queue.

Regarding claim 157, Loughran'4577 does not expressly disclose that the web server is configured to provide queue information for each of the plurality of the three-dimensional printers. However, Lum discloses that the web server is configured to provide queue information for each of the plurality of the three-dimensional printers (para [0089], Job Status). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, users benefit from the ability to view the queue information from each printer in order to manually select a printer least busy for their print jobs in case of higher print queue volumes.

Regarding claims 158 and 159, in the combination of Loughran'4577 and Lum, Lum further discloses that a queue for one of the plurality of the three-dimensional printers can be stored in a variety of locations and manners (Fig. 30 and para [0268]-[0270], JQM 328, Job Objects 325). Lum does not expressly disclose that the storage location is locally at the one of the plurality of three-dimensional printer or in the database. However, one having ordinary skill in the art would have recognized that such storage locations could be selected based on the desired system architecture based on the Lum architecture illustrated in Fig. 30.

Regarding claim 161, Loughran'4577 does not expressly disclose a second database coupled in a communicating relationship with the print server, the database storing printable content for the plurality of three-dimensional printers. However, Lum discloses a database coupled in a communicating relationship with the print server, the database storing printable content for the plurality of three-dimensional printers (Fig. 30 and para [0268]-[0270], JQM 328, Job Objects 325). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, system administrators benefit from the ability to store job objects in one or more databases in a flexible system architecture. Lum does not expressly disclose a second database. However, one having ordinary skill in the art would have recognized that such a storage location could be selected based on the desired system architecture based on the Lum architecture illustrated in Fig. 30.

Regarding claim 162, in the combination of Loughran'4577 and Lum, Lum further discloses that the web server includes a search tool for the printable content (Fig. 31 and para [0278], [0280], request; Fig. 5 and para [0194]-[0196]).

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 205, Loughran'4577 does not expressly disclose that the user interface displays a status for at least one of the plurality of three-dimensional printers. However, Lum discloses that the user interface displays a status for at least one of the plurality of three-dimensional printers (para [0089], Job Status). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, users benefit from the ability to view the queue information from each printer in order to manually select a printer least busy for their print jobs in case of higher print queue volumes.

Regarding claim 206, in the combination of Loughran'4577 and Lum, Lum further discloses that the status includes an availability of the at least one of the plurality of three-dimensional printers (para [0089]).

Regarding claim 207, in the combination of Loughran'4577 and Lum, Lum further discloses that the availability includes a job started and a job ended notification as well as a notification in case the job status changes, for example, due to a paper jam or out-of-paper situation on at least one of the plurality of three-dimensional printers (para [0231], [0271]). Lum does not expressly disclose an estimated wait time until a printer is available. However, one having ordinary skill in the art would have recognized that such an estimate could have been computed based, for example, on a running average of completion rates of past print jobs and the probability of a printer issue occurring. It would have been obvious to compute such an estimate based on available information in order for remote users to be able to manually select a printer during times of high print volumes.

Regarding claim 208, in the combination of Loughran'4577 and Lum, Lum further discloses that the status includes a job started and a job ended status as well as a job change status, for example, due to a paper jam or out-of-paper situation on at least one of the plurality of three-dimensional printers (para [0231], [0271]). Lum does not expressly disclose that the status includes a percentage completion of a current print job. However, one having ordinary skill in the art would have recognized that such a percentage could have been computed based, for example, on a running average of completion rates of past print jobs and the probability of a printer issue occurring. It would have been obvious to compute such a percentage based on available information in order for remote users to be able to manually select a printer during times of high print volumes.

Regarding claims 211 and 212, Loughran'4577 does not expressly disclose that the print queue for at least one of the plurality of three-dimensional printers is stored on the at least one of the plurality of three-dimensional printers or on the print server. However, Lum discloses that the print queue for at least one of the plurality of three-dimensional printers can be stored in a variety of locations and manners (Fig. 30 and para [0268]-[0270], JQM 328, Job Objects 325). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Lum does not expressly disclose that the storage location is locally at the one of the plurality of three-dimensional printer or on the printer server. However, one having ordinary skill in the art would have recognized that such storage locations could be selected based on the desired system architecture based on the Lum architecture illustrated in Fig. 30.

Regarding claim 215, Loughran'4577 does not expressly disclose that the user interface displays a status for at least one of the plurality of three-dimensional printers. However, Lum discloses that the user interface displays a status for at least one of the plurality of three-dimensional printers (para [0089], Job Status). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, users benefit from the ability to view the queue information from each printer in order to manually select a printer least busy for their print jobs in case of higher print queue volumes.

Regarding claim 216, in the combination of Loughran'4577 and Lum, Lum further discloses that the status includes an availability of the at least one of the plurality of three-dimensional printers (para [0089]).

Regarding claim 217, in the combination of Loughran'4577 and Lum, Lum further discloses that the availability includes a job started and a job ended notification as well as a notification in case the job status changes, for example, due to a paper jam or out-of-paper situation on at least one of the plurality of three-dimensional printers (para [0231], [0271]). Lum does not expressly disclose an estimated wait time until a printer is available. However, one having ordinary skill in the art would have recognized that such an estimate could have been computed based, for example, on a running average of completion rates of past print jobs and the probability of a printer issue occurring. It would have been obvious to compute such an estimate based on available information in order for remote users to be able to manually select a printer during times of high print volumes.

Regarding claim 218, in the combination of Loughran'4577 and Lum, Lum further discloses that the status includes a job started and a job ended status as well as a job change status, for example, due to a paper jam or out-of-paper situation on at least one of the plurality of three-dimensional printers (para [0231], [0271]). Lum does not expressly disclose that the status includes a percentage completion of a current print job. However, one having ordinary skill in the art would have recognized that such a percentage could have been computed based, for example, on a running average of completion rates of past print jobs and the probability of a printer issue occurring. It would have been obvious to compute such a percentage based on available information in order for remote users to be able to manually select a printer during times of high print volumes.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claims 221 and 222, Loughran'4577 does not expressly disclose that the print queue for at least one of the plurality of three-dimensional printers is stored on the at least one of the plurality of three-dimensional printers or on the print server. However, Lum discloses that the print queue for at least one of the plurality of three-dimensional printers can be stored in a variety of locations and manners (Fig. 30 and para [0268]-[0270], JQM 328, Job Objects 325). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Lum, because both references are directed to systems and methods for printing jobs, including printing images. Lum does not expressly disclose that the storage location is locally at the one of the plurality of three-dimensional printer or on the printer server. However, one having ordinary skill in the art would have recognized that such storage locations could be selected based on the desired system architecture based on the Lum architecture illustrated in Fig. 30.

Claims 53, 56-59 and 61-67 lack an inventive step under PCT Article 33(3) as being obvious over Lum in view of Loughran'4577.

Regarding claim 53, Lum discloses a system comprising: a web server configured to provide a user interface over a data network (para [0274], web service module; para [0273], user interface; para [0278], network), the user interface adapted to receive user preferences from a user (para [0277], subscriber preferences, which may be stored in subscriber database 335), and an identification of one or more fabrication resources coupled to the data network and suitable for fabricating objects from the plurality of models (para [0243], The subscribing application may then obtain 172, from the IDev, a list of reportable events that the IDev is capable of identifying for notification purposes), a prioritization of content from the plurality of sources (para [0089], reprioritize or delete jobs); a database to store the user preferences (para [0277], subscriber preferences, which may be stored in subscriber database 335), and to receive and store the plurality of models as they are issued by the plurality of sources (para [0186], [0229], [0237], [0270], e.g., a relationship between centralized and distributed databases allowing for various system configurations); a processor configured [to] select a selected one of the plurality of models for fabrication based upon the prioritization (para [0083], Job Status - an RCD application can retrieve the current job queue and history information and reprioritize or delete jobs in the queue; para [0273], e.g., relates the processor to user interface functionality); and a print server configured to communicate with the one or more fabrication resources through the data network (para [0046], interfaces and architecture that integrate imaging devices with remote computing device applications and environments . . . Software functions that are not practical within the imaging device can be performed on the server but are accessible from the imaging device), to determine an availability of the one or more fabrication resources (para [0060], The imaging device may periodically try to contact the External Authorization server until it is available), and to transmit the selected one of the plurality of models to one of the one or more fabrication resources (para [0192], The imaging device may also receive data that was stored on a remote computing device, such as a file server, in response to processing the user input). Lum does not expressly disclose that the models are three-dimensional models. However, Loughran'4577 discloses three-dimensional models (para [0001], The scheduling of jobs on a machine such as a fabrication machine). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Lum and Loughran'4577, because both references are directed to systems and methods for printing jobs, including printing images. Furthermore, users benefit from systems that allow for printing three-dimensional jobs, because such systems allow for printing jobs with depth perception, such as images, fabrication jobs, and the like. The combination of Lum and Loughran'4577 does not expressly disclose that the interface is adapted to perform the steps utilizing the plurality of sources. However, Lum further discloses including a subscription to a plurality of sources of a plurality of models (para [0241]-[0242], e.g., a subscription process based on event type and job ID; para [0047], e.g., multi-functional peripheral device), but one having ordinary skill in the art would have recognized that the steps disclosed by Lum could be applied to the plurality of sources, based on the inclusive disclosure of the multi-functional peripheral device (Lum, para [0047]) and routine experimentation based on the configurations required and suitable for the particular system.

Regarding claim 56, the combination of Lum and Loughran'4577 does not expressly disclose that prioritizing content includes prioritizing the content according to source. However, one having ordinary skill in the art would have recognized that sources may be associated with urgency and would have enabled prioritizing content according to source to make sure that sources associated with fabrication required immediately, or with short lead-time, could be prioritized higher than other sources.

Regarding claim 57, in the combination of Lum and Loughran'4577, Loughran'4577 further discloses that each one of the plurality of sources has a type, and wherein prioritizing content includes prioritizing the content according to the type (para [0154], The scheduling heuristics 56 can include machine selection if there are multiple machines 40 of the same type or function). One having ordinary skill in the art would have recognized that, since the heuristics can schedule machines by type, priority could be assigned to sources of the same type as for an available machine.

Regarding claim 58, in the combination of Lum and Loughran'4577, Loughran'4577 further discloses that each one of the three-dimensional models has a type, and wherein prioritizing the content includes prioritizing the content according to the type (claim 19, said plurality of job input characteristics comprising an input type; para [0111], By identifying the input type, the system 20 could then know not to schedule that particular job until after the resource had arrived).

Regarding claim 59, the combination of Lum and Loughran'4577 does not expressly disclose that the processor is further configured to select two or more of the plurality of three-dimensional models for concurrent fabrication by two or more of the plurality of fabrication resources based upon the prioritization when a priority of the two or more of the plurality of three-dimensional models exceeds a predetermined threshold. However, one having ordinary skill in the art would have recognized that many fabrication facilities are capable of fabricating more than one product at any one time. It would have been obvious to allow prioritization of two or more models concurrently when the priority of the associated two or more projects exceed a predetermined threshold.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 61, the combination of Lum and Loughran'4577 does not expressly disclose that one of the plurality of sources includes a source of paid content. However, one having ordinary skill in the art would have recognized that sources can include sources of paid as well as free or substantially free content. It would have been obvious to one having ordinary skill in the art to include a source of paid content since some paid sources provide improved accuracy, detail, calibration, etc.

Regarding claim 62, the combination of Lum and Loughran'4577 does not expressly disclose that one of the plurality of sources includes a source of promotional content. However, one having ordinary skill in the art would have recognized that sources can include sources of promotional as well as unbiased or non-affiliated content. It would have been obvious to one having ordinary skill in the art to include a source of promotional content since some such sources are subsidized by the promoting entity.

Regarding claims 63 and 64, the combination of Lum and Loughran'4577 does not expressly disclose that one of the plurality of sources includes a source of product support content, including at least one of replacement parts and upgrade parts. However, one having ordinary skill in the art would have recognized that sources can include sources of product support content. It would have been obvious to one having ordinary skill in the art to include a source of product support content since users can benefit from product support, for example, from the vendor of the modeling tool. Furthermore, users can benefit from access to vendor sources associated with replacement as well as upgrade parts in case the performance of the tool used is unsatisfactory to the user.

Regarding claim 65, the combination of Lum and Loughran'4577 does not expressly disclose that one of the plurality of sources includes a source of contest prizes. However, one having ordinary skill in the art would have recognized that sources can include sources of promotional content, including sources of contest prizes. It would have been obvious to one having ordinary skill in the art to include a source of promotional content, such as a source of contest prizes, since some such sources are subsidized by the promoting entity and may motivate the user to try new features of a modeling tool.

Regarding claim 66, the combination of Lum and Loughran'4577 does not expressly disclose that the processor is further configured to identify one or more additional sources of content based upon a similarity to one of the plurality of sources of content. However, one having ordinary skill in the art would have recognized that sources of a similar content can be included. It would have been obvious to include such sources, for example, to encourage users to try competing products or modeling tools.

Regarding claim 67, the combination of Lum and Loughran'4577 does not expressly disclose that the processor is further configured to identify one or more additional sources of content based upon a social graph of the user. However, one having ordinary skill in the art would have recognized that sources can include additional sources based on the user social graph or demographic, because users may be more likely to try sources, such as sources having competing content, when those sources are utilized by others with similar demographics to the targeted user.

Claims 103, 106, 107, 109-114, 116-118 and 120-122 lack an inventive step under PCT Article 33(3) as being obvious over Yanagisawa in view of Loughran'4577.

Regarding claim 103, Yanagisawa discloses a system comprising: a three-dimensional printer including a build volume (para [0012], stereolithographic shaping apparatus; para [0027], shaping table, three-dimension positioning); a video camera directed toward the build volume and configured to provide a video feed of the build volume (para [0098], such as a CCD camera for detecting a position of the shaping table 96 of the table supporting unit 90 and a shape of a shaped article formed on the shaping table 96). Yanagisawa does not expressly disclose: a processor coupled to the three-dimensional printer, the processor configured to provide a web server that serves a web page displaying the video feed; and a network interface configured to couple the three-dimensional printer and the processor in a communicating relationship with a data network. However, Loughran'4577 discloses: a processor coupled to the three-dimensional printer (para [0037], computer network configuration, or other device capable of supporting the programming logic needed for the system; claim 23, wherein said job scheduling application is in communication with one or more fabrication machines), the processor configured to provide a web server that serves a web page displaying the video feed (para [0031], interfaces 26 include operating systems, web browsers, and other types of application software; para [0040], the controller 44 could host the scheduling application 32, including a web view if desired); and a network interface configured to couple the three-dimensional printer and the processor in a communicating relationship with a data network (para [0037], computer network configuration, or other device capable of supporting the programming logic needed for the system; claim 23, wherein said job scheduling application is in communication with one or more fabrication machines). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Yanagisawa and Loughran'4577, because both references are directed to systems and methods for shaping and viewing three-dimensional objects. Furthermore, users benefit from systems that allow for viewing a video feed over a network interface, because such systems increase the flexibility and utility of the system for a user working remotely from the object.

Regarding claim 106, the combination of Yanagisawa and Loughran'4577 does not expressly disclose that the web server is configured to host a remote user of the three-dimensional printer through the network interface. However, one having ordinary skill in the art would have recognized that remote users are often connected to resources through a network interface. It would have been obvious to one having ordinary skill in the art to utilize a network interface to connect users to remote printers, because such network interface add security features to the printer connection.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

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Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 107, the combination of Yanagisawa and Loughran'4577 does not expressly disclose that the web server displays status information from one or more sensors of the three-dimensional printer. However, one having ordinary skill in the art would have recognized that status information could be obtained from one or more sensors associated with the printer. It would have been obvious to include sensor status, such as weight sensor status indicating out-of-paper status, heat sensor status indicating overheating-printer status, or the like, in the web server display in order to provide remote printer users additional information about the printer.

