(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
03 August 2017 (03.08.2017)

W!P O | PCT

(10) International Publication Number
WO 2017/130068 A4

(51) International Patent Classification:
H04N 1/44 (2006.01) *B33Y 30/00* (2015.01)

(21) International Application Number:
PCT/IB20 17/000 130

(22) International Filing Date:
30 January 2017 (30.01.2017)

(25) Filing Language: English

(26) Publication Langiuage: English

(30) Priority Data:
62/288,980 29 January 2016 (29.01.2016) US

(71) Applicant: **Y SOFT CORPORATION** [CZ/CZ]; **U** Knezske Louky 2151/18, 130 00 Prague (CZ).

(72) Inventors: **MUCHNA, Vaclav; U** Knezske Louky 215 1/18, 130 00 Praha (CZ). **KRAJICEK, Ondrej;** Rakovecka 13a, 635 00 Brno (CZ). **MIKLAS, David;** Matejkova 2123/1 1, 190 00 Praha (CZ). **VLADIMIR, Co-ufal;** Merklovice 34, 517 54 Vamberk (CZ).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available):* AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available):* ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,

(54) Title: SECURE 3D PRINTER AND 3D PRINTER MANAGEMENT NETWORK

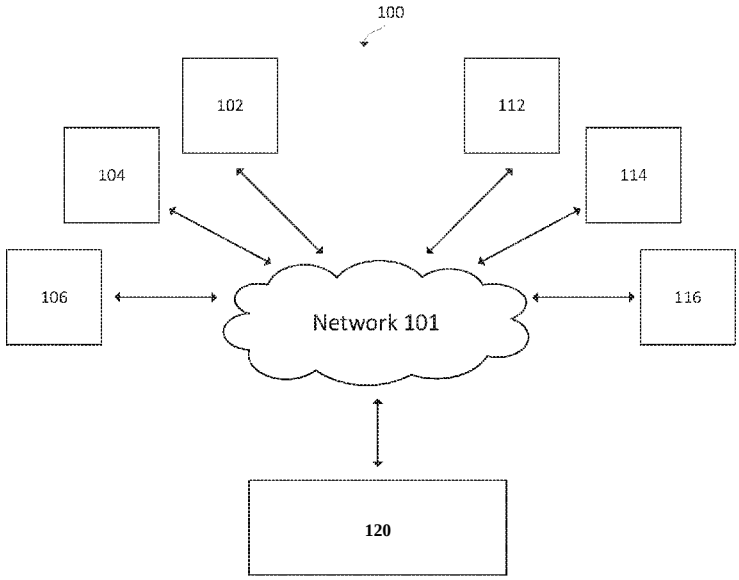

FIG. 1

(57) Abstract: A printer management system includes one or more printing devices having a printing area for printing according to a digital file, an access area through which a user may access the printing area, and a locking mechanism configured to lock the access area preventing access to the printing area. A management server is communicatively coupled to the one or more printing devices over a communication network and is configured to receive a print request from one or more user devices or one of the one or more printing devices to print the digital file, transmit the digital file to one of the one or more printing devices, and transmit commands to lock and unlock the locking mechanism of the one or more printing devices. In one embodiment the management system is configured to update a printing status of each of the one or more printing devices.

WO 2017/130068 A4

[Continued on next page]

EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*
— *with amended claims and statement (Art. 19(1))*

Date of publication of the amended claims and statement:

09 November 2017 (09.11.2017)

AMENDED CLAIMS
received by the International Bureau on 21 August 2017 (21.08.17)

1. A printer management system comprising:

one or more 3D printing devices each comprising

a 3-dimensional printing region for printing according to a digital file;

an opening through which a user may access the printing region;

a moveable panel adapted to cover the opening when disposed in a closed position;

a locking mechanism configured to lock the moveable panel in the closed position thereby preventing the user from accessing the printing region through the opening; and

a management server communicatively coupled to each of the one or more printing devices over a communications network,

wherein the management server is configured to

receive a print request from one or more user devices or one of the one or more printing devices to print the digital file,

transmit the digital file to a selected one of the one or more printing devices, and

transmit commands to lock and unlock the locking mechanism of the one or more printing devices.

2. The printer management system of claim 1, wherein the one or more printing devices are configured to lock the locking mechanism during printing of the digital file, and are capable of unlocking the locking mechanism upon receiving a command from the management server and from an authorized user.

