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Control over increasing printing material based on determination of subscription service operation mode and network setup process based on internet connection

Abstract

A printing apparatus determines whether it has connected to the Internet in a case where an operation to power on is accepted before initial setup of the printing apparatus is completed, and executes predetermined control for preventing a process for holding printing material in the printing apparatus from being performed by a user. Contract information is obtained through the Internet in a case where the printing apparatus has connected to the Internet, and it is confirmed whether the user can use the printing apparatus in a contract status indicated by the contract information. The predetermined control is cancelled in a case where the printing apparatus connects to the Internet and it is confirmed the user can use the printing apparatus in the contract status indicated by the contract information.

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Background/Summary

BACKGROUND
Field of the Invention
(1) The present disclosure relates to a printing apparatus, a method of controlling a printing apparatus, and a storage medium.
Description of the Related Art
(2) Printing apparatuses go through initial setup operations to be ready to use after being shipped to users. The users perform the initial setup by following a designated procedure while seeing an instruction manual, an operation screen on the printing apparatus, a mobile terminal, or the like.
(3) The main setup operations that the users perform in the initial setup include ink setup and network setup. The ink setup is an operation of setting inks, which are consumables to be used by the printing apparatus for printing, on the printing apparatus and filling the inks into the printing apparatus. The network setup is an operation of configuring settings for connecting the printing apparatus to a desired access point so that the printing apparatus and external apparatuses can communicate with each other through a network. After the network setup is completed, a contracted service(s) is(are) checked through the network thus set up.
(4) The above two types of setup are not directly associated with each other in terms of order. Hence, either setup may be performed before the other. Japanese Patent Laid-Open No. 2021-22876 discloses simultaneous execution of ink setup and network setup.
SUMMARY
(5) Printing apparatuses that can obtain contract information regarding contracts related to the use of the printing apparatuses and is connectable to networks have become popular. This has led to a demand to control such printing apparatuses more appropriately.
(6) A printing apparatus according to an aspect of the present disclosure is a printing apparatus capable of executing printing using a printing material, including: an obtaining unit capable of obtaining contract information through a network, the contract information indicating a contract related to use of the printing apparatus; a control unit that executes predetermined control for preventing a process of increasing the printing material included in the printing apparatus from being performed in a state where the printing apparatus is connected to no network; and a cancellation unit that cancels the predetermined control in a case where the printing apparatus connects to a network.
(7) Further features of the present invention will become apparent from the following description of exemplary embodiments with reference to the attached drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) FIG. **1** is a diagram illustrating a configuration of a printing system;
(2) FIGS. **2**A and **2**B are exterior views of a printer;
(3) FIG. **3** is a diagram illustrating a hardware configuration of the printer;
(4) FIG. **4** is a software module diagram of the printer;
(5) FIG. **5** is a diagram illustrating a hardware configuration of a cloud server;
(6) FIG. **6** is a software module diagram of the cloud server;
(7) FIGS. **7**A and **7**B are diagrams illustrating web application programming interface (API) data

structures;

DESCRIPTION OF THE EMBODIMENTS

(18) A preferred embodiment of the present disclosure will be exemplarily described below with reference to the drawings. It is to be understood that the scope of the present disclosure also encompasses embodiments obtained by changing or improving the embodiment described below as appropriate based on the ordinary knowledge of those skilled in the art without departing from the gist of the present disclosure.

Embodiment 1

(19) FIG. **1** is a diagram illustrating a configuration of a printing system **100**. The printing system **100** includes a cloud server **200** and devices **400** connected by a local area network (LAN) **102** and an Internet **104**. The devices **400** includes various apparatuses connectable to networks. Examples of the devices **400** include a smartphone **500**, a printer **300**, a client terminal **401**, such as a personal computer or a work station, a digital camera **402**, and so on. However, the devices **400** are not limited to these types of apparatuses and may include home appliances such as a refrigerator, a television set, and an air conditioning, for example. These devices **400** can be connected to one another by the local area network **102** and connected to the Internet **104** via a router **103** installed in the local area network **102**. The router **103** is illustrated as an apparatus that connects the local area network **102** and the Internet **104**, but can be given a wireless LAN access point function that establishes the local area network **102**. In this case, each of the devices **400** can be configured not only to connect to the router **103** through a wired LAN but also to connect to the access point through a wireless LAN to join the local area network **102**. For example, the printer **300** or the client terminal **401** can be configured to connect to the router **103** through a wired LAN, and the smartphone **500** or the digital camera **402** can be configured to connect to the router **103** through a wireless LAN. Each of the devices **400** is capable of mutually communicating with the cloud server **200** through the Internet **104**, to which the device **400** is connected via the router **103**. The devices **400** are capable of mutually communicating with one another through the local area network **102**. The smartphone **500** and the printer **300** are capable of communicating with each other by close-range wireless communication **101**. Wireless communication complying with a Bluetooth (registered trademark) standard or a near-field communication (NFC) standard may be utilized as the close-range wireless communication **101**. The smartphone **500** is also connected to a cellular phone network **105** and is capable of communicating with the cloud server **200** through this cellular phone network **105**. This configuration represents an example of the present embodiment. A different configuration may be employed. For example, although an example in which the router **103** has an access point function has been presented, the access point may be configured of an apparatus other than the router **103**.

(20) FIGS. **2**A and **2**B are exterior views of the printer **300**. In the present embodiment, a multi-function printer (MFP) which is a printer equipped also with a scanner function or another function is employed as an example. FIG. **2**A illustrates an exterior view of the whole printer **300**. A document positioning plate **301** is a glassy clear plate and is used to read a document placed thereon with a scanner. A document positioning plate pressing plate **302** is a cover to be pressed

against the document positioning plate to keep a document thereon from floating in a case of reading it with the scanner and also to block entry of external light into a scanner unit. A print sheet insertion port **303** is an insertion port where sheets of various sizes can be set. Sheets set at this print sheet insertion port **303** are conveyed one by one to a print unit, subjected to desired printing, and discharged from a print sheet discharge port **304**.

(21) FIG. **2**B illustrates an exterior view of the upper face of the printer **300**. An operation panel **305** and a close-range wireless communication unit **306** are arranged in the top of the document positioning plate pressing plate **302**. The operation panel **305** is a touch panel-type liquid crystal display which can present various displays and on which the user can input operations addressed to the printer **300**.

(22) The close-range wireless communication unit **306** is a unit for performing close-range wireless communication and is capable of communicating with close-range wireless communication units of communication targets present within a predetermined distance. A wireless LAN antenna **307** is embedded as an antenna for connecting to the local area network **102** and performing communication using a wireless LAN.