Regarding claim 109, the combination of Yanagisawa and Loughran'4577 does not expressly disclose that the web server is configured to provide queue information for the three-dimensional printer. However, one having ordinary skill in the art would have recognized that users benefit from the inclusion of queue information of their submitted jobs, because such status informs remote users of when to leave their workstation to pick up completed jobs at the printer location.

Regarding claim 110, in the combination of Yanagisawa and Loughran'4577, Loughran'4577 further discloses that a queue for the three-dimensional printer is stored locally at the three-dimensional printer (para [0028]). In embodiments of the system 20 where the user 22 is also the operator 46 of the machine 40, the access device 24 can be the same device as the controller 44 for the machine 40).

Regarding claim 111, in the combination of Yanagisawa and Loughran'4577, Loughran'4577 further discloses that a queue for the three-dimensional printer is stored at a remote database (para [0154], data mining, schedule).

Regarding claim 112, the combination of Yanagisawa and Loughran'4577 does not expressly disclose a second video camera directed toward other hardware associated with the printer, and providing a second video feed for display in the web page. However, one having ordinary skill in the art would have recognized that once the infrastructure for providing a first video camera with a first video feed has been incorporated into the system architecture, additional video cameras and associated feeds could easily have been added. It would have been obvious to include additional video cameras and feeds, for example, to allow systems administrators to monitor remote hardware not of direct interest to users.

Regarding claims 113 and 114, the combination of Yanagisawa and Loughran'4577 does not expressly disclose that the network interface includes hardware for short range data communications and a wired or wireless Ethernet interface. However, one having ordinary skill in the art would have recognized that short range data communications, such as Bluetooth, and wired as well as wireless Ethernet interfaces were well-established in the art at the time of Applicant's claimed invention. It would have been obvious to include an interface that utilized established technologies to minimize installation and maintenance trouble-shooting.

Regarding claim 116, the combination of Yanagisawa and Loughran'4577 does not expressly disclose that the processor is configured to autonomously connect to a data network to retrieve printable content. However, one having ordinary skill in the art would have recognized that autonomous retrieval of printable content would be preferred over manual retrieval of such content. It would have been obvious to retrieve printable content in an autonomous fashion to allow less computer-savvy printer users to utilize the system seamlessly.

Regarding claims 117 and 118, the combination of Yanagisawa and Loughran'4577 does not expressly disclose that the processor is configured to respond to a remote request for status and availability of the three-dimensional printer. However, one having ordinary skill in the art would have recognized that users benefit from being able to request status and availability of a printer remotely. It would have been obvious to include status and availability response functionality to minimize the interruption to remote users otherwise having to walk over to the printer location to obtain such information.

Regarding claim 120, the combination of Yanagisawa and Loughran'4577 does not expressly disclose that the processor is configured to provide open access to a remote user. However, one having ordinary skill in the art would have recognized that certain remote users might be permitted open access, for example, systems administrators working remotely. It would have been obvious to permit open access to at least select users for systems maintenance and administrative purposes.

Regarding claim 121, the combination of Yanagisawa and Loughran'4577 does not expressly disclose a three-dimensional scanner directed toward the build volume and configured to extract three-dimensional information from the build volume. However, one having ordinary skill in the art would have recognized that the video camera disclosed by Yanagisawa (para [0098]) could include scanning functionality and that such functionality could have been utilized to extract various characteristics of the build volume. It would have been obvious to utilize a video camera having scanning to generate images of the build volume and to thereafter extract characteristics of the build volume from such images in order to increase the utility of the video camera already included in the system.

Regarding claim 122, the combination of Yanagisawa and Loughran'4577 does not expressly disclose that the processor is further configured to obtain status information for the working volume and display the status information on the web page. However, one having ordinary skill in the art would have recognized that users benefit from status information being available on the web page, because such status allows colleagues, working on associated features of the model, as well as colleagues responsible for stages later in the fabrication process, to ascertain the status of the working model and to modify their schedules and activities accordingly.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient,

Continuation of:

Box No. V.2 Citations and explanations:

Claims 153, 154, 209, 210, 219 and 220 lack an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of US 2006/0095152 A1 to Loughran (hereinafter Loughran'5152).

Regarding claim 153, Loughran'4577 does not expressly disclose that the plurality of three-dimensional printers include a fused deposition modeling printer. However, Loughran'5152 discloses that the plurality of three-dimensional printers include a fused deposition modeling printer (para [0015], SFF system 104 may be or include . . . a fused deposition modeling SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Loughran'5152, because both references are directed to systems and methods for fabrication of three-dimensional objects. Furthermore, users benefit from systems that allow for multiple types of modeling, including fused deposition modeling, because such systems reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

Regarding claim 154, Loughran'4577 does not expressly disclose that the plurality of three-dimensional printers include a stereo lithography printer. However, Loughran'5152 discloses that the plurality of three-dimensional printers include a stereo lithography printer (para [0015], SFF system 104 may be or include . . . a stereo lithography SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Loughran'5152, because both references are directed to systems and methods for fabrication of three-dimensional objects. Furthermore, users benefit from systems that allow for multiple types of printers, including a stereo lithography printer, because such systems reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

Regarding claim 209, Loughran'4577 does not expressly disclose that at least one of the plurality of three-dimensional printers is a fused deposition modeling printer. However, Loughran'5152 discloses that at least one of the plurality of three-dimensional printers is a fused deposition modeling printer (para [0015], a fused deposition modeling SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Loughran'5152, because both references are directed to systems and methods for managing three-dimensional fabrication jobs. Furthermore, users benefit from systems that allow for multiple types of modeling, including fused deposition modeling, because such systems reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

Regarding claim 210, Loughran'4577 does not expressly disclose that at least one of the plurality of three-dimensional printers is a stereo lithography printer. However, Loughran'5152 discloses that at least one of the plurality of three-dimensional printers is a stereo lithography printer (para [0015], a stereo lithography SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Loughran'5152, because both references are directed to systems and methods for fabrication of three-dimensional objects. Furthermore, users benefit from systems that allow for multiple types of printers, including a stereo lithography printer, because such systems reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

Regarding claim 219, Loughran'4577 does not expressly disclose that at least one of the plurality of three-dimensional printers is a fused deposition modeling printer. However, Loughran'5152 discloses that at least one of the plurality of three-dimensional printers is a fused deposition modeling printer (para [0015], a fused deposition modeling SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Loughran'5152, because both references are directed to systems and methods for managing three-dimensional fabrication jobs. Furthermore, users benefit from systems that allow for multiple types of modeling, including fused deposition modeling, because such systems reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

Regarding claim 220, Loughran'4577 does not expressly disclose that at least one of the plurality of three-dimensional printers is a stereo lithography printer. However, Loughran'5152 discloses that at least one of the plurality of three-dimensional printers is a stereo lithography printer (para [0015], a stereo lithography SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Loughran'5152, because both references are directed to systems and methods for fabrication of three-dimensional objects. Furthermore, users benefit from systems that allow for multiple types of printers, including a stereo lithography printer, because such systems reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

Claims 163, 165-167 and 169 lack an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of US 2007/0124436 A1 (Shepherd).

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 163, Loughran'4577 discloses a system comprising: a print server coupled through a data network to a plurality of three-dimensional printers (para [0001], The scheduling of jobs on a machine such as a fabrication machine; para [0037]-[0038], e.g., device 30 being an application server interacting with scheduling application 32 and with user interface 26, collectively, comprising a print server for the networked machines or printers), the print server configured to receive status information from each one of the plurality of three-dimensional printers (para [0033], status metrics; para [0099], machine maintenance characteristics . . . a maintenance status) and to manage a print queue for each one of the plurality of three-dimensional printers (para [0037]-[0038], e.g., together the application device and scheduling application comprise a print server which manages the queue or schedule 34); and a database coupled in a communicating relationship with the print server and configured to store print queue data, status information (para [0154], e.g., data mining tracks machines, users, schedules). Loughran'4577 does not expressly disclose: a printer location for each one of the plurality of three-dimensional printers, wherein the print server is configured to determine a location of a mobile system transmitting a print request to the print server, and to select one of the plurality of three-dimensional printers for executing the print request based upon a proximity of the printer location to the location of the mobile system. However, Shepherd discloses: a printer location for each one of the plurality of three-dimensional printers (para [0010], memory contains printer locations for preconfigured printers), wherein the print server is configured to determine a location of a mobile system transmitting a print request to the print server (para [0003], a print server comprising a submission processor configured to receive a print request, a positioning processor configured to track a global position of a mobile computing device), and to select one of the plurality of three-dimensional printers for executing the print request based upon a proximity of the printer location to the location of the mobile system (para [0034], data mining and/or a knowledge-base is used to predict the path of the mobile user and select an appropriate printer based upon this prediction). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Shepherd, because both references are directed to systems and methods for printing jobs from networked remote locations, including from mobile devices. Furthermore, users benefit from systems capable of determining the location of the remote requester and selecting the most suitable printer based upon that location, because such systems reduce the time and effort for users to pick up completed print jobs from printers located far away from their desks.

Regarding claim 165, in the combination of Loughran'4577 and Shepherd, Shepherd further discloses that the mobile system includes at least one of a cellular phone and a smart phone (para [0016], wireless phone).

Regarding claim 166, in the combination of Loughran'4577 and Shepherd, Shepherd further discloses that the mobile system includes location awareness technology (para [0019], a mobile computing device 12 is equipped with a global positioning component 14 . . . GPS).

Regarding claim 167, in the combination of Loughran'4577 and Shepherd, Shepherd further discloses that the mobile system includes a Global Positioning System (para [0019], GPS).

Regarding claim 169, in the combination of Loughran'4577 and Shepherd, Shepherd further discloses that the print server is configured to initiate a print job based upon the print request at one of the plurality of three-dimensional printers closest to the printer location (para [0007], both the print location and the print time are determined by the print server).

Claims 172, 175, 177, 178, 180 and 181 lack an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of US 2004/0203872 A1 (Bajikar).

Regarding claim 172, Loughran'4577 discloses a system comprising: a three-dimensional printer including a network interface (para [0001], The scheduling of jobs on a machine such as a fabrication machine), the three-dimensional printer configured to receive a request to execute a print job from a user through the network interface (para [0037], computer network configuration, or other device capable of supporting the programming logic needed for the system), and a processor that controls the three-dimensional printer (para [0091], In some embodiments, the interface 26 allows users 22 to drag-drop a CAD file (or other design 54) into an existing reservation on the calendar view 38 . . . with a choice of providers and/or machines 40). Loughran'4577 does not expressly disclose that the processor configured to conditionally authorize execution of the print job based upon a location of the user. However, Bajikar discloses that the processor configured to conditionally authorize execution of the print job based upon a location of the user (para [0031], correlated to distance . . . before a device is authorized to transmit data over a network). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577 and Bajikar, because both references are directed to systems and methods for printing jobs from networked remote locations, including from mobile devices. Furthermore, users benefit from systems capable of authorizing the execution of print jobs only conditionally, because such systems can be used to limit users to printers close to their current work area, thereby avoiding unintentional queuing of print jobs to a default printer when the user is working away from his or her normal work area.

Regarding claim 175, in the combination of Loughran'4577 and Bajikar, Bajikar further discloses that the location of the user is based upon a mobile system operated by the user (para [0012], 'mobile client device is a node on a WLAN that may be physically moved with some ease from location to location and is operated by an end user; para [0020], the mobile client device may determine or estimate the distance).

Regarding claim 177, in the combination of Loughran'4577 and Bajikar, Bajikar further discloses that the mobile system includes at least one of a laptop computer and a tablet (para [0029], laptop).

Regarding claim 178, in the combination of Loughran'4577 and Bajikar, Bajikar further discloses that the mobile system includes location awareness technology (para [0035], the mobile client device is able to estimate its location).

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

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Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 180, in the combination of Loughran'4577 and Bajikar, Bajikar further discloses that the processor conditionally authorizes execution of the print job only when the user is near a predetermined location (para [0034], transmit that location to a print server in order to print to the nearest printer).

Regarding claim 181, in the combination of Loughran'4577 and Bajikar, Bajikar further discloses that the predetermined location includes a geofenced area (para [0030], Bluetooth standards; para [0027], This attenuation of signal strength may be correlated to the distance of the mobile client device from the transmitting device). One having ordinary skill in the art would have recognized that a geofence could be established centered at a predetermined location based on the signal strength and a desired radius therefrom based on the particular application.

Claims 183-188, 191-197 and 199-202 lack an inventive step under PCT Article 33(3) as being obvious over US 2006/0111807 A1 to Gothait et al. (hereinafter Gothait) in view of US 2007/0061393 A1 (Moore).

Regarding claim 183, Gothait discloses a system comprising: a three-dimensional printer including a build volume (para [0014], systems and methods for calibration of drop volume in 3-D selective deposition model printing apparatus); a video camera directed toward the build volume (para [0061], video camera . . . object being created); and a user interface for the three-dimensional printer (para [0085], may perform self-calibration, upon request by a user), the user interface including a first control to capture data from the video camera including a stop-motion animation of a fabrication of an object on the three-dimensional printer (para [0061], video camera, still camera . . . images of an object being created). Gothait does not expressly disclose that the user interface includes a second control to share the data with a social network platform. However, Moore discloses that the user interface includes a second control to share the data with a social network platform (para [0088], any digital media including still or moving images, audio, application-specific file formats, and so on; para [0089], The term syndication is intended to refer to publication, republication, or other distribution of content using any suitable technology; para [0243], e.g., social networking interface enables syndication of content). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Gothait and Moore, because both references are directed to systems and methods for document and print management. Furthermore, users benefit from the ability to share their printing capabilities with social network contacts, because such sharing stimulates innovation and creativity (Moore, para [0061]).

Regarding claim 184, the combination of Gothait and Moore does not expressly disclose that the user interface is deployed as a web page served by the three-dimensional printer. However, one having ordinary skill in the art would have recognized that web pages were well-established as user interfaces for remote users at the time of Applicant's claimed invention. It would have been obvious to deploy the user interface as a web page for scalability and easy integration of additional remote users.

Regarding claims 185 and 186, the combination of Gothait and Moore does not expressly disclose that the user interface is deployed as a web page served by a remote print server, and that the user interface includes a group of controls for operation of the three-dimensional printer by a remote user. However, one having ordinary skill in the art would have recognized that web pages and remote print servers were well-established as user interfaces for remote users at the time of Applicant's claimed invention. It would have been obvious to deploy the user interface as a web page served by a remote print server, for scalability and easy integration of additional remote users. Moreover, printer users require more than one control for operation of the printer, such as controls for cancelling, submitting and suspending or changing the priority of a print job as well as controls for identifying status and settings and altering settings, for example, to print on a different size of paper. It would have been obvious to include similar controls for remote users of the printer.

Regarding claims 187 and 188, the combination of Gothait and Moore does not expressly disclose that the user interface includes a second control for a frame rate and a duration of the stop-motion animation. However, one having ordinary skill in the art would have recognized that a separate, second, control could have been included for stop-motion animation, and to make such a second control available only to users with the credentials to utilize stop-motion animation functionality. It would have been obvious to include frame rate and duration of the stop-motion animation as part of the second control, because frame rate and duration are characteristics of interest to control as part of animation functionality.

Regarding claim 191, the combination of Gothait and Moore does not expressly disclose that the user interface includes a search tool for searching one or more databases of printable objects. However, one having ordinary skill in the art would have recognized that database search tools were well-established at the time of Applicant's claimed invention. It would have been obvious include such a tool in the user interface in order to provide users with adequate functionality to utilize the database.

Regarding claim 192, the combination of Gothait and Moore does not expressly disclose that the user interface includes a queue management tool for managing one or more pending prints. However, one having ordinary skill in the art would have recognized that queue management was a basic function for pending print jobs. It would have been obvious to one having ordinary skill in the art to include such a tool in order to allow remote users to cancel, suspend or change the priority of pending prints.