3. The printer management system of claim 1, wherein the management server is further configured to update a printing status of each of the one or more 3D printing devices and the selected one or more 3D printing devices is selected based upon the printing status of each of the one or more 3D printing devices.

4. The printer management system of claim 1, wherein the one or more 3D printing devices further comprises a user interface,

wherein the user interface is configured to

authenticate an authorized user, and

unlock the locking mechanism in response to an unlock command from the authorized user.

5. The printer management system of claim 1, wherein the locking mechanism comprises an electromagnetic lock.

6. The printer management system of claim 1, wherein the locking mechanism comprises a mechanical bolt-action lock.

7. The printer management system of claim 4, wherein the management server is further configured to store a plurality of digital files, and the user interface is further configured to retrieve, in response to a request from the authorized user, a selected one or more digital files of the plurality of digital files for printing by the 3D printing device.

8. The printer management system of claim 4, wherein the user interface is further configured to transmit, in response to a print command from the authorized user, the print request to the management server.

9. The printer management system of claim 1, wherein the print request comprises the metadata for the digital file.

10. The printer management system of claim 9, wherein the metadata comprises at least one of a file name of the digital file, an owner of the digital file, an estimated time to print the digital file, and an estimated amount of material required to print the digital file.

11. The printer management system of claim 3, wherein the printing status indicates printer operation time, printer occupation time, or printer material remaining.

12. (Canceled)

13. A printer management system comprising:

a management server capable of being communicatively coupled to one or more 3D printing devices over a communications network,

wherein, the management server is configured to

receive, over the communications network, a print request from one or more user devices or the one or more 3D printing devices to print a digital file,

transmit, over the communications network, the digital file to a selected one or more 3D printing devices, and

transmit, over the communications network, commands to lock and unlock a locking mechanism of the one or more 3D printing devices, the locking mechanism configured to secure a moveable panel, which is adapted to cover an opening through which a user may access a 3-dimensional printing region of the 3D printing device for printing the digital file when the moveable panel is in a closed

position, in the closed position thereby preventing the user from accessing the printing region through the opening.

14. The printer management system of claim 13, wherein the management server transmits the command to lock the locking mechanism of the selected one or more 3D printing devices prior to printing of the digital file, and transmits the command to unlock the locking mechanism of the selected one or more 3D printing devices at a time after the digital file has completed printing.

15. The printer management system of claim 13, wherein the management server is further configured to update a printing status of each of the one or more 3D printing devices.

16. The printer management system of claim 13, wherein the management server is further configured to store the digital files received from the one or more user devices.

17. The printer management system of claim 13, wherein the print request comprises the metadata for the digital file.

18. The printer management system of claim 17, wherein the metadata comprises at least one of a file name of the digital file, an owner of the digital file, an estimated time to print the digital file, and an estimated amount of material required to print the digital file.

19. The printer management system of claim 15, wherein the printing status indicates printer operation time, printer occupation time, or printer material remaining.

20. A 3D printing device comprising:

a 3-dimensional printing region for printing a digital file;

an opening through which a user may access the printing region;

a moveable panel adapted to cover the opening when disposed in a closed position; and

a locking mechanism configured to lock the moveable panel in the closed position

thereby preventing the user from accessing the printing region through the opening,

wherein

the 3D printing device is capable of being communicatively coupled to a management server, and

the 3D printing device is configured to lock the locking mechanism during printing of the digital file, and is capable of unlocking the locking mechanism upon receiving a command from an authorized user and from the management server.

21. The 3D printing device of claim 20, wherein the locking mechanism comprises an electromagnetic lock.

22. The 3D printing device of claim 20, wherein the locking mechanism comprises a mechanical bolt-action lock.

23. The 3D printing device of claim 20, further comprising:

a user interface,

wherein the user interface is configured to

authenticate an authorized user, and

unlock the locking mechanism in response to an unlock command from the authorized user.

24. (Canceled)

25. The printer management system of claim 1, wherein the management server comprises:

a user account subsystem configured to store or access individual user account information; and

a security subsystem in communication with the user account subsystem and configured to store or access user authentication information associated with the individual user account information,

wherein the security subsystem is further configured to receive and verify user authentication information from a user and (i) grant access to the associated individual user account information if the user's authentication information is verified, and (ii) deny access to individual user account information if not.