(23) FIG. **3** is a block diagram illustrating a configuration of the printer **300**. The printer **300** has a main board **310** that comprehensively controls the apparatus, a wireless LAN unit **308**, and the close-range wireless communication unit **306**. A CPU **311** arranged on the main board **310**, which is in the form of a microprocessor, operates in accordance with a control program stored in a program memory **313** connected via an internal bus **312**, which is in the form of a rear-only memory (ROM), and contents in a data memory **314**, which is in the form of a random access memory (RAM). The CPU **311** reads a document by controlling a scanner mechanism control circuit **315**, and stores the result in an image memory **316** in the data memory **314**. The CPU **311** is also capable of printing an image in the image memory **316** in the data memory **314** on a print medium by controlling a print mechanism control circuit **317**. The CPU **311** performs wireless LAN communication with other communication terminal apparatuses by controlling the wireless LAN unit **308** via a wireless LAN control circuit **318**. The CPU **311** is also capable of, for example, detecting connections to other close-range wireless communication terminals and sending and receiving data to and from the other close-range wireless communication terminals by controlling the close-range wireless communication unit **306** via a close-range wireless communication control circuit **319**. The CPU **311** is capable of, for example, controlling the display of a status of the printer **300** or a function selection menu on the operation panel **305**, and accepting operations from the user by controlling an operation unit control circuit **320**. The CPU **311** is also capable of managing covers **322** and **326** by, for example, detecting the covers' states and locking their opening and closing via controlling a cover mechanism control circuit **321**. Incidentally, an ink tank-incorporated printer includes the covers **326**. The ink tank-incorporated printer will be described later. The operation unit control circuit **320** performs control related to operations and the cover mechanism control circuit **321** manages the covers **322** and **326**, but these may be the same control circuit. The CPU **311** is also capable of managing a printer head **324** and ink tanks **325** by, for example, detecting states of the printer head **324** and the ink tanks **325** and changing the position of the printer head **324** via controlling a printer head control circuit **323**. Incidentally, the print mechanism control circuit **317** performs control related to printing and the printer head control circuit **323** manages the printer head **324** and the ink tanks **325**, but these may be the same control circuit.

(24) FIG. **4** is a diagram illustrating a module configuration of software that operates on the printer **300**. Printer control software **1300**, which operates on the printer **300**, runs on a built-in control operating system (OS) **1301**. Each module is broadly categorized in a system control layer **1310**, a job management layer **1320**, a middleware layer **1330**, or an application layer **1340**. The built-in control OS **1301** is an OS that controls the basic operation of the printer control software **1300**. Areal-time OS, which has excellent responsiveness, is usually used. The system control layer **1310**

is a group of modules that mainly control hardware of the printer **300**. A print control module **1311** is a control module for, for example, executing the print operation of the printer **300** by controlling the print mechanism control circuit **317**, and managing the printer head **324** and the ink tanks **325** by controlling the printer head control circuit **323**. A reading control module **1312** is a control module for executing an operation of reading a document placed on the document positioning plate **301** by controlling the scanner mechanism control circuit **315**.

(25) A panel control module **1313** is a control module for, for example, controlling the display on the operation panel **305** of the printer **300** and detecting various key operations and the state of the cover **322**. A memory management module **1314** is a control module for performing management such as dynamic allocation of the data memory **314** and the image memory **316**. A power supply control module **1315** is a control module for, for example, supplying hardware blocks with electric power necessary for operation and performing control in a power save mode by controlling the power supply of the printer **300**. A close-range wireless communication control module **1316** is a control module for communicating with terminal apparatuses such as the smartphone **500** by controlling the close-range wireless communication unit **306**. A network communication control module **1317** is a control module for controlling a physical communication layer for performing LAN communication with external apparatuses by controlling the wireless LAN unit **308**. The job management layer **1320** is a group of modules that execute various operations using the system control layer **1310** while performing hardware resource allocation, exclusion control, scheduling, and the like in response to a job execution request from an upper layer. The middleware layer **1330** is situated between the application layer **1340** and the job management layer **1320**, and is a group of modules commonly used by multiple function modules in the application layer **1340**. An application framework **1331** is a framework module commonly used in a case where the application layer **1340** requests the job management layer **1320** to execute a job.

(26) A network protocol stack **1332** is a module for performing communication in compliance with various network protocols, such as the Hypertext Transfer Protocol (HTTP) and the Transmission Control Protocol/Internet Protocol (TCP/IP). An encryption processing module **1333** is a module for performing encryption and decryption processing necessary in network communication and the like. A web server module **1334** is a module for causing the printer **300** to operate as a web server in order to distribute remote user interface (UI) contents. The application layer **1340** is a group of applications that implement various functions of the printer **300**. A copying application **1341** is an application module for executing a copying operation to read and print a document. A driver printing application **1342** is an application module for receiving jobs from printer drivers in the smartphone **500** and the client terminal **401** and executing operations. Examples of the jobs from the drivers include a print job for executing a print operation, a scan job for reading a document and outputting image data, a maintenance job for exchanging information with an external apparatus to configure settings of the printer **300** and perform management, and the like. A default printing application **1343** is an application module that receives jobs from a default printing service included in a system in the smartphone **500** and executes operations. Examples of the jobs from the default printing service include a print job for executing a print operation, and a scan job for reading a document and outputting image data. Note that the default printing service is provided by the manufacturer of the smartphone or the vendor of the default OS. Hence, there is a limitation that makes it impossible to configure and manage settings specific to individual manufacturers' printer models. A remote UI module **1344** is a module that provides a remote UI function of the printer **300** to external apparatuses by using the web server module **1334**. By using a remote UI, it is possible to configure and manage settings of the printer **300**. In particular, in the printer **300** described in the present embodiment, information that can be displayed and set on the operation panel **305** is limited. The remote UI is therefore used to configure and manage more detailed settings. Also, in a case where the smartphone **500** or the client terminal **401** is not provided with a dedicated driver, only the default printing service will be used. For this reason, it will be essential

to use the remote UI to configure and manage detailed settings.

(27) The printer **300** in the present embodiment is such that its connection mode is set by network setup to be described later, and the printer **300** communicates with the smartphone **500** by a form of connection that is based on the set connection mode. The printer **300** in the present embodiment is set to an infrastructure connection mode as the connection mode in a case of performing communication through an infrastructure connection.

(28) <<Infrastructure Connection Method>>

(29) An infrastructure connection refers to a form of connection in which apparatuses to communicate with each other (e.g., the smartphone **500** and the printer **300**) connect to an access point managing a network for these apparatuses (e.g., the router **103**) and communicate with each other via the access point. The printer **300** is capable of operating in a mode for performing communication through an infrastructure connection (infrastructure connection mode) as one connection mode. In the present embodiment, an infrastructure connection is implemented in accordance with a communication standard under the IEEE 802.11 series.