Regarding claims 193, 194 and 195, the combination of Gothait and Moore does not expressly disclose that the user interface includes a status tool for receiving a user specification of one or more preferences for receiving status updates, and that the one or more preferences include notification by electronic mail and instant text message. However, one having ordinary skill in the art would have recognized that remote users may have different preferences for receiving status updates, and that such preferences could include email or instant text messages. It would have been obvious to include such preferences in order to accommodate users frequently away from their workstations and then utilizing a mobile device to obtain status information.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 196, the combination of Gothait and Moore does not expressly disclose that the user interface includes a tool for managing one or more subscriptions to content. However, one having ordinary skill in the art would have recognized that users might want to add or cancel a subscription to content, for example, when changing work project. It would have been obvious to include a tool to manage subscriptions to content in order to provide comprehensive functionality for remote users, regardless of the nature of their current work project.

Regarding claim 197, the combination of Gothait and Moore does not expressly disclose that the user interface includes a web page that displays status information from one or more sensors of the three-dimensional printer. However, one having ordinary skill in the art would have recognized that status information could be obtained from one or more sensors associated with the printer. It would have been obvious to include sensor status, such as weight sensor status indicating out-of-paper status, heat sensor status indicating overheating-printer status, or the like, in the web server display in order to provide remote printer users additional of the printer.

Regarding claim 199, the combination of Gothait and Moore does not expressly disclose that the user interface includes a web page that displays a queue for the three-dimensional printer. However, one having ordinary skill in the art would have recognized that users benefit from the inclusion of queue information of their submitted jobs, because such status informs remote users of when to leave their workstation to pick up completed jobs at the printer location.

Regarding claim 200, the combination of Gothait and Moore does not expressly disclose that the user interface includes a web page configured to display a video feed from the video camera. However, one having ordinary skill in the art would have recognized that a video feed from a video camera could be added to the user interface in order to allow users to trouble-shoot the printer from their remote work location. It would have been obvious to include such a video feed, for example, to easily and quickly detect an overheating printer or a paper jam.

Regarding claim 201, the combination of Gothait and Moore does not expressly disclose that the user interface includes a second tool to capture a photograph from the video camera and to forward the photograph to the social networking platform. However, one having ordinary skill in the art would have recognized that a separate, second, tool could have been included in connection with the video camera for a secondary purpose. It would have been obvious to include such a second tool in order to permit users to engage is some, albeit limited, use of the video camera for social or collegial purposes.

Regarding claim 202, the combination of Gothait and Moore does not expressly disclose that the social networking platform includes at least one of Flickr, Twitter, LinkedIn, Google+, and Facebook. However, one having ordinary skill in the art would have recognized that Flicks, Twitter, LinkedIn, Google+ and Facebook were all well-established social networking platforms at the time of Applicant's claimed invention. It would have been obvious to select at least one of these platforms as the social networking platform to be included in the system.

Claims 3, 4 and 26 lack an inventive step under PCT Article 33(3) as being obvious over Menchik in view of Loughran'4577, further in view of US 2009/0164379 A1 to Jung et al. (hereinafter Jung).

Regarding claim 3, the combination of Menchik and Loughran'4577 does not expressly disclose that evaluating the availability includes assessing the availability according to a receiving state for the three-dimensional printer. However, Jung discloses that evaluating the availability includes assessing the availability according to a receiving state for the three-dimensional printer (para [0060], which provides for comparing the digital rights management code to a machine identifier associated with the one or more manufacturing machines). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Menchik, Loughran'4577 and Jung, because all three references are directed to systems and methods for printing jobs, including jobs including multi-dimensional objects. Furthermore, users benefit from methods that allow for assessing a receiving state of the printer, because such methods improve efficiency by allowing users to select a different printer if one printer is unavailable or busy.

Regarding claim 4, in the combination of Menchik, Loughran'4577 and Jung, Jung further discloses that the receiving state is selected from a group consisting of open, closed, or authenticated (para [0060]), to determine whether any of the one or more manufacturing machines is authorized to produce an object described in the object data files).

Regarding claim 26, the combination of Menchik and Loughran'4577 does not expressly disclose securing the print job using a digital rights management technique [that] restricts execution of the print job to one or more predetermined three-dimensional printers, wherein evaluating the availability of the three-dimensional printer includes determining whether the three-dimensional printer is one of the one or more predetermined three-dimensional printers. However, Jung discloses securing the print job using a digital rights management technique [that] restricts execution of the print job to one or more predetermined three-dimensional printers (para [0012], regarding compliance with the licensing restriction), wherein evaluating the availability of the three-dimensional printer includes determining whether the three-dimensional printer is one of the one or more predetermined three-dimensional printers (para [0033], which can be a list of digital rights management codes, a list of object data files, or any list that could be, for example, associated with multiple manufacturing machines 290 that require multiple authorization rights to be analyzed or the like). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Menchik, Loughran'4577 and Jung, because all three references are directed to systems and methods for printing jobs, including jobs including multi-dimensional objects. Furthermore, users benefit from methods that allow for restricts printing to one or more specific printers, because such methods improve efficiency by restricting access to highly desirable printers, such as three-dimensional printers, to users having a need for such specific printers.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Claim 30 lacks an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of Menchik, further in view of Jung.

Regarding claim 30, the combination of Loughran'4577 and Menchik does not expressly disclose a processor configured to store a plurality of print jobs submitted to the web server in a log and to provide an analysis of print activity based on the log. However, Jung discloses a processor configured to store a plurality of print jobs submitted to the web server in a log and to provide an analysis of print activity based on the log (para [0032], [0054], determining a usage status according to a compiling history of the object data files, the compiling history providing data related to a prior manufacturing history). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Menchik and Jung, because all three references are directed to systems and methods for printing jobs, including jobs including multi-dimensional objects. Furthermore, systems operators benefit from methods that allow for storing print jobs to a log and analyzing that log, because such analysis of historical use allow for reconfiguring the security and access setting of available printers to improve efficiency and to load-balance available printers.

Claims 8 and 13 lack an inventive step under PCT Article 33(3) as being obvious over Menchik in view of Loughran'4577, further in view of Yanagisawa.

Regarding claim 8, in the combination of Menchik and Loughran'4577, Loughran'4577 further discloses receiving a manual confirmation to proceed with the print job from the requester (para [0051], manual), and multiple views of design (para [0045]). The combination of Menchik and Loughran'4577 does not expressly disclose that evaluating the availability of the three-dimensional printer includes transmitting an image of the three-dimensional printer to the requester. However, Yanagisawa discloses that evaluating the availability of the three-dimensional printer includes transmitting an image of the three-dimensional printer to the requester (para [0098], image of work volume (therefore obvious of machine)). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Menchik, Loughran'4577 and Yanagisawa, because all three references are directed to systems and methods for manipulating objects, such as three-dimensional objects, the manipulating including printing views thereof. Furthermore, users benefit from methods that allow the user to observe a view of the printer of interest, because such methods improve efficiency by allowing a user to assess the status of a desired printer without having to leave his or her desk.

Regarding claim 13, the combination of Menchik and Loughran'4577 does not expressly disclose that the plurality of sensors includes an optical sensor that detects obstructions within a working volume of the three-dimensional printer. However, Yanagisawa discloses that the plurality of sensors includes an optical sensor that detects obstructions within a working volume of the three-dimensional printer (para [0098], image recognizing section (not shown), such as a CCD camera for detecting a position of the shaping table 96 of the table supporting unit 90 and a shape of a shaped article formed on the shaping table 96. The image recognizing section is for accurately measuring a shape of the shaped article). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Menchik, Loughran'4577 and Yanagisawa, because all three references are directed to systems and methods for manipulating objects, such as three-dimensional objects, the manipulating including printing views thereof. Furthermore, users benefit from methods that allow for accurately measuring a shape, because such methods also detect when the shape is represented by an obstacle rather than by the formed object.

Claim 12 lacks an inventive step under PCT Article 33(3) as being obvious over Menchik in view of Loughran'4577, further in view of Gothait.

Regarding claim 12, the combination of Menchik and Loughran'4577 does not expressly disclose that the plurality of sensors includes a video camera directed toward a working volume of the three-dimensional printer. However, Gothait discloses the plurality of sensors includes a video camera directed toward a working volume of the three-dimensional printer (para [0061], 3-D printer 1 may optionally include . . . video camera . . . to acquire one or more images of an object being created). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Menchik, Loughran'4577 and Gothait, because all three references are directed to systems and methods for document and print management, such as three-dimensional objects, the manipulating including printing views thereof. Furthermore, users benefit from methods that enable the user to observe a video image of the printer, because such methods allow users to trouble shoot the printer remotely, for example, visually assess that the printer is jammed.

Claim 43 lacks an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of Menchik, further in view of US 2011/0137578 A1 to Dietrich et al. (hereinafter Dietrich).

Regarding claim 43, the combination of Loughran'4577 and Menchik does not expressly disclose that the user interface is adapted to display a current tool path of one of the plurality of three-dimensional printers that executes the print job. However, Dietrich discloses that the user interface is adapted to display a current tool path of one of the plurality of three-dimensional printers that executes the print job (para [0057], The bead width may be dictated by the FDM user to provide a width to the toolpaths taken by the process; para [0044], One or multiple tool path geometries may be explored within a single build of the Z-axis test coupon structure 1). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Menchik and Dietrich, because all three references are directed to systems and methods for modeling, manipulating and printing objects, including three-dimensional objects intended for fabrication. Furthermore, devices that allow designers to view a model from various angles and to display a current tool path improve the ability to view the model as layers or additional aspects are added one at a time (Dietrich, para [0005]).

-- See next Supplemental Box --

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Claim 45 lacks an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of Menchik, further in view of Yanagisawa.

Regarding claim 45, the combination of Loughran'4577 and Menchik does not expressly disclose that the status information presented in the user interface includes an image of a working volume of one of the three-dimensional printers that is executing the print job. However, Yanagisawa discloses that the status information presented in the user interface includes an image of a working volume of one of the three-dimensional printers that is executing the print job (para [0098], e.g., a feedback operation which implies operation during the execution of the print job). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Menchik and Yanagisawa, because all three references are directed to systems and methods for manipulating objects, such as three-dimensional objects, the manipulating including printing views thereof. Furthermore, users benefit from devices that allow for the image of the working volume to function as monitoring tool utilizing one of the sensors and associated status information recited in Applicant's claim 29.

Claims 54, 55 and 60 lack an inventive step under PCT Article 33(3) as being obvious over Lum in view of Loughran'4577, further in view of Jung.

Regarding claim 54, the combination of Lum and Loughran'4577 does not expressly disclose that the one or more fabrication resources include a private fabrication resource, and that the user provides, as a user preference prior to use of the private fabrication resource, credentials for accessing the private fabrication resource. However, Jung discloses that the one or more fabrication resources include a private fabrication resource (para [0094], a private party ownership agreement), and that the user provides, as a user preference prior to use of the private fabrication resource, credentials for accessing the private fabrication resource (para [0094]). In another embodiment, verification module 630 is configured for verifying authorization code(s) 620 to determine a payment status and/or an authorization status under a permission agreement 674). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Lum, Loughran'4577 and Jung, because all three references are directed to systems and methods for printing jobs, including jobs including multi-dimensional objects. Furthermore, systems operators benefit from systems that require the user to provide credentials in order to access private, or non-public, resources, because such systems improve the security of the system.

Regarding claim 55, the combination of Lum and Loughran'4577 does not expressly disclose that the one or more fabrication resources include a commercial fabrication resource, and that the user provides, as a user preference prior to use of the commercial fabrication resource, an authorization to pay for use of the commercial fabrication resource. However, Jung discloses that the one or more fabrication resources include a commercial fabrication resource (para [0103], a royalty status), and that the user provides, as a user preference prior to use of the commercial fabrication resource, an authorization to pay for use of the commercial fabrication resource (para [0104], a determination of a payment status and/or an authorization status). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Lum, Loughran'4577 and Jung, because all three references are directed to systems and methods for printing jobs, including jobs including multi-dimensional objects. Furthermore, companies benefit from systems that require the user obtain authorization and pay for the use of commercial fabrication resources, because such systems improve the ability of the companies to share resources while profiting therefrom.

Regarding claim 60, the combination of Lum and Loughran'4577 does not expressly disclose that the processor is further configured to adjust the prioritization based upon a history of fabrication when a number of objects fabricated from one of the plurality of sources exceeds a predetermined threshold. However, Jung discloses that the processor is further configured to adjust the prioritization based upon a history of fabrication (para [0054], determining a usage status according to a compiling history of the object data files, the compiling history providing data related to a prior manufacturing history including a location of manufacturing history indicative of one or more of a number of locations of compilation and/or a number of compilations at a manufacturing location) when a number of objects fabricated from one of the plurality of sources exceeds a predetermined threshold (para [0062], number of times a license permits a manufacturing run). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Lum, Loughran'4577 and Jung, because all three references are directed to systems and methods for printing jobs, including jobs including multi-dimensional objects. Furthermore, systems administrators benefit from systems that allow for re-prioritizing jobs based on historical use, because such systems enable administrators to load-balance available resources.

Claims 69-72 lack an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of Lum, further in view of Jung.

Regarding claim 69, the combination of Loughran'4577 and Lum does not expressly disclose a memory configured to store a queue of one or more additional ones of the one or more three-dimensional models not selected for immediate fabrication. However, Jung discloses a memory configured to store a queue of one or more additional ones of the one or more three-dimensional models not selected for immediate fabrication (para [0032], Comparison module 260 can further interact with object data files residing in memory 252). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Lum and Jung, because all three references are directed to systems and methods for printing jobs, including jobs including multi-dimensional objects. Furthermore, systems administrators benefit from devices that allow for queuing jobs not needed immediately, because such devices enable administrators to load-balance available resources. Moreover, one having ordinary skill in the art would have recognized that the Jung comparison of digital rights management codes indicates that some stored object data files are not selected for immediate fabrication.

Regarding claim 70, the combination of Loughran'4577, Lum and Jung does not expressly disclose that the processor is further configured to evaluate a new three-dimensional model based upon the user preference for prioritization and to place the new three-dimensional model at a corresponding position in the queue. However, one having ordinary skill in the art would have recognized that updates and revisions to models not selected for immediate fabrication would also not be needed immediately.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 71, the combination of Loughran'4577 and Lum does not expressly disclose that the processor is configured to retrieve content from at least one of the plurality of sources by providing authorization credentials for the user. However, Jung discloses that the processor is configured to retrieve content from at least one of the plurality of sources by providing authorization credentials for the user (para [0094]. In another embodiment, verification module 630 is configured for verifying authorization code(s) 620 to determine a payment status and/or an authorization status under a permission agreement 674). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Lum and Jung, because all three references are directed to systems and methods for printing jobs, including jobs including multi-dimensional objects. Furthermore, companies benefit from systems that enforce agreements with users that require authorization and payment prior to accessing the resource, because such systems improve the ability of the companies to share resources under the terms of contracts while profiting therefrom.

Regarding claim 72, the combination of Loughran'4577 and Lum does not expressly disclose that the processor is configured to retrieve content from at least one of the plurality of sources by authorizing a payment from the user to a content provider. However, Jung discloses that the processor is configured to retrieve content from at least one of the plurality of sources by authorizing a payment from the user to a content provider (para [0094]. In another embodiment, verification module 630 is configured for verifying authorization code(s) 620 to determine a payment status and/or an authorization status under a permission agreement 674). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Lum and Jung, because all three references are directed to systems and methods for printing jobs, including jobs including multi-dimensional objects. Furthermore, companies benefit from systems capable of authorizing a payment the user has requested in order to access a resource, because such systems improve the ability of the companies to share resources under the terms of contracts while profiting therefrom.

Claims 80-86, 88, 89 and 91-102 lack an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of Yanagisawa, further in view of US 2007/0172112 A1 to Paley et al. (hereinafter Paley).