26. The printer management system of claim 25, wherein the security subsystem is further configured to

store or access administrator authentication information,

receive and verify administrator authentication information from an administrator and (i) grant access to individual user account information if the administrator's authentication information is verified, and (ii) deny access to individual user account information if not.

27. The printer management system of claim 26, wherein the management server further comprises a 3D printing device subsystem in communication with the security subsystem and is configured to

retrieve and update a printing status of each of the one or more 3D printing devices, and

provide the printing status to verified users and administrators.

28. The printer management system of claim 25, wherein the user authentication information comprises at least one of a password, pin number, card number, biometric data, and RFID tag.

29. The printer management system of claim 25, wherein the individual user account information comprises at least one of the user's printing history, digital 3D printing files, available funds, and pending 3D printing requests.

30. The printer management system of claim 13, wherein the management server comprises:

a user account subsystem configured to store or access individual user account information; and

a security subsystem in communication with the user account subsystem and configured to store or access user authentication information associated with the individual user account information,

wherein the security subsystem is further configured to receive and verify user authentication information from a user and (i) grant access to the associated individual user account information if the user's authentication information is verified, and (ii) deny access to individual user account information if not.

31. The printer management system of claim 30, wherein the security subsystem is further configured to

store or access administrator authentication information,

receive and verify administrator authentication information from an administrator and (i) grant access to individual user account information if the administrator's authentication information is verified, and (ii) deny access to individual user account information if not.

32. The printer management system of claim 31, wherein the management server further comprises a 3D printing device subsystem in communication with the security subsystem and is configured to

retrieve and update a printing status of each of the one or more 3D printing devices, and

provide the printing status to verified users and administrators.

33. The printer management system of claim 30, wherein the user authentication information comprises at least one of a password, pin number, card number, biometric data, and RFID tag.

34. The printer management system of claim 30, wherein the individual user account information comprises at least one of the user's printing history, digital 3D printing files, available funds, and pending 3D printing requests.

STATEMENT UNDER PCT ARTICLE 19(1)

Pursuant to PCT Article 19, Applicant amended claims 1-4, 7, 13-15, and 20-23, added claims 25-34, and canceled claims 12 and 24.

AMENDMENTS TO THE CLAIMS

Applicant amended claims 1-4, 7, 13-15, and 20-23, added new claims 25-34, and canceled claims 12 and 24. Claims 5, 6, 8-11, and 16-19 remain unchanged. No new matter has been added.

Independent claim 1 has been amended at lines 2-9 to incorporate the limitations of claim 12 reciting, *inter alia,* "a moveable panel adapted to cover the opening when disposed in a closed position," whereby "the opening" is "an opening through which a user may access the printing region." Claim 1 has been further amended at line 2 to recite "one or more 3D printing devices," the support for which can be found throughout the application specification and figures, including the Title of the Invention, Field of the Invention Section, FIGS. 1-6, and paragraphs [0028]-[0073].

Independent claims 13 and 20 have been similarly amended as claim 1. Specifically, claim 13 has been amended at lines 12-15 to recite, *inter alia,* "a moveable panel, which is adapted to cover an opening through which a user may access a 3-dimensional printing region," and has been amended at lines 2, 6, 7, and 9 to recite "one or more 3D printing devices." Claim 20 has been amended at lines 2-7 to recite, *inter alia,* "an opening through which a user may access the printing region" and "a moveable panel adapted to cover the opening when disposed in a closed position," and has been amended at lines 1, 9, and 11 to recite a "3D printing device." The bases for these amendments are the same as the amendments to claim 1.

Claim 2 has been amended at lines 3-5 to clarify the function of the locking mechanism. The basis for this amendment can be found throughout the application specification, including at paragraphs [0043]-[0050] and [0059]-[0064].

Claims 3, 4, 14, and 21-23 have been amended to include the term "3D" to conform to the amended language of the independent claims from which they depend. The bases for these amendments are the same as the independent claims.

New claims 25-34 are directed to the subsystems of the management server. Support for these claims can be found in the application specification at FIG. 2 and paragraphs [0031]-[0043].

Dated: August 21, 2017

Respectfully submitted,

/David M. Tennant/

David M. Tennant
WHITE & CASE LLP
701 Thirteenth Street, NW
Washington, DC 20005-3807
(202) 626-3600
(202) 639-9355 (Fax)