(30) In an infrastructure connection, each apparatus searches for an access point by means of an apparatus search command. After finding an access point, the rest of the wireless connection process (such as establishing a wireless connection) is performed between the apparatus and the access point, which is followed by an Internet protocol (IP) connection process (such as allocating an IP address). As for commands and parameters sent and received between the apparatus and the access point to establish a wireless connection therebetween, those predefined in a communication standard under the IEEE 802.11 series may be used, and description thereof is omitted below.

(31) In the present embodiment, in a case where the printer **300** operates through an infrastructure connection, the router **103** operates as a master apparatus and the printer **300** operates as a slave apparatus. In sum, in the present embodiment, an infrastructure connection refers to a connection between the printer **300** operating as a slave apparatus and an apparatus operating as a master apparatus. In a case where the printer **300** has established an infrastructure connection and the smartphone **500** has also established an infrastructure connection to the router **103**, the printer **300** and the smartphone **500** can communicate with each other via the router **103**. The router **103** determines the channel to be used in the communication through the infrastructure connection. Thus, the printer **300** executes communication through the infrastructure connection by using the channel determined by the router **103**. In the present embodiment, the printer **300** is capable of using channels in a 2.4 GHz frequency band and channels in a 5 GHz frequency band for communication through the infrastructure connection. The printer **300** is capable of also using channels in the dynamic frequency selection (DFS) range in the 5 GHz frequency band for communication through the infrastructure connection. In order to communicate with the printer **300** via the router **103**, the smartphone **500** needs to recognize that the printer **300** belongs to a network which is formed by the router **103** and to which the smartphone **500** belongs.

(32) In the present embodiment, the printer **300** is capable of simultaneously establishing a direct connection and an infrastructure connection. In other words, the printer **300** is capable of simultaneously establishing a wireless fidelity (Wi-Fi) connection in which the printer **300** operates as a slave apparatus and a Wi-Fi connection in which the printer **300** operates as a master apparatus. This operation in a state of simultaneously establishing the above two connections is called simultaneous operation. Incidentally, a direct connection refers specifically to a form of connection in which apparatuses are directly (i.e., Peer-to-Peer) and wirelessly connected to each other without an external apparatus such as the router **103** interposed therebetween.

(33) <<Network Setup>>

(34) In the present embodiment, the smartphone **500** executes network setup as setup to cause the printer **300** to operate in the infrastructure connection mode by using wireless communication with the printer **300**. Network setup in the present embodiment is also called cableless setup (CLS) since it is executed via wireless communication. Network setup may be executed via wired

communication.

(35) The smartphone **500** performs network setup on the printer **300** in a case where a predetermined application stored in a ROM **104**, an external storage apparatus **106**, or the like is activated. The predetermined application refers to an application for, for example, setting an access point for the printer **300** to connect to and causing the printer **300** to print image data, document data, or the like in the smartphone **500**, and will hereinafter be referred to as "printing application". The printing application may have other functions in addition to the function of setting an access point for the printer **300** to connect to and the printing function. For example, in a case where the printer **300** has a scan function, the printing application may have a function of causing the printer **300** to scan a set document, a function of configuring other settings of the printer **300**, a function of checking the status of the printer **300**, and the like. The user can, for example, print desired images and set communication apparatuses, as well as using functions of the communication apparatuses via a display screen displayed by the printing application.

(36) For example, the smartphone **500** executes a process of causing the printer **300** to execute printing in response to detecting that a print button displayed by the printing application is pressed. This process includes a process of accepting selection of an image to be printed and a process of sending a print job for causing the printer **300** to execute the printing.

(37) The smartphone **500** executes a process for causing the printer **300** to execute scanning in response to detecting that a scan button is pressed. This process includes a process of sending a scan job for causing the printer **300** to execute scanning and a process of receiving an image obtained by the scanning executed based on the scan job.

(38) The smartphone **500** starts network setup in response to detecting that a printer setup button is pressed.

(39) The printer **300** is capable of operating in a connection setup mode (connection setup state) which is a mode for executing network setup, and executes network setup in a state of operating in the connection setup mode. Details of the connection setup mode will be described later.

(40) In a case of causing the printer **300** to operate in the infrastructure connection mode, the smartphone **500** wirelessly sends the printer **300** infrastructure setup information which is setup information for causing it to operate in the infrastructure connection mode. The infrastructure setup information contains information on the router **103**. The information on the router **103** is, for example, information on its service set identifier (SSID), password, frequency band, and the like.

(41) In the present embodiment, a direct connection for connection setup between the smartphone **500** and the printer **300** is used to send the infrastructure setup information in network setup. In the present embodiment, network setup is executed using Wi-Fi as the direct connection for connection setup. However, the direct connection for connection setup is not limited to Wi-Fi. For example, a wireless communication standard other than Wi-Fi, such as Bluetooth, may be used, or a wired communication standard, such as a wired LAN or the Universal Serial Bus (USB), may be used.

(42) After establishing an infrastructure connection via Wi-Fi or a direction connection between the smartphone **500** and the printer **300** by the network setup, the smartphone **500** and the printer **300** can communicate with each other through the established connection. Specifically, for example, the smartphone **500** can send a print job for causing the printer **300** to execute printing and a scan job for causing the printer **300** to execute scanning to the printer **300** through the established connection.

(43) <<Connecting Setup Mode>>

(44) As described above, the printer **300** is capable of operating in the connecting setup mode. A trigger for the printer **300** to start operating in the connection setup mode may be, for example, pressing of a connection setup mode button by the user or booting of the printer **300** (shifting to a software-on state). The connection setup mode button may be a hardware button included in the printer **300** or a software button displayed by the printer **300** on the operation panel **305**. After starting operating in the connection setup mode, the printer **300** activates Wi-Fi communication.

Specifically, the printer **300** is caused to operate as an access point dedicated for the connection setup mode. In this way, the printer **300** can establish a direct connection to the smartphone **500** via Wi-Fi. Connection information (such as SSID) for connecting to the dedicated access point for the connection setup mode is held beforehand in a setup program for the printer **300** installed in the smartphone **500**. Also, the smartphone **500** has acknowledged connection information for connecting to the software access point dedicated for the connection setup mode beforehand. Thus, unlike connection information of an access point to be activated in a direct connection mode, at least part of the connection information for connecting to the dedicated software access point for the connection setup mode (such as at least part of the SSID) cannot be changed as desired by the user. In the present embodiment, there is no password for connecting to the dedicated software access point for the connection setup mode. The smartphone **500** can connect to the printer **300** operating in the connection setup mode with no password as long as the smartphone **500** has acknowledged the SSID. The present embodiment is not limited to this configuration. For example, the configuration may be such that a password for connecting to the dedicated software access point for the connection setup mode is also held in the setup program for the printer **300** beforehand and the password is used to establish a connection to the printer **300** operating in the connection setup mode.