Regarding claim 80, Loughran'4577 discloses a device comprising: a network interface coupled to a data network (para [0037], computer network configuration, or other device capable of supporting the programming logic needed for the system; claim 23, wherein said job scheduling application is in communication with one or more fabrication machines); and a processor configured to receive a three-dimensional model through the network interface (para [0045], the schedule 34 includes an electronic model or design), and to control operation of the three-dimensional printer to fabricate the three-dimensional model as an object within the build volume of the three-dimensional printer (para [0045], the schedule 34 is the means by which a design is communicated to the machine 40, the schedule 34 will typically include all of the information needed for the machine 40 to generate the physical output 42 at the time that the machine 40 begins the particular job), the processor further configured to provide a user interface to a remote user accessing the device through the network interface (para [0023], the user 22 can schedule a machine 40 from a remote location), and to present in the user interface an image of the build volume from the camera (para [0045], display various images of various views of the design within the calendar view 38 of the schedule 34). Loughran'4577 does not expressly disclose: a three-dimensional printer including a build volume; a video camera positioned to capture video of the build volume from a point of view; and a two-dimensional projection of the three-dimensional model from the point of view of the video camera. However, Yanagisawa discloses: a three-dimensional printer including a build volume (para [0012], stereolithographic shaping apparatus; para [0027], shaping table, three-dimension positioning); and a video camera positioned to capture video of the build volume from a point of view (para [0098], such as a CCD camera for detecting a position of the shaping table 96 of the table supporting unit 90 and a shape of a shaped article formed on the shaping table 96). Furthermore, Paley discloses a two-dimensional projection of the three-dimensional model from the point of view of the video camera (para [0029], technology suitable for acquiring three-dimensional data, or two-dimensional data that can be resolved into three-dimensional data). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Yanagisawa and Paley, because all three references are directed to systems and methods for shaping and viewing three-dimensional objects. Furthermore, users benefit from devices that allow for viewing a 3D build volume, and a 2D projection thereof, because such devices increase the flexibility and utility of the system for a user working remotely from the object. Moreover, one having ordinary skill in the art would have recognized, after having added a camera as taught by Yanagisawa, that images from the build volume could also be presented in the user interface to verify build progress.

Regarding claim 81, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the two-dimensional projection is obtained from a three-dimensional scanner coupled to the processor. However, one having ordinary skill in the art would have recognized that two-dimensional projects can be generated from three-dimensional images in many ways. It would have been obvious to include 3D-to-2D projection capabilities in the scanner in order to improve the functionality and utility of the 3D scanner.

Regarding claim 82, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the two-dimensional projection is simulated based upon operation of the three-dimensional printer. However, one having ordinary skill in the art would have recognized that modeling tools frequently include simulation functionality. It would have been obvious to include the ability to simulate 3D-to-2D project capabilities in order to improve the functionality and utility of the 3D printer.

Regarding claim 83, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the processor is configured to monitor operation of the three-dimensional printer based upon a comparison of the two-dimensional projection with the image of the build volume. However, one having ordinary skill in the art would have recognized that accuracy to be ascertained and errors could be detected during the modeling process could be based on comparisons between 2D projects and associated 2D images of the build volume, preferably from multiple angles and perspectives. It would have been obvious to include such capabilities in the system in order to identify issues with the build volume at early stages of modeling.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

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Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 84, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the two-dimensional projection is dynamically updated to correspond to a state of physical completion of the object. However, one having ordinary skill in the art would have recognized that 2D projections of the object would need to be updated as work progresses. It would have been obvious to update the 2D projection dynamically as work on the object progressed in order to allow the user to access views of the model that correspond in level of completion.

Regarding claim 85, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the two-dimensional projection is a video image from the video camera. However, one having ordinary skill in the art would have recognized that video cameras are capable of capturing video images, and that such images can be 2D. It would have been obvious to utilize the video camera not only for video feeds but also for 2D projections in order to make the most use of the video camera incorporated in the system.

Regarding claim 86, in the combination of Loughran'4577, Yanagisawa and Paley, Loughran'4577 further discloses that the user interface provides at least one control for manual operation of the three-dimensional printer by the remote user (para [0051], manual embodiments . . . the system 20 relies on a human being to implement the schedule 34).

Regarding claim 88, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the user interface provides status information for the three-dimensional printer. However, one having ordinary skill in the art would have recognized that printer status information is of great importance to remote users. It would have been obvious to include printer status information in the user interface to enable remote users to view the status without having to walk to the printer location.

Regarding claim 89, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the user interface provides status information for a build process executing on the three-dimensional printer. However, one having ordinary skill in the art would have recognized that users benefit from status information being available on the user interface, because such status allows colleagues to ascertain when the execution of a build process is likely to be completed and to modify their schedules and activities accordingly.

Regarding claim 91, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the user interface supports remote access for technical support during local operation of the three-dimensional printer. However, one having ordinary skill in the art would have recognized that systems administrators benefit from being able to remotely access printers without interrupting local printing operations, because doing so allows technical support to be provided seamlessly from the perspective of remote printer users.

Regarding claim 92, in the combination of Loughran'4577, Yanagisawa and Paley, Loughran'4577 further discloses that the processor is configured to fabricate a test object (para [0045], schedule 34 will typically include all of the information needed for the machine 40 to generate the physical output 42; para [0049], user 22 can submit build jobs . . . directly by interacting with the calendar view 38); and Yanagisawa further discloses capturing an image of the test object (para [0098], provided with an image recognizing section), and comparing the image to the test object to validate operation of the three-dimensional printer (para [0098], accurately measuring a shape of the shaped article, and providing feedback to the subsequent stereolithographic shaping operation). One having ordinary skill in the art would have recognized that any object measured in this way could be a test object for validating the operation of the printer.

Regarding claim 93, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the user interface includes at least one control to capture a frame of data from the video camera as a video image and to transmit the video image to a remote location through the data network. However, one having ordinary skill in the art would have recognized that video cameras are capable of capturing video images from frames. It would have been obvious to utilize the video camera not only for video feeds but also to capture frames and to send such images or frames to remote locations, in order to allow technical support and systems administrators to trouble-shoot and perform maintenance without having to walk over to the printer.

Regarding claim 94, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the remote location is a social networking site. However, one having ordinary skill in the art would have recognized that the remote location could have been a social networking site. It would have been obvious to utilize remote locations comprising social networking sites, for example, if the images are not confidential to the company, and the use of well-established and free social networking sites could be utilized for sharing images and frames for some limited purposes.

Regarding claim 95, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the device is configured to transmit the video image in an electronic mail communication. However, one having ordinary skill in the art would have recognized that technology for attaching or otherwise incorporating video images in electronic mail was well-established at the time of Applicant's claimed invention. It would have been obvious to utilize a well-established mechanism for transmitting the video image.

Regarding claim 96, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the user interface includes at least one control to capture a stop-motion animation of a fabrication of the object using the video camera. However, one having ordinary skill in the art would have recognized that the video camera could be utilized to capture a variety of animations of objects. It would have been obvious to utilize the video camera already incorporated into the system to capture a stop-motion animation of the object in order to make the most use of existing system resources.

-- See next Supplemental Box --

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

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Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 97, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the processor is configured to couple the three-dimensional printer in a communicating relationship with a remote print server through the data network. However, one having ordinary skill in the art would have recognized that technology for coupling remote servers to printers were well-established at the time of Applicant's claimed invention. It would have been obvious to couple the server to the printer through the data network in order to make the best use of existing networks.

Regarding claim 98, Loughran'4577 discloses a method comprising: a network interface coupled to a data network (para [0037], computer network configuration, or other device capable of supporting the programming logic needed for the system; claim 23, wherein said job scheduling application is in communication with one or more fabrication machines); receiving a three-dimensional model through the network interface (para [0045], the schedule 34 includes an electronic model or design); fabricating the three-dimensional model as an object within the build volume of the three-dimensional printer (para [0045], the schedule 34 is the means by which a design is communicated to the machine 40, the schedule 34 will typically include all of the information needed for the machine 40 to generate the physical output 42 at the time that the machine 40 begins the particular job); and providing a user interface to a remote user accessing the device through the network interface (para [0023], the user 22 can schedule a machine 40 from a remote location), wherein the user interface presents an image of the build volume from the camera (para [0045], display various images of various views of the design within the calendar view 38 of the schedule 34). Loughran'4577 does not expressly disclose: providing a three-dimensional printer including a build volume, and a video camera positioned to capture video of the build volume from a point of view and a two-dimensional projection of the three-dimensional model from the point of view of the video camera. However, Yanagisawa discloses: providing a three-dimensional printer including a build volume (para [0012], stereolithographic shaping apparatus; para [0027], shaping table, three-dimension positioning), and a video camera positioned to capture video of the build volume from a point of view (para [0098], such as a CCD camera for detecting a position of the shaping table 96 of the table supporting unit 90 and a shape of a shaped article formed on the shaping table 96). Furthermore, Paley discloses a two-dimensional projection of the three-dimensional model from the point of view of the video camera (para [0029], technology suitable for acquiring three-dimensional data, or two-dimensional data that can be resolved into three-dimensional data). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Yanagisawa and Paley, because all three references are directed to systems and methods for shaping and viewing three-dimensional objects. Furthermore, users benefit from methods that allow for viewing a 3D build volume, and a 2D projection thereof, because such methods increase the flexibility and utility of the system for a user working remotely from the object. Moreover, one having ordinary skill in the art would have recognized, after having added a camera as taught by Yanagisawa, that images from the build volume could also be presented in the user interface to verify build progress.

Regarding claim 99, in the combination of Loughran'4577, Yanagisawa and Paley, Loughran'4577 further discloses transmitting status information over the data network upon completion of the object (para [0033], potentially relevant metrics include but are not limited to: (a) a variety of status metrics identifying in terms of resources and/or time what percentage of the work has been completed; para [0041], Notifications can be sent to users 22).

Regarding claim 100, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the status information includes data presented through the user interface. However, one having ordinary skill in the art would have recognized that printer status information is of great importance to remote users. It would have been obvious to include printer status information in the user interface to enable remote users to view the status without having to walk to the printer location.

Regarding claim 101, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the status information includes a digital image from the video camera. However, one having ordinary skill in the art would have recognized that the video camera could be utilized to capture a digital image of the printer, with the digital image indicating status information. It would have been obvious to utilize the video camera already incorporated into the system to capture a digital image comprising status information in order to make the most use of existing system resources.

Regarding claim 102, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the digital image is transmitted with an electronic mail communication confirming completion of the object. However, one having ordinary skill in the art would have recognized that technology for attaching or otherwise incorporating digital images in electronic mail was well-established at the time of Applicant's claimed invention. It would have been obvious to utilize electronic mail for transmitting the digital image indicating completion.

Claims 104 and 105 lack an inventive step as being obvious over Yanagisawa in view of Loughran'4577, further in view of Loughran'5152.

Regarding claim 104, the combination of Yanagisawa and Loughran'4577 does not expressly disclose that the three-dimensional printer is a fused deposition modeling printer. However, Loughran'5152 discloses that the three-dimensional printer is a fused deposition modeling printer (para [0015], a fused deposition modeling SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Yanagisawa, Loughran'4577 and Loughran'5152, because all three references are directed to systems and methods for shaping, manipulation and fabrication of three-dimensional objects. Furthermore, users benefit from systems that allow for multiple types of modeling, including fused deposition modeling, because such systems reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

-- See next Supplemental Box --

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 105, the combination of Yanagisawa and Loughran'4577 does not expressly disclose that the three-dimensional printer is a stereo lithography printer. However, Loughran'5152 discloses that the three-dimensional printer is a stereo lithography printer (para [0015], a stereo lithography SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Yanagisawa, Loughran'4577 and Loughran'5152, because all three references are directed to systems and methods for shaping, manipulation and fabrication of three-dimensional objects. Furthermore, users benefit from systems that allow for multiple types of printers, including a stereo lithography printer, because such systems reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

Claim 108 lacks an inventive step under PCT Article 33(3) as being obvious over Yanagisawa in view of Loughran'4577, further in view of Leyden.

Regarding claim 108, the combination of Yanagisawa and Loughran'4577 does not expressly disclose that the one or more sensors include a temperature sensor positioned to sense a temperature of a surface of a build platform of the three-dimensional printer. However, Leyden discloses that the one or more sensors include a temperature sensor positioned to sense a temperature of a surface of a build platform of the three-dimensional printer (col 11, ln 57 to col 12, ln 5, cool the dispensed material 14 and part-building platform 15 such that the desired building temperature is maintained . . . computer controlled in combination with temperature sensing devices). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Yanagisawa, Loughran'4577 and Leyden, because all three references are directed to systems and methods for three-dimensional modeling for fabrication. Furthermore, designers benefit from three-dimensional modeling techniques that include a temperature sensor, because such techniques allow for taking into account thermal considerations during the modeling phase (Leyden, col 7, ln 64-67 and col 8 ln 54-57).

Claim 115 lacks an inventive step under PCT Article 33(3) as being obvious over Yanagisawa in view of Loughran'4577, further in view of Menchik.

Regarding claim 115, the combination of Yanagisawa and Loughran'4577 does not expressly disclose that the network interface includes a cellular network interface. However, Menchik discloses wherein the network interface includes a cellular network interface (para [0053], via an external interface . . . communications network . . . a cellular operator). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Yanagisawa, Loughran'4577 and Menchik, because all three references are directed to systems and methods for shaping, viewing and printing three-dimensional objects. Furthermore, users benefit from systems connected via cellular operators, because users increasingly utilize a wide variety of cellular devices for initiating print jobs.

Claim 119 lacks an inventive step under PCT Article 33(3) as being obvious over Yanagisawa in view of Loughran'4577, further in view of Jung.

Regarding claim 119, the combination of Yanagisawa and Loughran'4577 does not expressly disclose that the processor is configured to provide authenticated access to a remote user. However, Jung discloses that the processor is configured to provide authenticated access to a remote user (para [0096], verification module 630 can prevent or enable a read function in one or more of verification module 630 and/or an operational component 610 if the authorization code(s) 620 is accepted from external control system 675 via input module 680 or is validated locally by verification module 630). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Yanagisawa, Loughran'4577 and Jung, because all three references are directed to systems and methods for manipulating and viewing objects, such as images and three-dimensional objects, subject to security measures. Furthermore, systems operators benefit from systems that require the user to provide credentials in order to access resources, because such systems improve the security of the system.

Claims 123, 126, 127, 130-142 lack an inventive step under PCT Article 33(3) as being obvious over Gothait in view of Paley, further in view of Loughran'4577.

-- See next Supplemental Box --

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 123, Gothait discloses a three-dimensional printer including a build volume (para [0051], optical sensor . . . allow height/distance sensor 96 to move together with printing head 8 and to vertically scan and/or measure the height and/or distance of measuring blocks, e.g., indicating a three-dimensional nature of the build volume); a machine vision system configured to capture and analyze image content from the three-dimensional scanner, thereby providing a status of a print job executing on the three-dimensional printer (para [0061], 3-D printer 1 may optionally include . . . video camera . . . to acquire one or more images of an object being created). Gothait does not expressly disclose that the three-dimensional printer comprises: a three-dimensional scanner configured to capture three-dimensional information from the build volume; a network interface configured to couple the three-dimensional printer in a communicating relationship with a data network; and a web server configured to transmit the status of the print job for display at a remote client through the network interface. However, Paley discloses that the three-dimensional printer comprises a three-dimensional scanner configured to capture three-dimensional information from the build volume (para [0031], structured light systems . . . recover three-dimensional data from the surface). Furthermore, Loughran'4577 discloses a network interface configured to couple the three-dimensional printer in a communicating relationship with a data network (para [0037], computer network configuration, or other device capable of supporting the programming logic needed for the system); and a web server configured to transmit the status of the print job for display at a remote client through the network interface (para [0033], potentially relevant metrics include but are not limited to: (a) a variety of status metrics identifying in terms of resources and/or time what percentage of the work has been completed; para [0041], Notifications can be sent to users 22; para [0062], from a remote location). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Gothait, Paley and Loughran'4577, because all three references are directed to systems and methods for manipulating and viewing three-dimensional objects. Furthermore, users benefit from printers that incorporate scanning functionality and are capable of providing status via the web, because scanning, status and web technology were all well-established at the time of Applicant's claimed invention, and the incorporation of well-established technologies reduces the testing of the resulting printer prior to commercial introduction. Moreover, one having ordinary skill in the art would have recognized that the image-based techniques of Paley and Gothait could be incorporated into the printer in order to provide real-time status monitoring.