(45) In the connection setup mode, the printer **300** may connect to the smartphone **500** via Wi-Fi Direct (WFD), instead of normal Wi-Fi. Specifically, the printer **300** may operate as the Group Owner and receive setup information from the smartphone **500** by communication via WFD. WFD is a standard specified by the Wi-Fi Alliance and included as a communication standard (Wi-Fi communication standards) in the IEEE 802.11 series. In the connection setup mode, the printer **300** may connect to the smartphone **500** via Bluetooth. Specifically, the printer **300** may operate as a slave apparatus in Bluetooth and receive setup information from the smartphone **500** by communication via Bluetooth (communication via a Bluetooth connection). The Bluetooth may be Bluetooth Classic or Bluetooth Low Energy (BLE). In a case of using BLE, a communication apparatus starts sending advertisement information complying with the BLE standard after starting operating in the connection setup mode, and shifts to a state where the communication apparatus can establish a BLE connection to the smartphone **500** having received the advertisement information. The connection setup mode may be a state where Wi-Fi and Bluetooth are both usable. Specifically, the printer **300** operating in the connection setup mode may receive setup information via a Wi-Fi connection in a case where it received a connection request from the smartphone **500** via Wi-Fi. The printer **300** may receive setup information via a Bluetooth connection in a case where it received a connection request from the smartphone **500** via Bluetooth.

(46) The smartphone **500** and the printer **300** share the processing in the above-described manner as an example. The sharing of the processing is not particularly limited to this manner and may be done in another manner.

(47) FIG. **5** is a block diagram illustrating a configuration of the cloud server **200**. The cloud server **200** has a main board **210** that comprehensively controls the apparatus, a network connection unit **201**, and a hard disk drive unit **202**. A CPU **211** arranged on the main board **210**, which is in the form of a microprocessor, operates in accordance with a control program stored in a program memory **213** connected via an internal bus **212** and contents in a data memory **214**. The CPU **211** connects to a network such as the Internet **104** and communicates with other apparatuses by controlling the network connection unit **201** via a network control circuit **215**. The CPU **211** is capable of reading and writing data out of and to the hard disk drive unit **202** connected via a hard disk drive control circuit **216**. The hard disk drive unit **202** stores an OS or a control software for the cloud server **200** to be loaded to and used in the program memory **213** as well as various data. A GPU **217** is connected to the main board **210** and is capable of executing various kinds of arithmetic processing on behalf of the CPU **211**.

(48) FIG. **6** is a diagram illustrating a module configuration of software that operates on the cloud

server **200**. Software **1200**, which operates on the cloud server **200**, runs on an OS **1201**. Each module is broadly categorized in a data storage layer **1210**, a middleware layer **1220**, and an application layer **1230**. Each module is implemented by loading the module stored in the hard disk drive unit **202** to the program memory **213** and the data memory **214** and executing it as appropriate. The data storage layer **1210** has a database and a file storage in which to store and manage information to be used in various services. A database **1211** stores the data of a relational database managed by a database management system **1223**. A file storage **1212** stores files and the like managed by a file system **1224**. The files stored in the file storage **1212** include image data of print jobs to be printed by the printer **300**, image data obtained by scanning by the printer **300**, and the like. The middleware layer **1220** is situated under the application layer **1230** and includes a group of modules to be commonly used by multiple application modules in the application layer **1230**.

(49) A web API service **1221** is a module for performing a web API process for a service(s) to be provided by the cloud server **200**. A web API is defined as a data structure to be handled in the HTTP protocol. The web API service **1221** requests modules for services **1231** to **1235** in the application layer **1230** to perform processes based on the contents of an HTTP request received using a network protocol stack **1222**. The web API service **1221** also receives the results of the requested processes by the modules, and performs a process of returning an HTTP response to the requester using the network protocol stack **1222**. The network protocol stack **1222** is a module for performing communication in compliance with various network protocols, such as HTTP and TCP/IP. The database management system **1223** is a module that provides a management function for accessing the information in the database **1211** from the services **1231** to **1235** in the application layer **1230**. The file system **1224** is a module that provides a management function such as reading and writing files out of and to the file storage **1212** from the services **1231** to **1235** in the application layer **1230**.

(50) The application layer **1230** is a group of services that provide various functions of the cloud server **200**. A printer management service **1231** provides functions to manage information on the registered printer **300**. The provided functions include managing status notifications received from the printer **300**, requesting ink delivery according to a status of the printer **300** based on a service use contract, and managing the number of sheets printed by the printer **300** and restricting printing above an upper limit based on a service use contract.

(51) An account management service **1232** provides functions to manage information on registered service users. The provided functions include managing information on the service users, managing the volume of the data stored in the file storage **1212** based on a service use contract, restricting data storage of a volume exceeding an upper limit, and the like.

(52) A job management service **1233** provides functions to manage information on jobs for service users to execute printing, scanning, and the like with the registered printer **300**. The provided functions include receiving job execution requests from service users, spooling job data in the file storage, notifying the printer **300** of the job data, and returning job information in response to an inquiry from the printer **300**. Other functions include receiving and managing job status notifications from the printer **300**, deleting the data of completed jobs from the file storage, and the like.

(53) A contract management service **1234** provides functions to manage service use contract information related to use of the printer **300**, which is a registered printer for service users. The provided functions include managing information of service use contracts and the like.

(54) An ink delivery management service **1235** provides functions to manage information for delivering inks that are consumables to be used on the printer **300** from the service provider to service users based on a service use contract. The provided functions include performing a necessary procedure for delivery of an ink(s) to a service user in response to an ink delivery request from the printer management service **1231**, managing information on the ink delivery, and the like.

(55) FIG. **6** is depicted assuming a case where the cloud server **200** is constructed as a single physical server. Alternatively, the configuration may be such that the multiple modules described above are distributed to and constructed on two or more physical servers. For example, the services **1231** to **1235** in the application layer may each be caused to operate on a different physical server. Moreover, an application server that provides these services and the database **1211** or the file storage **1212** may each be caused to operate on a different physical server.

(56) FIGS. **7**A and **7**B are diagrams illustrating web API data structures for the cloud server **200**. FIG. **7**A illustrates a data structure of an API request **3000**. The API request **3000** is sent to the cloud server **200** from the printer **300** as an HTTP request. The whole API request **3000** is described as text data, and its structure is defined by lines divided by line feed codes. The first line in the API request **3000** is a request line **3001**. The request line **3001** begins with the request HTTP method, which is followed by a universal resource identifier (URI) identifying the requested resource and an indication of the protocol version, and ends with a line feed code. The URI is a combination of "base", which is a URI indicating the location of the cloud server **200**, and a character string following the URI indicating the name of the API request. The section from the line next to the request line **3001** down to the line where the first blank line appears is a request header **3002**. The request header **3002** is used to pass the request or additional information on an HTTP client which is the request source to an HTTP server which is the request destination. In FIG. **7**A, as an example, a character string **3004** identifying a user is described after a name character string "userid:", and a character string **3005** identifying a printer is described after a name character string "printerid:". Other parameters can be described in a line **3006** and subsequent lines. The line following the blank line after the request header **3002** is referred to as a message body **3003**. In the message body **3003** is described the very data to be passed to the HTTP server from the HTTP client based on the type of the request HTTP method. The message body **3003** may not be present depending on the type of the API.