Regarding claim 126, the combination of Gothait, Paley and Loughran'4577 does not expressly disclose that the web server is configured to host a remote user of the three-dimensional printer through the network interface. However, one having ordinary skill in the art would have recognized that hosting remote users through network interfaces was a well-established technique at the time of Applicant's claimed invention. It would have been obvious to one having ordinary skill in the art to utilize a network interface to host a remote printer user.

Regarding claim 127, the combination of Gothait, Paley and Loughran'4577 does not expressly disclose that the web server displays status information from one or more sensors of the three-dimensional printer. However, one having ordinary skill in the art would have recognized that status information could be obtained from one or more sensors associated with the printer and thereafter displayed to the remote user. It would have been obvious to include sensor status, such as weight sensor status indicating out-of-paper status, heat sensor status indicating overheating-printer status, or the like, in the web server display in order to provide remote printer users additional information about the printer.

Regarding claim 130, in the combination of Gothait, Paley and Loughran'4577, Paley further discloses that the three-dimensional scanner obtains three-dimensional data using structured light techniques (para [0031], structured light systems . . . recover three-dimensional data from the surface).

Regarding claim 131, the combination of Gothait, Paley and Loughran'4577 does not expressly disclose that the machine vision system provides automatic inspection of an object within the build volume. However, one having ordinary skill in the art would have recognized that technology for automating processes was well-established at the time of Applicant's claimed invention. It would have been obvious to program the machine vision system to automatically inspecting the object within the build object as part of streamlining and speeding up the fabrication process.

Regarding claim 132, the combination of Gothait, Paley and Loughran'4577 does not expressly disclose that the machine vision system provides a robotic guidance function for the three-dimensional printer. However, one having ordinary skill in the art would have recognized that technology for robotic guidance was well-established at the time of Applicant's claimed invention. It would have been obvious to program the machine vision system to provide robotic guidance as part of streamlining and speeding up the fabrication process.

Regarding claims 133 and 134, the combination of Gothait, Paley and Loughran'4577 does not expressly disclose that the machine vision system provide[s] a pass/fail evaluation of a fabricated object and for error detection for an object within the build volume. However, one having ordinary skill in the art would have recognized that technology for error detection and pass/fail evaluations was well-established at the time of Applicant's claimed invention. It would have been obvious to program the machine vision system to perform an evaluation of a fabricated object and to output a pass, a fail, or an error-detected notification as part of streamlining and speeding up the fabrication process.

Regarding claims 135 and 136, the combination of Gothait, Paley and Loughran'4577 does not expressly disclose that the machine vision system creates an audible alert and a visual alert when an error is detected. However, one having ordinary skill in the art would have recognized that technology for creating audible as well as visual alerts was well-established at the time of Applicant's claimed invention. It would have been obvious to include both an audible and a visual alert in order to get the attention of the machine operator in loud as well as poor visibility conditions.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 137, the combination of Gothait, Paley and Loughran'4577 does not expressly disclose that the machine vision system tracks actual progress of a print job against a predicted progress of the print job. However, one having ordinary skill in the art would have recognized that technology for comparing states of progress of a job was well-established at the time of Applicant's claimed invention. It would have been obvious to track actual versus predicted progress and compare the two in order to provide dynamically updated progress information.

Regarding claim 138, the combination of Gothait, Paley and Loughran'4577 does not expressly disclose that the machine vision system compares an actual three-dimensional result in the build volume with an expected three-dimensional result based upon a source model. However, one having ordinary skill in the art would have recognized that technology for comparing actual versus expected results was well-established at the time of Applicant's claimed invention. It would have been obvious to utilize a source model as the baseline in order to allow for repeatability in the comparing against a fixed baseline.

Regarding claim 139, the combination of Gothait, Paley and Loughran'4577 does not expressly disclose that the machine vision system is configured to abort a fabrication process of the three-dimensional printer upon detection of an unrecoverable error in the fabrication process. However, one having ordinary skill in the art would have recognized that technology for error detection was well-established at the time of Applicant's claimed invention. It would have been obvious to program the machine vision system to perform an evaluation of a fabricated object and to output an error detection notice, including an abort command, as part of streamlining and speeding up the fabrication process.

Regarding claim 140, in the combination of Gothait, Paley and Loughran'4577, Gothait further discloses that the machine vision system is configured to detect a misalignment of layers (para [0063], a plurality of measuring blocks may be deposited, according to a pre-defined configuration and/or alignment).

Regarding claim 141, in the combination of Gothait, Paley and Loughran'4577, Gothait further discloses that the machine vision system is configured to detect an unexpected surface hole (para [0104], Uniformity of layer thickness of deposited material may allow obtaining, for example, a good surface quality of a 3-D model . . . calibrating nozzles 52; para [0051], optical sensor . . . allow height/distance sensor 96 to move together with printing head 8 and to vertically scan and/or measure the height and/or distance of measuring blocks).

Regarding claim 142, the combination of Gothait, Paley and Loughran'4577 does not expressly disclose a processor configured to respond to a remote request for status from the machine vision system. However, one having ordinary skill in the art would have recognized that users benefit from being able to request status of a printer remotely. It would have been obvious to include status response functionality to minimize the interruption to remote users otherwise having to walk over to the printer location to obtain such information.

Claim 156 lacks an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of Menchik, further in view of US 6,193,923 B1 to Leyden et al. (hereinafter Leyden).

Regarding claim 156, the combination of Loughran'4577 and Menchik does not expressly disclose that the one or more sensors include a temperature sensor. However, Leyden discloses that the one or more sensors include a temperature sensor (col 11, ln 57 to col 12, ln 5, cool the dispensed material 14 and part-building platform 15 such that the desired building temperature is maintained . . . computer controlled in combination with temperature sensing devices). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Menchik and Leyden, because all three references are directed to systems and methods for three-dimensional modeling for fabrication. Furthermore, designers benefit from three-dimensional modeling techniques that include a temperature sensor, because such techniques allow for taking into account thermal considerations during the modeling phase (Leyden, col 7, ln 64-67 and col 8 ln 54-57).

Claims 164 and 168 lack an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of Shepherd, further in view of Bajikar.

Regarding claim 164, the combination of Loughran'4577 and Shepherd does not expressly disclose that the mobile system includes at least one of a laptop computer and a tablet. However, Bajikar discloses that the mobile system includes at least one of a laptop computer and a tablet (para [0029], laptop). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Shepherd and Bajikar, because all three references are directed to systems and methods for printing jobs, including from a mobile device. Furthermore, users benefit from systems that allow for printing from a variety of mobile devices, including laptop computers, because users increasingly utilize mobile devices of varying brands, sizes, and capabilities.

Regarding claim 168, the combination of Loughran'4577 and Shepherd does not expressly disclose that the location awareness technology includes cellular network triangulation. However, Bajikar discloses that the location awareness technology includes cellular network triangulation (para [0029], solve for its own location through triangulation). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Shepherd and Bajikar, because all three references are directed to systems and methods for printing jobs, including from a mobile device. Furthermore, users benefit from systems that allow for printing from location aware devices, because users increasingly utilize mobile devices where the location awareness is achieved through GPS, wireless triangulation or a combination thereof.

-- See next Supplemental Box --

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Claims 170 and 171 lack an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of Shepherd, further in view of Loughran'5152.

Regarding claim 170, the combination of Loughran'4577 and Shepherd does not expressly disclose that the plurality of three-dimensional printers include at least one fused deposition modeling system. However, Loughran'5152 discloses that the plurality of three-dimensional printers include at least one fused deposition modeling system (para [0015], a fused deposition modeling SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Shepherd and Loughran'5152, because all three references are directed to systems and methods for viewing and manipulating three-dimensional objects. Furthermore, users benefit from systems that allow for multiple types of modeling, including fused deposition modeling, because such systems reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

Regarding claim 171, the combination of Loughran'4577 and Shepherd does not expressly disclose that the plurality of three-dimensional printers include at least one stereo lithography system. However, Loughran'5152 discloses that the plurality of three-dimensional printers include at least one stereo lithography system (para [0015], a stereo lithography SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Shepherd and Loughran'5152, because all three references are directed to systems and methods for viewing and manipulating three-dimensional objects. Furthermore, users benefit from systems that allow for multiple types of modeling, including fused deposition modeling, because such systems reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

Claim 173 lacks an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of Bajikar, further in view of Loughran'5152.

Regarding claim 173, the combination of Loughran'4577 and Bajikar does not expressly disclose that the processor is local to the three-dimensional printer. However, Loughran'5152 discloses that the processor is local to the three-dimensional printer (para [0083], operators 46 enforce the schedule).

It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Bajikar and Loughran'5152, because all three references are directed to systems and methods for printing jobs from networked remote locations, including from mobile devices. Furthermore, users benefit from systems with co-dependent components, such as processors and corresponding printers, located close to one another, because such systems avoid unnecessary cables to couple components together. Moreover, one having ordinary skill in the art would have recognized that operators, as disclosed by Loughran'5152, are understood to be local to the printers. It would have been obvious to one having ordinary skill in the art that the authorization processor, like operator enforcement, could also be local to the printer.

Claims 174, 176, 179 and 182 lack an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of Bajikar, further in view of Shepherd.

Regarding claim 174, the combination of Loughran'4577 and Bajikar does not expressly disclose that the processor is on a print server remote from the three-dimensional printer. However, Shepherd discloses that the processor is on a print server remote from the three-dimensional printer (para [0003], a print server comprising a submission processor; para [0010], The operating system of the mobile computing device can include a processor for estimating an arrival time to a print location). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Bajikar and Shepherd, because all three references are directed to systems and methods for printing jobs, including from a mobile device. Furthermore, system administrators benefit from systems that allow users to print utilizing a processor on a remote print server, because such systems enable systems administrators to concentrate IT equipment requiring maintenance in a few, select locations.

Regarding claim 176, the combination of Loughran'4577 and Bajikar does not expressly disclose that the mobile system includes at least one of a cellular phone and a smart phone. However, Shepherd discloses that the mobile system includes at least one of a cellular phone and a smart phone (para [0016], wireless phone). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Bajikar and Shepherd, because all three references are directed to systems and methods for printing jobs, including from a mobile device. Furthermore, users benefit from systems that allow for printing from a variety of mobile devices, including cellular phones and smart phones, because users increasingly utilize mobile devices of varying brands, sizes, and capabilities.

Regarding claim 179, the combination of Loughran'4577 and Bajikar does not expressly disclose that the mobile device includes a Global Positioning System. However, Shepherd discloses that the mobile device includes a Global Positioning System (para [0019], a mobile computing device 12 is equipped with a global positioning component 14). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Bajikar and Shepherd, because all three references are directed to systems and methods for printing jobs, including from a mobile device. Furthermore, users benefit from systems that allow for printing from location aware devices, because users increasingly utilize mobile devices where the location awareness is achieved through GPS, wireless triangulation or a combination thereof.

-- See next Supplemental Box --

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 182, the combination of Loughran'4577 and Bajkar does not expressly disclose that the processor conditionally authorizes execution of the print job only after a user has visited a predetermined location. However, Shepherd discloses that the processor conditionally authorizes execution of the print job only after a user has visited a predetermined location (para [0034], predicting the path of the mobile user). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Bajkar and Shepherd, because all three references are directed to systems and methods for printing jobs, including from a mobile device. Furthermore, users benefit from systems capable of authorizing the execution of print jobs only conditionally, because such systems can be used to limit users to printers close to their current work area, thereby avoiding unintentional queuing of print jobs to a default printer when the user is working away from his or her normal work area. Moreover, one having ordinary skill in the art would have recognized that the device could record a prior path and thus satisfy an authorization condition including a prior predetermined location.

Claims 189 and 190 lack an inventive step as being obvious over Gothait in view of Moore, further in view of Loughran'5152.

Regarding claim 189, the combination of Gothait and Moore does not expressly disclose that the three-dimensional printer is a fused deposition modeling printer. However, Loughran'5152 discloses that the three-dimensional printer is a fused deposition modeling printer (para [0015], a fused deposition modeling SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Gothait, Moore and Loughran'5152, because all three references are directed to systems and methods for managing three-dimensional fabrication jobs. Furthermore, users benefit from systems that allow for multiple types of modeling, including fused deposition modeling, because such systems reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

Regarding claim 190, the combination of Gothait and Moore does not expressly disclose that the three-dimensional printer is a stereo lithography printer. However, Loughran'5152 discloses that the three-dimensional printer is a stereo lithography printer (para [0015], a stereo lithography SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Gothait, Moore and Loughran'5152, because all three references are directed to systems and methods for managing three-dimensional fabrication jobs. Furthermore, users benefit from systems that allow for multiple types of printers, including a stereo lithography printer, because such systems reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

Claim 198 lacks an inventive step under PCT Article 33(3) as being obvious over Gothait in view of Moore, further in view of Leyden.

Regarding claim 198, the combination of Gothait and Moore does not expressly disclose that the one or more sensors include a temperature sensor. However, Leyden discloses that the one or more sensors include a temperature sensor (col 11, ln 57 to col 12, ln 5, cool the dispensed material 14 and part-building platform 15 such that the desired building temperature is maintained . . . computer controlled in combination with temperature sensing devices). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Gothait, Moore and Leyden, because all three references are directed to systems and methods for management of documents and objects, including those related to three-dimensional modeling. Furthermore, designers benefit from three-dimensional modeling techniques that include a temperature sensor, because such techniques allow for taking into account thermal considerations during the modeling phase (Leyden, col 7, ln 64-67 and col 8 ln 54-57).

Claims 24 and 25 lack an inventive step under PCT Article 33(3) as being obvious over Menchik in view of Loughran'4577, further in view of Yanagisawa, and yet further in view of Moore.

Regarding claim 24, the combination of Menchik and Loughran'4577 does not expressly disclose that the status information includes at least one photograph, and that transmitting the status information includes submitting the at least one photograph to a social networking platform. However, Yanagisawa discloses that the status information includes at least one photograph (para [0098], image of work volume), and Moore discloses that transmitting the status information includes submitting the at least one photograph to a social networking platform (para [0088], any digital media including still or moving images, audio, application-specific file formats, and so on; para [0089], The term syndication is intended to refer to publication, republication, or other distribution of content using any suitable technology; para [0243], e.g., the social networking interface enables syndication of content). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Menchik, Loughran'4577, Yanagisawa and Moore, because all four references are directed to systems and methods for managing, manipulating and viewing documents, images, and objects. Furthermore, users benefit the ability to share their printing capabilities, such as photographic information about a print job, with social network contacts, because such sharing stimulates innovation and creativity (Moore, para [0061]).

Regarding claim 25, in the combination of Menchik, Loughran'4577, Yanagisawa and Moore, Moore further discloses that the social networking platform includes one or more of Flickr, Twitter, LinkedIn, Google+, and Facebook (para [0059], Flickr).

Claim 87 lacks an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of Yanagisawa, further in view of Paley, yet further in view of Jung.

-- See next Supplemental Box --

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 87, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the processor is configured to provide credential-based access to the user interface. However, Jung discloses that the processor is configured to provide credential-based access to the user interface (para [0094]. In another embodiment, verification module 630 is configured for verifying authorization code(s) 620 to determine a payment status and/or an authorization status under a permission agreement 674). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Yanagisawa, Paley and Jung, because all four references are directed to systems and methods for manipulating and viewing objects, such as images and three-dimensional objects, subject to security measures. Furthermore, systems operators benefit from systems that require the user to provide credentials in order to access resources, because such systems improve the security of the system.

Claim 90 lacks an inventive step under PCT Article 33(3) as being obvious over Loughran'4577 in view of Yanagisawa, further in view of Paley, yet further in view of Dietrich.

Regarding claim 90, the combination of Loughran'4577, Yanagisawa and Paley does not expressly disclose that the user interface displays a two-dimensional tool path for the three-dimensional printer, the two-dimensional tool path corresponding to a current layer of the object during a fabrication of the object by the three-dimensional printer. However, Dietrich discloses that the user interface displays a two-dimensional tool path for the three-dimensional printer (Fig. 3 and para [0019], tool path direction), the two-dimensional tool path corresponding to a current layer of the object during a fabrication of the object by the three-dimensional printer (para [0045], [0048], layer; para [0044], [0057], tool path). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Loughran'4577, Yanagisawa, Paley and Dietrich, because all four references are directed to systems and methods for modeling, shaping, manipulating, viewing and printing objects, including three-dimensional objects intended for fabrication. Furthermore, users benefit from devices that allow for viewing a 3D build volume, and a 2D projection thereof, devices that allow designers to view a model from various angles and to display a current layer or tool path improve the ability to view the model as building the object progresses (Dietrich, para [0005]).

Claims 124 and 125 lack an inventive step as being obvious over Gothait in view of Paley, further in view of Loughran'4577, yet further in view of Loughran'5152.

Regarding claim 124, the combination of Gothait, Paley and Loughran'4577 does not expressly disclose that the three-dimensional printer is a fused deposition modeling printer. However, Loughran'5152 discloses that the three-dimensional printer is a fused deposition modeling printer (para [0015], a fused deposition modeling SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Gothait, Paley, Loughran'4577 and Loughran'5152, because all four references are directed to systems and methods for manipulating, viewing and fabricating three-dimensional objects. Furthermore, users benefit from printers that allow for multiple types of modeling, including fused deposition modeling, because such printers reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

Regarding claim 125, the combination of Gothait, Paley and Loughran'4577 does not expressly disclose that the three-dimensional printer is a stereo lithography printer. However, Loughran'5152 discloses that the three-dimensional printer is a stereo lithography printer (para [0015], a stereo lithography SFF system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Gothait, Paley, Loughran'4577 and Loughran'5152, because all four references are directed to systems and methods for manipulating, viewing and fabricating three-dimensional objects. Furthermore, users benefit from printers that allow for multiple types of printers, including a stereo lithography printer, because such printers reduce delays in the design and fabrication process (Loughran'5152, para [0002]).

Claim 128 lacks an inventive step under PCT Article 33(3) as being obvious over Gothait in view of Paley, further in view of Loughran'4577, yet further in view of US 6,195,205 B1 (Faris).

Regarding claim 128, the combination of Gothait, Paley and Loughran'4577 do not expressly disclose that the three-dimensional scanner obtains three-dimensional data using stereoscopic imaging. However, Faris discloses that the three-dimensional scanner obtains three-dimensional data using stereoscopic imaging (col 1, ln 66 to col 2, ln 8, e.g., advantages of the inventive stereoscopic imaging system). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Gothait, Paley, Loughran'4577 and Faris, because all four references are directed to systems and methods for manipulating and viewing three-dimensional objects, including images. Furthermore, users benefit from systems that include stereoscopic imaging, because such images can be converted by the users into multiple viewing modes (Faris, col 1, ln 66 to col 2, ln 3).

Claim 129 lacks an inventive step under PCT Article 33(3) as being obvious over Gothait in view of Paley, further in view of Loughran'4577, yet further in view of US 2008/0228434 A1 to Aratani et al. (hereinafter Aratani).

-- See next Supplemental Box --

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 12/68429

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box No. V.2 Citations and explanations:

Regarding claim 129, the combination of Gothait, Paley and Loughran'4577 does not expressly disclose that the three-dimensional scanner obtains three-dimensional data using shape from motion. However, Aratani discloses that the three-dimensional scanner obtains three-dimensional data using shape from motion (para [0264]). Even when no reference indices exist, the second embodiment can be used for the purpose of estimating the relative allocation relationship among the environment allocation indices 300. Of course, the second embodiment can be used for the purpose of not only the calibration of indices but also improvement of 3D reconstruction (a technique called Shape From Motion) of points using an image sequence). It would have been obvious to one having ordinary skill in the art to combine the disclosures of Gothait, Paley, Loughran'4577 and Aratani, because all four references are directed to systems and methods for manipulating and viewing three-dimensional objects, including images. Furthermore, users benefit from printers capable of detecting shape from motion, because such systems allow for incorporating well-established technologies, such as scanning, into the printing system.

Claims 1-222 have industrial applicability as defined by PCT Article 33(4), because the subject matter can be made or used in industry.

Electronic Acknowledgement Receipt	
EFS ID:	15556233
Application Number:	13348896
International Application Number:	
Confirmation Number:	7161
Title of Invention:	NETWORKED THREE-DIMENSIONAL PRINTING
First Named Inventor/Applicant Name:	Nathaniel B. Pettis
Customer Number:	43520
Filer:	Robert A. Mazzaresse/Paula Ng
Filer Authorized By:	Robert A. Mazzaresse
Attorney Docket Number:	MBOT-0002-P04
Receipt Date:	18-APR-2013
Filing Date:	12-JAN-2012
Time Stamp:	16:11:38
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	MBOT-0002-P04_041813_Form1449.pdf	87995 b8e12c9ceff71a61fb56a91625096c5c4db62487	no	4

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2	Non Patent Literature	NPL-29_Design_Principles_for_Rapid_Prototyping_Forces.pdf	991585 a20e98785f29a6e6fa656ac17363d035e793f55d	no	5
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Information:					
3	Non Patent Literature	NPL-25_SN13348728_NFOA-012213.pdf	1199420 bf46393b36aee7ce2fd63dff6f42537ca603540e	no	15
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Information:					
4	Non Patent Literature	NPL-28_SN13348728_NOA-021513.pdf	687768 40915640ba5d8d181ac998792fd1918c078e01d7	no	6
Warnings:					
Information:					
5	Non Patent Literature	NPL-24_SN13348863_NFOA-011813.pdf	1159304 4027f9e29df4db47985e72943261cfa913845ea4	no	14
Warnings:					
Information:					
6	Non Patent Literature	NPL-27_SN13348863_NOA-021113.pdf	697520 b17dabbd1b4bd3acc424bb48409a8ab4f14c7165	no	6
Warnings:					
Information:					
7	Non Patent Literature	NPL-30_PCTUS1268429_ISR-022113.pdf	5830240 b3b8b4b29349de1dd2fd9ae62fa938c3bc0efa99	no	36
Warnings:					
Information:					
8	Non Patent Literature	NPL-31_Towards_a_Cloud-based_design_and_manufacturing_paradigm.pdf	2371704 cbf105f14d292ea5a235536a6252393135fd3efe	no	14
Warnings:					
Information:					
Total Files Size (in bytes):			13025536		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

In re:	PETTIS	Group Art Unit:	1743
Serial No.:	13/348,896	Confirmation No.:	7161
Filed:	January 12, 2012	Examiner:	SULTANA, N.

AMENDMENT AND REPLY

In response to the Office Action mailed on January 22, 2013, the applicant requests reconsideration of this application. Please enter the following prior to further substantive examination:

Remarks begin on page 7 of this paper.

Request for Extension of Time

The applicant requests a one month extension of time from April 22, 2013 to May 22, 2013 for responding to the outstanding action. The fee of \$200 as specified by 37 C.F.R. § 1.17(a)(1) accompanies this request.

Amendments to the Claims

Please amend the claims according to the following claim listing, which replaces all previous versions of the claims in this application.

1. (Currently amended) A device comprising:
 - a three-dimensional printer including a build volume;
 - a network interface coupled to a data network;
 - a video camera positioned to capture video of the build volume from a point of view; and
 - a processor configured to receive a three-dimensional model through the network interface, and to control operation of the three-dimensional printer to fabricate the three-dimensional model as an object within the build volume of the three-dimensional printer, the processor further configured to provide a user interface to a remote user accessing the device through the network interface, and to present in the user interface an image of the build volume from the video camera and a two-dimensional projection of the three-dimensional model from the point of view of the video camera.
2. (Original) The device of claim 1 wherein the two-dimensional projection is obtained from a three-dimensional scanner coupled to the processor.
3. (Original) The device of claim 1 wherein the two-dimensional projection is simulated based upon operation of the three-dimensional printer.
4. (Original) The device of claim 3 wherein the processor is configured to monitor operation of the three-dimensional printer based upon a comparison of the two-dimensional projection with the image of the build volume.
5. (Original) The device of claim 1 wherein the two-dimensional projection is dynamically updated to correspond to a state of physical completion of the object.

6. (Original) The device of claim 1 wherein the two-dimensional projection is a video image from the video camera.
7. (Original) The device of claim 1 wherein the user interface provides at least one control for manual operation of the three-dimensional printer by the remote user.
8. (Original) The device of claim 1 wherein the processor is configured to provide credential-based access to the user interface.
9. (Original) The device of claim 1 wherein the user interface provides status information for the three-dimensional printer.
10. (Original) The device of claim 1 wherein the user interface provides status information for a build process executing on the three-dimensional printer.
11. (Original) The device of claim 1 wherein the user interface displays a two-dimensional tool path for the three-dimensional printer, the two-dimensional tool path corresponding to a current layer of the object during a fabrication of the object by the three-dimensional printer.
12. (Original) The device of claim 1 wherein the user interface supports remote access for technical support during local operation of the three-dimensional printer.
13. (Original) The device of claim 1 wherein the processor is configured to fabricate a test object, capture an image of the test object, and compare the image to the test object to validate operation of the three-dimensional printer.
14. (Original) The device of claim 1 wherein the user interface includes at least one control to capture a frame of data from the video camera as a video image and to transmit the video image to a remote location through the data network.

15. (Original) The device of claim 14 wherein the remote location is a social networking site.

16. (Original) The device of claim 14 wherein the device is configured to transmit the video image in an electronic mail communication.

17. (Original) The device of claim 1 wherein the user interface includes at least one control to capture a stop-motion animation of a fabrication of the object using the video camera.

18. (Original) The device of claim 1 wherein the processor is configured to couple the three-dimensional printer in a communicating relationship with a remote print server through the data network.

19. (Currently amended) A method comprising:
 providing a three-dimensional printer including a build volume, a network interface coupled to a data network, and a video camera positioned to capture video of the build volume from a point of view;
 receiving a three-dimensional model through the network interface;
 fabricating the three-dimensional model as an object within the build volume of the three-dimensional printer; and
 providing a user interface to a remote user accessing the device through the network interface, wherein the user interface presents an image of the build volume from the video camera and a two-dimensional projection of the three-dimensional model from the point of view of the video camera.

20. (Original) The method of claim 19 further comprising transmitting status information over the data network upon completion of the object.

21. (Original) The method of claim 20 wherein the status information includes data presented through the user interface.

22. (Original) The method of claim 20 wherein the status information includes a digital image from the video camera.

23. (Original) The method of claim 22 wherein the digital image is transmitted with an electronic mail communication confirming completion of the object.

Remarks

Status of the Claims

Claims 1 and 19 are amended to address a minor informality. Claims 1-23 are presented for examination, with claims 1 and 19 being independent.

Claim Rejections – 35 U.S.C. § 102

Independent claim 1 stands rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Pat. No. 7,168,935 to *Taminger, et al.* (“*Taminger*”).

The applicant has devised a personal manufacturing device, e.g., a three-dimensional printer, configured for use as a remote network resource. In addition to receiving a model through a network interface and controlling the printer to fabricate a model, a processor provides a user interface that shows both a video of an object being manufactured and a three-dimensional model of the object. Further, in order for a remote user to monitor progress of fabrication in a meaningful way, the three-dimensional model is rendered in the user interface from the perspective of the video camera that provides the image, thus advantageously permitting side-by-side comparison by a remote user of the model and the resulting object. This feature is expressly claimed as a processor configured to “present in the user interface an image of the build volume from the camera *and a two-dimensional projection of the three-dimensional model from the point of view of the video camera.*”

Taminger does not teach or suggest any processor that provides an interface to a remote user that includes both an image from a camera *and* a two-dimensional rendering of a model from the point of view of the camera. The outstanding rejection refers generally to col. 11, l. 20 – col. 12, l. 10 of *Taminger* as disclosing this feature, however, this passage of *Taminger* provides no specific teaching of such a user interface, and no suggestion that such a feature is useful, or any more general suggestion that visual rendering of a two-dimensional digital model might improve the disclosed devices.

The cited passage of *Taminger* instead provides a range of teachings concerning possible instrumentation of an electron beam deposition system. For example, in this passage *Taminger* discloses various instrumentation subsystems such as lighting

systems,¹ networking systems,² a camera,³ and a variety of sensors.⁴ *Taminger* appears to further contemplate that such systems and others may in general be interconnected through a network, and that a user interface may be provided for user control. “[T]he operator makes the appropriate command inputs through the computer user interface and the control software makes the appropriate commands to the various subsystems and manages the process.”⁵

As most generously construed, *Taminger* thus suggests remote control and monitoring of a three-dimensional fabrication process; however, there is nothing in this general suggestion that specifically leads to the applicant’s claimed user interface, which provides both video and model views *from the same point of view* in order to permit side-by-side comparison of model and results by a remote user. *Taminger* cannot anticipate the invention of claim 1 because *Taminger* does not teach a processor configured to provide a user interface [to a remote user] that includes an image of a build volume from a video camera *and* a two-dimensional projection of a three-dimensional model from the point of view of the video camera.

The applicant respectfully requests reconsideration and withdrawal of the outstanding rejection of claim 1 based on *Taminger*. For similar reasons, claim 19 is believed to be patentable over *Taminger*. The remaining claims depend from an allowable base claim, and are likewise believed to be in condition for allowance.

¹ *Taminger*, col. 11, ll. 20-22.

² *Taminger*, col. 11, ll. 22-23.

³ *Taminger*, col. 11, ll. 25-27 & col. 11, ll. 37-41.

⁴ *Taminger*, col. 11, ll. 41-48.

⁵ *Taminger*, col. 12, ll. 3-7.

Conclusion

In view of the foregoing, the applicant believes that the currently pending claims are in condition for allowance and respectfully requests a corresponding Notice of Allowance.

The applicant believes that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Nothing in this paper should be construed as intent to concede any issue with regard to any claim, except as specifically stated in this paper. The amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

The Director is hereby authorized to charge any fees or to credit any overpayments associated with this filing to Deposit Account No. 50-4262.

If the examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at (617) 916-2658.

Respectfully submitted,
STRATEGIC PATENTS, P.C.