(57) FIG. **7**B illustrates a data structure of an API response. This data structure is used to return an HTTP response to the printer **300** from the cloud server **200** as a response to the API request **3000**. A whole API response **3010** is described as text data, and its structure is defined by lines divided by line feed codes. The first line in the API response **3010** is a status line **3011**. The status line **3011** begins with the version of the protocol, which is followed by a numerical status code and a character string, and ends with a line feed code. The section from the line next to the status line **3011** down to the line where the first blank line appears is a status header **3012**. The status header **3012** is used to pass a status or additional information on data to be passed in a message body **3013** included in the HTTP response or the like to the HTTP client, which is the request source. In FIG. **7**B, as an example, a character string **3014** identifying the user is described after a name character string "userid:", and a character string **3015** identifying the printer is described after a name character string "printerid:". Other parameters can be described in a line **3016** and subsequent lines. The lines following the blank line after the status header **3012** are referred to as the message body **3013**. In the message body **3013** is described the very data to be passed to the HTTP client from the HTTP server. FIG. **7**B exemplarily illustrates a case where API return data **3017** is stored, but the message body **3013** may not be present depending on the type of the API.

(58) FIGS. **8**A to **8**E are diagrams illustrating data structures of records stored in the database in the cloud server **200**. The data structure of each table is defined as a set of attribute values grouped together. The attributes include a primary key uniquely identifying the records stored in the table, and foreign keys for referring to records in other tables. In FIGS. **8**A to **8**E, the data structures are illustrated to be divided into upper and lower frames. The attribute including the primary key is described in the upper box, and the attributes including the foreign keys are described in the lower box. In the present embodiment, the five pieces of record data illustrated in FIGS. **8**A to **8**E (user information record **3100**, printer information record **3110**, job information record **3120**, contract information record **3130**, and delivery information record **3140**) will be described as an example.

(59) FIG. **8**A is a diagram illustrating a data structure of the user information record **3100** stored in a user information table. A user ID **3101** is a primary key, with which a desired record can be uniquely identified out of multiple records stored in the user information table. Detailed user information **3102** stores attribute information such as a user's address, name, age, and the like. A current-period storage volume upper limit **3103** stores an upper limit for the storage volume in a current period for the user. A current-period used storage volume **3104** stores the storage volume used in the current period by the user. The current period refers to a management period determined in accordance with a contract, and is managed based on a predetermined period of time, such as one month or one year. Also, the current-period storage volume upper limit **3103** is set for each management period based on the value of a storage volume upper limit **3137** in the contract information record **3130** to be described later, and can be changed during the period depending on the usage of the service. In this way, the user may be allowed to use the cloud server **200** while temporarily exceeding the storage volume designated in the contract. In a case where the current-period used storage volume **3104** exceeds the current-period storage volume upper limit **3103**, the user of interest will not be able to store further data on the cloud server **200**. A currently held point **3105** stores information on points held by the user. Points are granted according to the number of sheets printed or the amount of an ink(s) consumed, and the user can receive various services using the granted points. For example, the user can use the points to pay the fee for a contract, or pay for an article sold by a service provider.

(60) FIG. **8**B is a diagram illustrating a data structure of the printer information record **3110** stored in a printer information table. A printer ID **3111** is a primary key, with which a desired record can be uniquely identified out of multiple records stored in the printer information table. A printer status **3112** indicates whether an error has occurred on the printer **300** and, in a case where an error has occurred, stores information such as the type of the error. A remaining ink amount **3113** stores information on the remaining amounts of the inks used in the printer **300**. In a case where the remaining amount of an ink falls to or below a predetermined amount, a warning is output or this state is determined as an error and the operation is stopped, for example. A current-period printed sheet count **3114** stores the number of sheets printed in the current period by the printer **300**, which is the printer of interest. A current-period printed sheet count upper limit **3115** stores an upper limit for the number of sheets printed in the current period by the printer **300**, which is the printer of interest. Also, the current-period printed sheet count upper limit **3115** is set for each management period based on the value of a printed sheet count upper limit **3136** in the contract information record **3130** to be described later, and can be changed during the period depending on the usage of the service. In this way, the user may be allowed to use the printer **300** while temporarily exceeding the number of printed sheets designated in the contract. In a case where the current-period printed sheet count **3114** exceeds the current-period printed sheet count upper limit **3115**, the printer **300** of interest will not be able to further execute printing.

(61) FIG. **8**C is a diagram illustrating a data structure of the job information record **3120** stored in a job information table. A job ID **3121** is a primary key, with which a desired record can be uniquely identified out of multiple records stored in the job information table. A user ID **3122** is a foreign key and is used to identify a user who requested a job and to refer to information on that user in the user information table. A printer ID **3123** is a foreign key and is used to identify the printer **300** to execute the job and to refer to information on that printer in the printer information table. A job status information **3124** stores information on the current status of the job. The status can take a value such as "waiting to print," "printing," "printed," or "printed by another printer". Printing parameter settings **3125** store information on parameters designating printing conditions to be used in the job. This can include information such as the sheet size, the sheet type, and the types of inks to be used. Print job data **3126** stores information identifying print image data to be printed in the job. This is formed of address information of the job stored in the file storage **1212**, or the like. A reprinting flag **3127** indicates whether the job is reprinting. This is enabled in a case where

reprinting is necessary after performing printing with another printer, and is cleared after the reprinting is completed.

(62) FIG. **8D** is a diagram illustrating a data structure of the contract information record **3130** stored in a contract information table. A contract ID **3131** is a primary key, with which a desired record can be uniquely identified out of multiple records stored in the contract information table. A user ID **3132** is a foreign key and is used to identify a user who is a subject of a contract and to refer to information on that user in the user information table. A printer ID **3133** is a foreign key and is used to identify a printer which is a subject of the contract and to refer to information on that printer in the printer information table. A contract type **3134** stores the type of the contract. The type of the contract includes a pay-as-you-go contract, a flat rate contract, a delivery contract, or the like. The pay-as-you-go contract is a contract in which the user is charged by how much the user used the printer. Specifically, it is a contract in which the user is charged according to the number of sheets printed or the amount of a consumable(s) consumed. The flat rate contract is a so-called subscription contract in which the user is charged a fixed usage fee for each predetermined period regardless of how much the user used the printer. It is a contract in which, for example, an upper limit is set for the number of sheets to be printed per a predetermined period or a limit is set for the storage volume of print data to be held on the cloud server **200** per a predetermined period, and the user is allowed to use the printer **300** or the cloud server **200** as much as the user wants within the limit. The delivery contract is a contract in which a consumable such as an ink will be automatically ordered and delivered in a case where the consumable runs low, and the user pays the amount of money corresponding to the ordered consumable to purchase it. The contract types described above are mere examples, and other forms of use may be provided as contracts. Detailed contract information **3135** stores detailed information on the contract. This can include information such as the period of the contract, the conditions of use, and the fee. The printed sheet count upper limit **3136** stores the upper limit for the number of sheets to be printed in the contract set for the printer **300** involved in the contract. The storage volume upper limit **3137** stores the upper limit for the storage volume in the contract set for the user involved in the contract.

(63) FIG. **8E** is a diagram illustrating a data structure of the delivery information record **3140** stored in a delivery information table. An order ID **3141** is a primary key, with which a desired record can be uniquely identified out of multiple records stored in the delivery information table. A contract ID **3142** is a foreign key and is used to identify a contract on which a delivery is based, and to refer to information on that contract in the contract information table. Detailed order information **3143** stores detailed information on the delivery. This can include information such as the ink type and the quantity. An order date **3144** stores the date on which the delivery was arranged. A scheduled arrival date **3145** stores the date on which the article arranged to be delivered is scheduled to be delivered to the user.

(64) FIG. **9** is a flowchart illustrating a flow of processing performed in a case where the cloud server **200** receives a web API request. The CPU **211** of the cloud server **200** executes this processing in response to the cloud server **200** receiving a web API request from outside. The CPU **211** of the cloud server **200** performs the series of processes illustrated in this flowchart by loading program code stored in the program memory **213** to the data memory **214** and executing it. Note that "S" in the description of each process below means a step in the flowchart, and this applies also to the subsequent embodiments.

(65) First, in S**901**, the CPU **211** of the cloud server **200** checks the type of the received web API request. In each of the subsequent steps, a process corresponding to the result of the check of the web API request type is performed.

(66) If the request is job execution from a user terminal, the CPU **211** proceeds to S**902** and performs a job execution process corresponding to the contents of the job.

(67) If the request is a job inquiry from the printer **300**, the CPU **211** proceeds to S**903** and sends job data in a case where there is a job for the printer **300**. The CPU **211** may send the job data by

returning spooled job data itself as a web API response or returning a URI representing the spooled job data as a response.

(68) If the request is job status notification from the printer **300**, the CPU **211** proceeds to S**904** and performs a job status notification process.

(69) If the request is printer status notification from the printer **300**, the CPU **211** proceeds to S**905** and performs a printer status notification process.

(70) If the request is a delivery status inquiry, the CPU **211** proceeds to S**906**, and obtains the corresponding delivery information record **3140** from the database **1211** and returns it as a web API response.

(71) If the request is a contract status inquiry, the CPU **211** proceeds to S**907**, and obtains the corresponding contract information record **3130** from the database **1211** and returns it as a web API response.

(72) If the request is point update notification, the CPU **211** proceeds to S**908** and updates the currently held point **3105** in the user information record **3100** stored in the database **1211**.

(73) If the request is other than the above, the CPU **211** proceeds to S**909** and performs a process corresponding to the request. After finishing any of the processes of S**902** to S**909**, the CPU **211** terminates the flowchart.

(74) FIGS. **10**A and **10**B are schematic views illustrating configurations of the ink tanks **325** and the printer head **324** of the printer **300**. In the present embodiment, the printer **300** is an ink-jet printer, and its print mechanism includes the printer head **324**, which ejects inks onto a print medium, and the ink tanks **325**, which hold the inks to be supplied to the printer head **324**. The configuration of the print unit includes one in which the printer head **324** and the ink tanks **325** are formed separately and one in which the printer head **324** and the ink tanks **325** are formed integrally.

(75) Incidentally, in a case where a problem occurs during the check of the service(s) contracted for the printer **300**, the user will not be able to start using the printing apparatus. Due to this, the user may cancel the contracted service(s) and return the printing apparatus to the service provider. In this case, if ink setup has already been done, the printing apparatus may be returned with inks filled in the printing apparatus. This leads to a possibility of, for example, experiencing ink leakage during movement resulting from the return, having to perform maintenance work to reuse the printing apparatus, or wasting the inks filled in the setup, which requires a cost. Thus, in the present embodiment, control is performed so as to avoid the unnecessary cost.

(76) FIG. **10**A is a diagram illustrating a method of setting inks in an ink tank-separated printer head. The ink tank-separated printer head is such that demountable ink tanks **325** are mounted to a printer head **324**, and the printer head **324** is mounted to a head mount **1001** connected to the printer **300**. The head mount **1001** moves via a carriage **1002** provided in the printer **300** in parallel to the carriage **1002** while the printer head **324** ejects the inks in the ink tanks **325** to perform printing. The carriage **1002** and the head mount **1001** may be configured to be integral with each other. Incidentally, in the ink setting method with the separated type, the extent of work the user needs to perform is not particularly defined. For example, the configuration may be such that the printer head **324** and the head mount **1001** are already assembled at the time of shipping the printer **300** as a product, and the user only attaches or replaces the ink tanks **325**.

(77) FIG. **10**B is a diagram illustrating a method of setting inks in an ink tank-integrated printer head. The ink tank-integrated printer head is such that ink tanks **325** and a printer head **324** are formed integrally with each other, and the user therefore mounts them to the head mount **1001** together. The head mount **1001** moves via the carriage **1002** provided in the printer **300** in parallel to the carriage **1002** while the printer head **324** ejects the inks in the ink tanks **325** to perform printing. The carriage **1002** and the head mount **1001** may be configured to be integral with each other. In the case of the integrated type, the ink tanks **325** and the printer head **324** are replaced together if the inks run out.

(78) FIGS. **11**A and **11**B are exterior views illustrating a procedure to mount the ink tanks **325** and the printer head **324** described with reference to FIG. **10**A or **10**B to the head mount **1001**. The mounting procedure in FIGS. **11**A and **11**B is applicable to both the ink tank-integrated printer head and the ink tank-separated printer head. The printer **300** includes the cover **322**, which covers an opening portion of the printer **300**. The cover **322** is capable of pivoting or moving between an open position in which the opening portion of the printer **300** is open and a closed position in which the cover **322** closes the opening portion of the printer **300**. In a state where the cover **322** is located at the closed position, the printer head **324** is located at a standby position.