/Robert A. Mazzaresc/
Robert A. Mazzaresc
Reg. No. 42,852
Tel.: (617) 916-2658

May 22, 2013

Electronic Patent Application Fee Transmittal				
Application Number:		13348896		
Filing Date:		12-Jan-2012		
Title of Invention:		NETWORKED THREE-DIMENSIONAL PRINTING		
First Named Inventor/Applicant Name:		Nathaniel B. Pettis		
Filer:		John H. Nortrop		
Attorney Docket Number:		MBOT-0002-P04		
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with \$0 paid	1251	1	200	200

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				200

Electronic Acknowledgement Receipt	
EFS ID:	15843367
Application Number:	13348896
International Application Number:	
Confirmation Number:	7161
Title of Invention:	NETWORKED THREE-DIMENSIONAL PRINTING
First Named Inventor/Applicant Name:	Nathaniel B. Pettis
Customer Number:	43520
Filer:	John H. Nortrop
Filer Authorized By:	
Attorney Docket Number:	MBOT-0002-P04
Receipt Date:	22-MAY-2013
Filing Date:	12-JAN-2012
Time Stamp:	14:45:02
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$200
RAM confirmation Number	1071
Deposit Account	504262
Authorized User	NORTRUP, JOHN
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		MBOT-0002-P04_052213_OAResponse.pdf	111722 02541f80781ef78cda3ef77fbd4b2972bd7d28ed	yes	9
	Multipart Description/PDF files in .zip description				
	Document Description	Start	End		
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1		
	Extension of Time	2	2		
	Claims	3	6		
	Applicant Arguments/Remarks Made in an Amendment	7	9		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30415 890caf652d46aed4a9454249657c3562a3c07c5e	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			142137		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 13/348,896		Filing Date 01/12/2012		☐ To be Mailed		
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO										
APPLICATION AS FILED – PART I										
		(Column 1)		(Column 2)						
FOR		NUMBER FILED		NUMBER EXTRA		RATE (\$)		FEE (\$)		
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A		N/A		N/A				
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A		N/A		N/A				
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A		N/A		N/A				
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 =		*		X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =		*		X \$ =				
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).								
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.						TOTAL				
APPLICATION AS AMENDED – PART II										
		(Column 1)		(Column 2)		(Column 3)				
AMENDMENT	05/22/2013		CLAIMS REMAINING AFTER AMENDMENT			HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA			
	Total (37 CFR 1.16(i))		* 23		Minus	** 23	= 0			
	Independent (37 CFR 1.16(h))		* 2		Minus	*** 3	= 0			
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE		0		
		(Column 1)		(Column 2)		(Column 3)				
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT			HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA			
	Total (37 CFR 1.16(i))		*		Minus	**	=			
	Independent (37 CFR 1.16(h))		*		Minus	***	=			
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE				
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.										

LIE
/KIMBERLY PANNELL/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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NOTICE OF ALLOWANCE AND FEE(S) DUE

43520 7590 08/05/2013
STRATEGIC PATENTS P.C.
P.O. BOX 920629
NEEDHAM, MA 02492

EXAMINER

SULTANA, NAHIDA

ART UNIT

PAPER NUMBER

1743

DATE MAILED: 08/05/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/348,896	01/12/2012	Nathaniel B. Pettis	MBOT-0002-P04	7161

TITLE OF INVENTION: NETWORKED THREE-DIMENSIONAL PRINTING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1780	\$300	\$0	\$2080	11/05/2013

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

43520 7590 08/05/2013
STRATEGIC PATENTS P.C.
P.O. BOX 920629
NEEDHAM, MA 02492

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/348,896	01/12/2012	Nathaniel B. Pettis	MBOT-0002-P04	7161

TITLE OF INVENTION: NETWORKED THREE-DIMENSIONAL PRINTING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1780	\$300	\$0	\$2080	11/05/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
SULTANA, NAHIDA	1743	425-145000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
- 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/348,896	01/12/2012	Nathaniel B. Pettis	MBOT-0002-P04	7161
43520	7590	08/05/2013	EXAMINER	
STRATEGIC PATENTS P.C.			SULTANA, NAHIDA	
P.O. BOX 920629			ART UNIT	
NEEDHAM, MA 02492			PAPER NUMBER	

1743

DATE MAILED: 08/05/2013

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 13/348,896	Applicant(s) PETTIS, NATHANIEL B.	
	Examiner NAHIDA SULTANA	Art Unit 1743	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 4/18/2013; 05/22/2013.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are 1-23. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
Certified copies:
a) ☐ All b) ☐ Some *c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)	5. ☐ Examiner's Amendment/Comment
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date <u>4/18/2013</u>	6. ☒ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material	7. ☐ Other _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.	

/NAHIDA SULTANA/ Examiner, Art Unit 1743	
---	--

DETAILED ACTION

Allowable Subject Matter

1. **Claims 1-23 are** allowed.
2. The following is an examiner's statement of reasons for allowance: the applicant argued that the closest prior art reference by Taminger (US 7,168,935) teaches all the limitation except having a device comprising: *presenting the user interface an image of the build volume from the video camera and a two-dimensional projection of the three-dimensional model from the point of view of the video camera* (see applicant's argument on page 7, lines 7 – 25).
3. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: US 2004/0162629 A1; 2003/0200308 A1; 2004/0010801 A1. Any inquiry concerning this communication or earlier communications from the examiner should be directed to NAHIDA SULTANA whose telephone number is (571)270-1925. The examiner can normally be reached on Mon- Fri 9:00 Am - 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Del Sole can be reached on 571-272-1130. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1743

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NS

/JOSEPH S. DEL SOLE/
Supervisory Patent Examiner, Art Unit 1743

Notice of References Cited	Application/Control No. 13/348,896	Applicant(s)/Patent Under Reexamination PETTIS, NATHANIEL B.	
	Examiner NAHIDA SULTANA	Art Unit 1743	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2004/0162629 A1	08-2004	Kondou et al.	700/166
*	B	US-2003/0200308 A1	10-2003	Tameda et al.	709/224
*	C	US-2004/0010801	01-2004	Kim et al.	725/86
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



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BIB DATA SHEET

CONFIRMATION NO. 7161

SERIAL NUMBER 13/348,896	FILING or 371(c) DATE 01/12/2012 RULE	CLASS 425	GROUP ART UNIT 1743	ATTORNEY DOCKET NO. MBOT-0002-P04		
APPLICANTS Nathaniel B. Pettis, Brooklyn, NY; ** CONTINUING DATA ***** This application is a CON of 13/314,337 12/08/2011 which is a CIP of 12/858,622 08/18/2010 PAT 8282380 ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 01/25/2012						
Foreign Priority claimed ☐ Yes ☒ No 35 USC 119(a-d) conditions met ☐ Yes ☐ No Verified and /NAHIDA SULTANA/ Acknowledged Examiner's Signature		☐ Met after Allowance Initials	STATE OR COUNTRY NY	SHEETS DRAWINGS 6	TOTAL CLAIMS 23	INDEPENDENT CLAIMS 2
ADDRESS STRATEGIC PATENTS P.C. P.O. BOX 920629 NEEDHAM, MA 02492 UNITED STATES						
TITLE NETWORKED THREE-DIMENSIONAL PRINTING						
FILING FEE RECEIVED 1430	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			☐ All Fees		
				☐ 1.16 Fees (Filing)		
				☐ 1.17 Fees (Processing Ext. of time)		
				☐ 1.18 Fees (Issue)		
				☐ Other _____		
				☐ Credit		

Receipt date: 04/18/2013

13348896 - GAU: 1743

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

SUBSTITUTE PTO/SB/08 (01-10)
SPPC v1.5 011712

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	SULTANA, NAHIDA
Sheet 1 of 4	Attorney Docket No.	MBOT-0002-P04

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-20090164379		Jun 25, 2009	Jung, Edward K., et al.	
		US-7168935		Jan 30, 2007	Taminger, Karen M., et al.	
		US-20060127153		Jun 15, 2006	Menchik, Guy et al.	
		US-20040175450		Sep 9, 2004	Yanagisawa, Kenji et al.	
		US-6490496		Dec 3, 2002	Dacey, Edward J.	
		US-6195205		Feb 27, 2001	Faris, Sadeg	
		US-6193923		Feb 27, 2001	Leyden, Richard N., et al.	
		US-5738817		Apr 14, 1998	Danforth, Stephen C., et al.	

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-20110137578		Jun 9, 2011	DIETRICH, DAVID M., et al.	
		US-20110029591		Feb 3, 2011	Wood, Michael C., et al.	
		US-20100131584		May 27, 2010	Johnson, William J.	
		US-20080269939		Oct 30, 2008	KRITCHMAN, Eliahu M.	
		US-20080228434		Sep 18, 2008	Aratani, Shinichi et al.	
		US-20070172112		Jul 26, 2007	Paley, Eric B., et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.S./

Receipt date: 04/18/2013

13348896 - GAU: 1743

Doc code: IDS
 Doc description: Information Disclosure Statement (IDS) Field

SUBSTITUTE PTO/SB/08 (01-10)
 SPPC v1.5 011712

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	SULTANA, NAHIDA
Sheet 2 of 4	Attorney Docket No.	MBOT-0002-P04

U.S. PATENT APPLICATION PUBLICATIONS						
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-20070124436		May 31, 2007	Shepherd, Michael D.	
		US-20070088640		Apr 19, 2007	Hyakutake, Shogo et al.	
		US-20070061393		Mar 15, 2007	Moore, James F.	
		US-20060111807		May 25, 2006	Gothait, Hanan et al.	
		US-20060095152		May 4, 2006	Loughran, Stephen A.	
		US-20060077413		Apr 13, 2006	Lum, Joey P., et al.	
		US-20060041443		Feb 23, 2006	Horvath, Charles W.	
		US-20050234577		Oct 20, 2005	Loughran, Stephen A., et al.	
		US-20040207662		Oct 21, 2004	Anderson, Daryl E., et al.	
		US-20040203872		Oct 14, 2004	Bajikar, Sundeep M.	

FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number ³	Cnty Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.S./

Receipt date: 04/18/2013

13348896 - GAU: 1743

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

SUBSTITUTE PTO/SB/08 (01-10)
SPPC v1.5 011712

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	NPL-29	KESNER, SAMUEL B. et al., "Design Principles for Rapid Prototyping Forces Sensors Using 3-D Printing", International Search Report and Written Opinion. IEEE/ASME transactions on mechatronics. vol 16 no. 5 October 2011, 10/2011 , Pages 866-870	
	NPL-25	, "Application Serial No. 13/348,728 (Atty Ref MBOT-0002-P02) Non-Final Office Action mailed 1/22/13", 15 pages	
	NPL-28	, "Application Serial No. 13/348,728 (Atty Ref MBOT-0002-P02) Notice of Allowance mailed 2/15/13", 6 pgs	
	NPL-24	, "Application Serial No. 13/348,863 (Atty Ref MBOT-0002-P03) Non-Final Office Action mailed 1/18/13", 14 pgs	
	NPL-27	, "Application Serial No. 13/348,863 (Atty Ref MBOT-0002-P03), Notice of Allowance mailed 2/11/13", 7 pages	
	NPL-30	, "International Application Serial No. PCT/US2012/68429, Search Report and Written Opinion mailed 02-21-2013", pages 1-36	
	NPL-31	WU, DAZHONG et al., "Towards a cloud-based design and manufacturing paradigm: looking backward, looking forward", International search report and written opinion. Proceedings of the ASME 2012 international design engineering technical conference. IDETC/CIE 2012. August 12-15, 2012 Chicago, Illinois, USA, pages 1-14	

EXAMINER SIGNATURE			
Examiner Signature	/Nahida Sultana/	Date Considered	06/20/2013
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.S./

Search Notes 	Application/Control No. 13348896	Applicant(s)/Patent Under Reexamination PETTIS, NATHANIEL B.
	Examiner NAHIDA SULTANA	Art Unit 1743

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
264	40.7.401-405, 308	1/8/2013	NS
425	174.4,140,375	1/8/2013	NS
700	98,118,204	1/8/2013	NS
Above	Updated	7/29/2013	NS

SEARCH NOTES		
Search Notes	Date	Examiner
East Search (see search history attached for details)	1/8/2013	NS
Inventor search	1/8/2013	NS
Consulted David Brown	1/8/2013	NS
Consulte Del Sole, Joseph regarding similar case #12/884982	1/8/2013	NS
Consulted Dimple Bodawala, regarding similar case #12/884982	1/8/2013	NS
Above Updated	7/29/2013	NS

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
264	40.7.401-405, 308	7/29/2013	NS
425	174.4,140,375	7/29/2013	NS
700	98,118,204	7/29/2013	NS

/NAHIDA SULTANA/ Examiner.Art Unit 1743	
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INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
Text Search	See interference Search (attached)	7/29/2013	NS

/NAHIDA SULTANA/
Examiner, Art Unit 1743

Issue Classification 	Application/Control No. 13348896	Applicant(s)/Patent Under Reexamination PETTIS, NATHANIEL B.
	Examiner NAHIDA SULTANA	Art Unit 1743

CPC		
Symbol	Type	Version

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

/NAHIDA SULTANA/ Examiner.Art Unit 1743 (Assistant Examiner)	07/29/2013 (Date)	Total Claims Allowed: 23	
/JOSEPH S DEL SOLE/ Supervisory Patent Examiner.Art Unit 1743 (Primary Examiner)	07/30/2013 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification 	Application/Control No. 13348896	Applicant(s)/Patent Under Reexamination PETTIS, NATHANIEL B.
	Examiner NAHIDA SULTANA	Art Unit 1743

US ORIGINAL CLASSIFICATION						INTERNATIONAL CLASSIFICATION										
CLASS			SUBCLASS			CLAIMED					NON-CLAIMED					
425			150			B	2	9	C	41 / 02 (2006.0)						
CROSS REFERENCE(S)						B	2	9	C	35 / 08 (2006.0)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)															
264	40.1	308	401													
700	98	118														
425	375															
	</															

/NAHIDA SULTANA/ Examiner.Art Unit 1743 (Assistant Examiner)	07/29/2013 (Date)	Total Claims Allowed: 23	
/JOSEPH S DEL SOLE/ Supervisory Patent Examiner.Art Unit 1743 (Primary Examiner)	07/30/2013 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification 	Application/Control No. 13348896	Applicant(s)/Patent Under Reexamination PETTIS, NATHANIEL B.
	Examiner NAHIDA SULTANA	Art Unit 1743

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17												
	2		18												
	3		19												
	4		20												
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	12														
	13														
	14														
	15														
	16														

/NAHIDA SULTANA/ Examiner.Art Unit 1743 (Assistant Examiner)	07/29/2013 (Date)	Total Claims Allowed: 23	
/JOSEPH S DEL SOLE/ Supervisory Patent Examiner.Art Unit 1743 (Primary Examiner)	07/30/2013 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

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	Art Unit	1743
	Examiner Name	SULTANA, NAHIDA
Sheet 1 of 3	Attorney Docket No.	MBOT-0002-P04

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-8425218		Apr 23, 2013	Pettis, Nathaniel B.	
		US-7958236		Jun 7, 2011	Motoyama, Tetsuro et al.	
		US-6529627		Mar 4, 2003	Callari, Francesco et al.	
		US-4575330		Mar 11, 1986	HULL, CHARLES	

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		US-20090287332		Nov 19, 2009	Adusumilli, Prasad et al.	
		US-20080309665		Dec 18, 2008	Gregory, II et al.	
		US-20070265727		Nov 15, 2007	Bae, Seockhoon et al.	
		US-20070024895		Feb 1, 2007	Clark, Gordon R.	
		US-20040136574		Jul 15, 2004	Kozakaya, Tatsuo et al.	
		US-20040030741		Feb 12, 2004	Wolton, Richard E., et al.	

FOREIGN PATENT DOCUMENTS								
Examiner Initial*	Cite No	Foreign Document Number ³	Cnty Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
		WO-2013086309			Jun 13, 2013	PETTIS, Nathaniel		

NON-PATENT LITERATURE DOCUMENTS

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
	Filing Date	Jan 12, 2012
	First Named Inventor	Nathaniel B. Pettis
	Art Unit	1743
	Examiner Name	SULTANA, NAHIDA
Sheet 2 of 3	Attorney Docket No.	MBOT-0002-P04

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	NPL-34	, "Application Serial No. 13/314,337(Atty Ref MBOT-0002-P01), Non-Final Office Action mailed 07-31-2013", , 37 pages	
	NPL-35	, "Application Serial No. 13/556,315 (Atty Ref: MBOT-0002-P05), Non-Final Office Acton mailed 07/05/2013", , 28 pages	
	NPL-36	, "Application Serial No. 13/556,515 (Atty Ref MBOT-0002-P07), Non-Final Office Action mailed 08-01-2013", , 25 pages	
	NPL-37	, "Application Serial No. 13/557,353 (Atty Ref MBOT-0002-P09), Non-Final Office Action mailed 08-02-2013", , 29 pages	
	NPL-38	, "Application Serial No.13/556,368 (Atty Ref MBOT-0002-P06), Non-Final Office Action mailed 07-11-2013", , 23 pages	

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			
¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.			