(79) FIG. **11**A is a view illustrating a state where the printer head **324** is at an ink setup-possible position as a result of the printer head **324** moving from the standby position in response to opening and moving the cover **322** to the open position. The ink setup-possible position is a position to which the printer head **324** can move in a case where ink setup is permitted in the later-described process performed in initial setup of the printer **300**. FIG. **11**B is a view indicating that the printer head **324** is at an ink setup-impossible position as a result of an ink setup prohibition process. The ink setup-impossible position is a position where the printer head **324** waits in a case where control is performed to prohibit ink setup in the later-described process performed in the initial setup of the printer **300**. The ink setup-impossible position is the same as the standby position mentioned above. Hence, in the case where ink setup is prohibited, the printer head **324** does not move from the standby position even if the cover **322** is opened and moved to the open position. With the cover **322** located at the open position, the user can see the inside of the printer **300** from the opening portion of the printer **300** and attach the ink tanks **325** or the printer head **324** or both to the printer **300** via the head mount **1001**. The printer **300** has a cover sensor **1101** for detecting whether the cover **322** is located at the closed position. In a case where the cover sensor **1101** detects that the cover has moved from the closed position, the printer **300** moves the head mount **1001** via the carriage **1002** from the standby position to a position within the opening portion as illustrated in FIG. **11**A (cartridge attachment position). At this time, a display indicating that ink setup can be performed may be presented on the operation panel **305**. Incidentally, ink setup consumes the inks to some extent. Even in a case where the inks are not ejected onto a print medium in the ink setup, the inks in the ink tanks **325** are consumed since the inks are supplied into the printer head **324** from the ink tanks **325**.

(80) The user attaches the printer head **324** to the head mount **1001**. Then, in a case where the cover sensor **1101** detects that the cover **322** has returned to the closed position, the printer **300** moves the head mount **1001** via the carriage **1002** to the ink setup-impossible position illustrated in FIG. **11**B from the ink setup-possible position. The ink setup-impossible position is covered by an outer covering of the printer **300**. Thus, it is physically impossible for the user to attach the ink tanks **325** or the printer head **324** to the head mount **1001**. At this time, a display indicating that ink setup cannot be performed may be presented on the operation panel **305**. In the present embodiment, the replacement position for the printer head **324** is set within an opening portion in an upper part of the printer **300**, but another configuration may be employed. For example, a configuration may be employed in which an opening portion is present in a side face or the front face instead of the upper face and the user performs ink setup through the side face or the front face.

(81) FIGS. **12**A and **12**B are configuration diagrams illustrating an example in which the ink tanks are incorporated inside the printer **300**. The printer **300** incorporating the ink tanks is referred to as "ink tank-incorporated printer". Also, the ink tanks illustrated in FIGS. **12**A and **12**B are referred to as "incorporated ink tanks **1241**".

(82) FIG. **12**A illustrates a configuration of an ink tank-incorporated printer. The incorporated ink tanks **1241** supply inks to the printer head **324** through tubes not illustrated. The ink tank-separated type and the ink tank-integrated type are similarly configured to eject the inks from the printer head **324** to perform printing. In FIGS. **12**A and **12**B, the incorporated ink tanks **1241** are separated based on the ink colors and incorporated in the left and right of the printer **300** from the viewpoint

of accommodation, but may be incorporated together at one position.

(83) FIG. **12**B illustrates an ink setup method for the ink tank-incorporated type. First, in a step **1250**, an ink bottle **1242** is prepared. The ink bottle **1242** is sufficiently filled with an ink. Then, in a step **1260**, the ink bottle **1242** is connected to an ink inlet port **1243**. As a result, in a step **1270**, the ink starts being introduced. Specifically, the ink in the ink bottle **1242** is introduced into the incorporated ink tank **1241** through the ink inlet port **1243**. Incidentally, some of the ink is consumed in this step.

(84) FIGS. **13**A and **13**B are exterior views illustrating a step of introducing inks in ink bottles **1242** into the incorporated ink tanks **1241**. The printer **300** includes the cover **322**, which covers the opening portion of the printer **300**, and the covers **326**, which cover the ink inlet ports **1243**. The cover **322** is capable of pivoting or moving between the opening portion and a closed portion of the printer **300**. Each cover **326** is capable of pivoting or moving between an open position at which the corresponding ink inlet port(s) **1243** is(are) open and a closed position at which the cover **326** covers the ink inlet port(s) **1243**. The covers **326** and the printer **300** are connected by solenoids (not illustrated), and the opening and closing of the covers **326** can be locked and unlocked by controlling the solenoids by means of the cover mechanism control circuit **321**. In this way, it is possible to physically prohibit the user from opening the covers **326** by locking the covers **326** according to the status of the printer **300**. In the present embodiment, the covers **326** are locked by the ink setup prohibition process. In the present embodiment, the opening portion of the printer **300** and the covers **326**, which cover the ink inlet ports **1243**, are formed to be separate, but these may be integrated with one another.

(85) FIG. **13**A is a view illustrating a state where the solenoids for the covers **326** are not actuated and therefore ink setup can be performed. With the covers **326** located at the open positions, the user can set ink bottles **1242** at the ink inlet ports **1243** and introduce the inks into the incorporated ink tanks **1241** in the printer **300**. At this time, a display indicating that ink setup can be performed may be presented on the operation panel **305**.

(86) FIG. **13**B is a view illustrating a state where the solenoids for the covers **326** are actuated as a result of the ink setup prohibition process, and therefore ink setup cannot be performed. The printer **300** locks the covers **326** via the solenoids in a case where the user should be prohibited from introducing the inks in the ink bottles **1242**. In this case, the covers **326** remain closed and cannot be opened, thus making it physically impossible to perform ink setup. At this time, a display indicating that ink setup cannot be performed may be presented on the operation panel **305**.

(87) In the present embodiment, an example in which the ink tank-incorporated printer **300** controls whether to prohibit or permit ink introduction by locking or unlocking the covers **326** has been presented. The above locking control may be used for replacement of the printer head **324** as well. Alternatively, whether to prohibit or permit replacement of the printer head **324** may be controlled by controlling the movement of the head mount **1001** via the carriage **1002** as with the above-described ink tank-integrated printer head and ink tank-separated printer head.

(88) Next, a flow of initial setup of a printer in the present embodiment will be described. The main setup operations performed in initial setup of a printer include network setup and ink setup. In the ink setup, the user attaches ink tanks at a predetermined position(s) in a case where the ink tanks are detachable. In a case where the printing apparatus is the ink tank-incorporated type, the user mounts ink bottles at predetermined positions and introduces the inks into the printing apparatus. In response to confirming introduction of the inks, the printing apparatus performs ink cleaning or a process of filling the inks into the printer head, such as ink filling.

(89) Network setup is another thing which the user performs in the initial setup. The network setup is an operation of configuring settings for connecting the printing apparatus to a desired access point so that the printing apparatus can communicate with external apparatuses through a network.