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	13/348,896
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	Art Unit	1743
	Examiner Name	SULTANA, NAHIDA
Sheet 3 of 3	Attorney Docket No.	MBOT-0002-P04

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (1).

OR

☒ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☒ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ Applicant believes that no fees are required with this filing. However, if an Office Action on the merits has been mailed, or a fee is otherwise required, the Commissioner is hereby authorized to charge any fees due under 37 C.F.R. §§1.16 or 1.17, or to credit any overpayments, to Deposit Account No. 50-4262 in order to have this information disclosure statement considered.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Robert Mazzaresse/	Date (YYYY-MM-DD)	2013-08-06
Name/Print	Robert A. Mazzaresse	Registration Number	42,852

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Electronic Patent Application Fee Transmittal				
Application Number:		13348896		
Filing Date:		12-Jan-2012		
Title of Invention:		NETWORKED THREE-DIMENSIONAL PRINTING		
First Named Inventor/Applicant Name:		Nathaniel B. Pettis		
Filer:		Robert A. Mazzaresse/Paula Ng		
Attorney Docket Number:		MBOT-0002-P04		
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt	
EFS ID:	16513522
Application Number:	13348896
International Application Number:	
Confirmation Number:	7161
Title of Invention:	NETWORKED THREE-DIMENSIONAL PRINTING
First Named Inventor/Applicant Name:	Nathaniel B. Pettis
Customer Number:	43520
Filer:	Robert A. Mazzaresse/Paula Ng
Filer Authorized By:	Robert A. Mazzaresse
Attorney Docket Number:	MBOT-0002-P04
Receipt Date:	06-AUG-2013
Filing Date:	12-JAN-2012
Time Stamp:	15:07:53
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$180
RAM confirmation Number	1595
Deposit Account	504262
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	MBOT-0002-P04_080613_Form1449.pdf	78621	no	3
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Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
2	Foreign Reference	WO2013086309.pdf	3611724	no	81
			7def07874e23d330b872f01ac66f77cb566c02ed		
Warnings:					
Information:					
3	Non Patent Literature	NPL-34_SN13314337_NFOA-073113.pdf	1555431	no	37
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Warnings:					
Information:					
4	Non Patent Literature	NPL-35_SN13556315_NFOA-070513.pdf	1103455	no	28
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5	Non Patent Literature	NPL-36_SN13556515_NFOA-080113.pdf	966060	no	25
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6	Non Patent Literature	NPL-37_SN13557353_NFOA-080213.pdf	1122559	no	29
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Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	30405	no	2
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Receipt date: 08/06/2013

13348896 - GAU: 1743

Doc code: IDS
 Doc description: Information Disclosure Statement (IDS) Field

SUBSTITUTE PTO/SB/08 (01-10)
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		US-6529627		Mar 4, 2003	Callari, Francesco et al.	
		US-4575330		Mar 11, 1986	HULL, CHARLES	

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		US-20090287332		Nov 19, 2009	Adusumilli, Prasad et al.	
		US-20080309665		Dec 18, 2008	Gregory, II et al.	
		US-20070265727		Nov 15, 2007	Bae, Seockhoon et al.	
		US-20070024895		Feb 1, 2007	Clark, Gordon R.	
		US-20040136574		Jul 15, 2004	Kozakaya, Tatsuo et al.	
		US-20040030741		Feb 12, 2004	Wolton, Richard E., et al.	

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Examiner Initial*	Cite No	Foreign Document Number ³	Cnty Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
		WO-2013086309			Jun 13, 2013	PETTIS, Nathaniel		

NON-PATENT LITERATURE DOCUMENTS								
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/Nahida Sultana/

09/03/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.S./

Receipt date: 08/06/2013

13348896 - GAU: 1743

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) FieldSUBSTITUTE PTO/SB/08 (01-10)
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Examiner Signature	/Nahida Sultana/	Date Considered	/Nahida Sultana/
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/348,896	01/12/2012	Nathaniel B. Pettis	MBOT-0002-P04	7161
43520 7590 09/11/2013 STRATEGIC PATENTS P.C. P.O. BOX 920629 NEEDHAM, MA 02492			EXAMINER SULTANA, NAHIDA	
			ART UNIT 1743	PAPER NUMBER
			NOTIFICATION DATE 09/11/2013	DELIVERY MODE ELECTRONIC

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Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@stratpat.com

Supplemental Notice of Allowability	Application No. 13/348,896 Examiner NAHIDA SULTANA	Applicant(s) PETTIS, NATHANIEL B. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Art Unit 1743</td> <td style="width: 50%;">AIA (First Inventor to File) Status No</td> </tr> </table>	Art Unit 1743	AIA (First Inventor to File) Status No
Art Unit 1743	AIA (First Inventor to File) Status No			

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 08/05/2013.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are 1-23. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to FPHfeedback@uspto.gov.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
Certified copies:
a) ☐ All b) ☐ Some *c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892) 2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date <u>08/06/2013</u> 3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material 4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.	5. ☐ Examiner's Amendment/Comment 6. ☐ Examiner's Statement of Reasons for Allowance 7. ☐ Other _____.
---	---

/NAHIDA SULTANA/ Examiner, Art Unit 1743	/JOSEPH S. DEL SOLE/ Supervisory Patent Examiner, Art Unit 1743
---	--

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or **Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

43520 7590 08/05/2013
STRATEGIC PATENTS P.C.
P.O. BOX 920629
NEEDHAM, MA 02492

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

John H. Nortrup	(Depositor's name)
/John H. Nortrup, Reg. No. 59,063/	(Signature)
September 12, 2013	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/348,896	01/12/2012	Nathaniel B. Pettis	MBOT-0002-P04	7161

TITLE OF INVENTION: NETWORKED THREE-DIMENSIONAL PRINTING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1780	\$300	\$0	\$2080	11/05/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
SULTANA, NAHIDA	1743	425-145000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Strategic Patents, P.C.

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

MakerBot Industries, LLC

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Brooklyn, NY

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
- ☒ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 50-4262 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /John H. Nortrup/

Date September 12, 2013

Typed or printed name John H. Nortrup

Registration No. 59,063

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

In re application of Nathaniel B. Pettis : Group Art Unit: 1743
Serial No. 13/348,896 : Confirmation No. 7161
Filed: January 12, 2012 : Examiner: Sultana, Nahida

ISSUE FEE COMMUNICATION

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Examiner:

For the above identified application, the applicant submits herewith the issue and publication fees.

The applicant hereby authorizes the Patent Office to charge any deficiencies or credit any overpayments associated with this filing to Deposit Account No. 50-4262.

Please direct any inquiry regarding this matter to the below signed agent.

Respectfully Submitted,

STRATEGIC PATENTS, P.C.

/John Nortrup/

John H. Nortrup
Reg. No. 59,063
(207) 590-0723
Customer Number 43,520

September 12, 2013

Electronic Patent Application Fee Transmittal				
Application Number:		13348896		
Filing Date:		12-Jan-2012		
Title of Invention:		NETWORKED THREE-DIMENSIONAL PRINTING		
First Named Inventor/Applicant Name:		Nathaniel B. Pettis		
Filer:		John H. Nortrop		
Attorney Docket Number:		MBOT-0002-P04		
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	1780	1780
Publ. Fee- Early, Voluntary, or Normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				2080

Electronic Acknowledgement Receipt	
EFS ID:	16833172
Application Number:	13348896
International Application Number:	
Confirmation Number:	7161
Title of Invention:	NETWORKED THREE-DIMENSIONAL PRINTING
First Named Inventor/Applicant Name:	Nathaniel B. Pettis
Customer Number:	43520
Filer:	John H. Nortrop
Filer Authorized By:	
Attorney Docket Number:	MBOT-0002-P04
Receipt Date:	12-SEP-2013
Filing Date:	12-JAN-2012
Time Stamp:	11:53:19
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$2080
RAM confirmation Number	12230
Deposit Account	504262
Authorized User	NORTRUP, JOHN
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	MBOT-0002- P04_091213_IssueFeeForm.pdf	246221	no	2
			66e9a5630ec5c31bba218455b44e3717252d38		
Warnings:					
Information:					
2	Transmittal Letter	MBOT-0002- P04_091213_IssueCommunicat ion.pdf	54150	no	1
			34f0d2bdf3b363f6251146f5b45c0dc60478b8		
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32066	no	2
			6d93553285216d2e84c859d6ff101f5b58d71fb5		
Warnings:					
Information:					
Total Files Size (in bytes):			332437		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. New Applications Under 35 U.S.C. 111 If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. National Stage of an International Application under 35 U.S.C. 371 If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. New International Application Filed with the USPTO as a Receiving Office If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/348,896	10/22/2013	8562324	MBOT-0002-P04	7161

43520 7590 10/02/2013
STRATEGIC PATENTS P.C.
P.O. BOX 920629
NEEDHAM, MA 02492

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Nathaniel B. Pettis, Brooklyn, NY;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

Note: This form is to be submitted with a Power of Attorney to identify the application to which the Power of Attorney is directed.

Application Number	<u>13/348,896</u>
Filing Date	<u>January 12, 2012</u>
First Named Inventor	<u>Nathaniel B. Pettis</u>
Title	<u>NETWORKED THREE-DIMENSIONAL PRINTING</u>
Art Unit	<u>1743---</u>
Examiner Name	<u>NAHIDA SULTANA---</u>
Attorney Docket Number	<u>---</u>

SIGNATURE of Patent Practitioner

Signature	<u>/Peter J. Ims/</u>	Date	<u>2024-11-13</u>
Name	<u>PETER J. IMS</u>	Telephone	<u>612/334-3222</u>
Registration Number	<u>48,774</u>		

POWER OF ATTORNEY

Principal's Name: Stratasys, Inc.

Principal's Address: 7665 Commerce Way, Eden Prairie, MN 55344

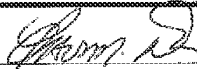
Principal hereby revokes all previous powers of attorney given in the application identified in the attached transmittal letter (the APPLICATION).

Principal hereby appoints Practitioner(s) associated with the following Customer Number as its attorney(s) or agent(s) to prosecute the APPLICATION and to transact all business in the United States Patent and Trademark Office connected therewith. Principal hereby ratifies all previous actions taken by the Practitioner(s) in connection with the APPLICATION:

27,367

Principal is empowered to act in the APPLICATION because Principal is the sole owner of the entire right, title and interest of the APPLICATION, one owner of a collection of owners of the entire right, title and interest of the APPLICATION, a person to whom at least one inventor is under an obligation to assign the APPLICATION, and/or a person who otherwise has sufficient proprietary interest to act as Applicant for the APPLICATION.

SIGNATURE of Principal

Signature		Date	April 2, 2013
Name	Larry Doerr		
Title	Executive Vice President		

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**CHANGE OF
CORRESPONDENCE ADDRESS
Patent**Address to:
Mail Stop Post Issue
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Patent Number	8562324
Issue Date	2013-10-22
Application Number	13348896
Filing Date	2012-01-12
First Named Inventor	Nathaniel B. Pettis
Attorney Docket Number	

Please change the Correspondence Address for the above-identified patent to:

☒ The address associated with Customer Number:

27367

OR☐ **Firm or
Individual Name****Address****City****State****ZIP****Country****Telephone****Email**

This form cannot be used to change the data associated with a Customer Number. To change the data associated with an existing Customer Number use "Request for Customer Number Data Change" (PTO/SB/124).

This form will not affect any "fee address" provided for the above-identified patent. To change a "fee address" use the "Fee Address Indication Form" (PTO/SB/47).

I am the:

☐ Patentee.☐ If the Patentee was not the applicant for patent (37 CFR 1.42), then a Statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is enclosed or was filed on _____. See 37 CFR 3.71.☒ Attorney or agent of record. Registration Number 48774.☐ Patent practitioner acting in a representative capacity whose correspondence address is the correspondence address of record. Notice has been given to the patentee or owner. Registration Number 48774.

Signature /Peter J. Ims/

Typed or
Printed Name Peter J. Ims

Date 2024-11-13

Telephone 612/334-3222

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☒ *Total of 1 forms are submitted.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-00**. Public burden for this form is estimated to average ** hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. If filing this completed form by mail, send to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013). <https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf>

Routine uses of the information in this record may include disclosure to: 1) law enforcement, in the event that the system of records indicates a violation or potential violation of law; 2) a Federal, state, local, or international agency, in response to its request; 3) a contractor of the USPTO having need for the information in order to perform a contract; 4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record; 5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record; 6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations; 7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals; 8) another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)); 9) the Office of Personnel Management (OPM) for personnel research purposes; and 9) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Additional Uses

Additional USPTO uses of the information in this record may include disclosure to: 1) the International Bureau of the World Intellectual Property Organization, if the record is related to an international application filed under the Patent Cooperation Treaty; 2) the public i) after publication of the application pursuant to 35 U.S.C. 122(b), ii) after issuance of a patent pursuant to 35 U.S.C. 151, iii) if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections, or an issued patent, or iv) without publication of the application or patent under the specific circumstances provided for by 37 CFR 1.14(a)(1)(v)-(vii); and/or 3) the National Archives and Records Administration, for inspection of records.



UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION # 13/348,896	RECEIPT DATE / TIME 11/13/2024 04:32:54 PM Z ET	ATTORNEY DOCKET # MBOT-0002-P04
------------------------------------	---	---

Title of Invention

NETWORKED THREE-DIMENSIONAL PRINTING

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	8562324
CONFIRMATION #	7161	FILED BY	LYNNELLE SWAJA
PATENT CENTER #	67952676	FILING DATE	01/12/2012
CUSTOMER #	43520	FIRST NAMED INVENTOR	Nathaniel B. Pettis
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Peter Ims

Documents

TOTAL DOCUMENTS: 3

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2024-11-13 POA.pdf	2	Power of Attorney	76 KB
2024-11-13 Change of Correspondence Address.pdf	2	Change of Address	418 KB
2024-11-13 373b.pdf	17	Assignee showing of ownership per 37 CFR 3.73	982 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2024-11-13 POA.pdf	CF49C3F37434302AF111EAF654C88507A61F23FB5B154E1E2 96CD4FB05DACF4397F0079DCAC786A85E4D4E9045275417F5 6070797BCE52ED57ED37C7CB0EE483

2024-11-13 Change of Correspondence Address.pdf	AA039C9AB4155181C91C5291062638D22F0BA58960CEE9994 92C6EAF849CD4E175B2784ADEAA0F6993044D2CF49BD4016 A04AF57ABAC813FC661409C251C8868
2024-11-13 373b.pdf	066AA0EC55E914717C65D46078962319837B9DB1711E476CE 45C95FEE29B07BF6322CBA8318B95DF067CFCA8DB4412548 F51C1F8C4EBC1F1750DE8C1B1A9EC43

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/348,896	01/12/2012	Nathaniel B. Pettis	MBOT-0002-P04

CONFIRMATION NO. 7161

27367

WESTMAN CHAMPLIN & KOEHLER, P.A.

121 South Eighth Street

Suite 1100

Minneapolis, MN 55402

POA ACCEPTANCE LETTER



OC000000080819279

Date Mailed: 11/19/2024

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/13/2024.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/nhassani/



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/348,896	01/12/2012	Nathaniel B. Pettis	MBOT-0002-P04

CONFIRMATION NO. 7161

43520
STRATEGIC PATENTS P.C.
P.O. BOX 920629
NEEDHAM, MA 02492

POWER OF ATTORNEY NOTICE



OC000000080819032

Date Mailed: 11/19/2024

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/13/2024.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/nhassani/