(90) The ink setup and the network setup are not directly associated with each other in terms of order. Thus, in the initial setup, it is desirable for the user that the initial setup succeed regardless of

which setup is performed first. For this reason, either setup may be performed before the other. Nonetheless, there are cases where an error occurs during the network setup after filling the inks into the printer in the ink setup or during the contract check after the network setup. Specifically, there is, for example, a case where a service has not been opened for a printer supporting a so-called subscription contract in which the user is charged a predetermined usage fee per a predetermined period. The user will not be able to start using the printer in a case the contract for the service is not confirmed to have been properly signed. In such a case, the user may cancel the service contract and return the printing apparatus to the service provider. This leads to a possibility of various problems such as experiencing ink leakage during movement resulting from the return, having to perform maintenance work to reuse the printing apparatus, and wasting the inks filled in the setup. In the following, a flow of initial setup taking concerns as mentioned above into account will be described.

(91) FIG. **14** is a flowchart illustrating an initial setup process executed by the printer **300** supporting a flat rate contract in the present embodiment. The CPU **311** implements this flowchart by loading a control program for the flowchart stored in the ROM **313** or an external storage apparatus (not illustrated) to the data memory **314** and executing that control program. This flowchart starts with the power supply of the printer **300** turned off.

(92) First, in **51401**, in response to detecting that a power button of the printer **300** is pressed (a power on operation is performed), the CPU **311** shifts the printer **300** to a power on state from the power off state.

(93) Then, in S**1402**, the CPU **311** determines whether initial setup is being performed by referring to information stored in the data memory **314** indicating whether initial setup is being performed. Specifically, in a case where the printer **300** is booted for the first time, an initial setup flag in the data memory **314** is ON. On the other hand, in the process of booting the printer **300** for the second time or later, the initial setup flag in the data memory **314** is OFF. The CPU **311** makes the determination in S**1402** by referring the initial setup flag. The CPU **311** proceeds to S**1403** if determining that initial setup is being performed, and proceeds to S**1411** if determining that initial setup is not being performed. This determination may be made by, for example, determining whether initial setup of the printer **300** has been done in the past. In S**1411**, the CPU **311** boots the printer **300** in a regular manner. Thereafter, the CPU **311** terminates the flowchart.

(94) If determining in S**1402** that initial setup is being performed, the CPU **311** performs an ink setup prohibition process in S**1403**. This makes it physically impossible for the user to perform ink setup irrespective of the ink configuration (ink tank-separated type, ink tank-integrated type, or ink tank-incorporated type). Specifically, with the ink tank-integrated type and the ink tank-separated type, the printer head **324** is kept at the ink setup-impossible position as illustrated in FIG. **11**B even with the cover **322** opened and moved to the open position. With ink tank-incorporated type, ink setup is impossible (the covers are locked) as illustrated in FIG. **13**B. Details of the ink setup prohibition process will be described later with reference to FIGS. **15** and **16**. The ink setup prohibition process is performed immediately after determining in S**1402** that initial setup is being performed, thereby preventing ink setup from preceding network setup. This helps eliminate the concern mentioned above that the printer may be returned to the provider with inks filled therein.

(95) Then, in S**1404**, the CPU **311** starts network setup. The network setup is a process for connecting the printer **300** to the Internet **104** through the local area network **102** and the router **103**. In the present embodiment, the network setup is setup for the wireless LAN control circuit **318** to become able to communicate with a network by controlling the wireless LAN unit **308**. Nonetheless, the actual communication method is not limited, and the contents of the setup are therefore not particularly limited. For example, the contents of the setup may be such that the printer **300** connects to the router **103** via a wired LAN connection to become able to communicate with the network.

(96) Specifically, in S**1404**, the CPU **311** firstly causes the printer **300** to start operating in the

connection setup mode. Then, the CPU **311** waits for a wireless connection to be established between the smartphone **500** and the printer **300** and infrastructure setup information to be received from the smartphone **500**. If receiving infrastructure setup information, the CPU **311** establishes a wireless connection between the printer **300** and the router **103** based on the infrastructure setup information. This completes the network setup. The network setup method is not limited to this method. The network setup may be executed by having the user connect the printer **300** and the router **103** by wire and having the CPU **311** detect that a connection is established between the printer **300** and the router **103** by wire. Also, instead of the network setup based on the infrastructure setup information received from the smartphone **500**, network setup based on operations on the printer **300** itself may be executed. Specifically, in the network setup based on operations on the printer **300** itself, the printer **300** searches for networks around itself based on a predetermined user operation on itself, and displays the found networks. Then by accepting selection of one of the displayed networks and input of the password for the selected network, the printer **300** connects to the access point forming the selected network (the router **103** in this example).

(97) In S**1405**, the CPU **311** determines whether the network setup has been completed. The CPU **311** proceeds to S**1406** if determining that the network setup has been completed, and continues the network setup in S**1404** if determining that the network setup has not been completed. Specifically, in this step, the CPU **311** determines whether the printer **300** has connected to the Internet **104**, for example. The network setup is considered completed in a case where the printer **300** has connected to the Internet **104**. The case where the printer **300** has connected to the Internet **104** corresponds specifically to a case where the printer **300** becomes able to execute Internet communication. The present embodiment is not limited to this manner. Specifically, in this process, the CPU **311** may determine whether the printer **300** can access the cloud server through the Internet **104**, for example. The network setup is considered completed in a case where the printer **300** can access the cloud server through the Internet **104**.

(98) In the above, a configuration has been described in which, in network setup, the printer **300** receives infrastructure setup information from the smartphone **500** and a wireless connection is established between the printer **300** and the router **103**. Alternatively, for example, in network setup, a wireless connection can be established between the printer **300** and the smartphone **500** by causing the printer **300** to operate in the direct connection mode. Specifically, in the case of causing the printer **300** to operate in the direct connection mode, the smartphone **500** wirelessly sends direct setup information which is setup information for causing the printer **300** to operate in the direct connection mode to the printer **300**. The direct setup information contains instructions to, for example, enable the WFD function to cause the printer **300** to operate as the Group Owner and to enable setup of an access point for the printer **300**. The smartphone **500** obtains connection information necessary for directly connecting to the printer **300** from the printer **300**. The connection information for directly connecting to the printer **300** contains information such as the SSID, password, and the like of the printer **300**, for example. The user can select whether to cause the printer **300** to operate in the infrastructure connection mode or in the direct connection mode as desired on a screen displayed on the smartphone **500**. Based on the user's selection, the smartphone **500** determines whether to send the infrastructure setup information or to send the direct setup information to the printer **300**.

(99) In a case where the printer **300** is caused to operate in the direct connection mode to establish a wireless connection between the printer **300** and the smartphone **500** as a result of network setup as described above, the printer **300** may fail to execute Internet communication. Thus, in such a case, the CPU **311** may give NO as the result of the determination in S**1405**.

(100) In S**1406**, the CPU **311** checks the contract status through the network to which the printer **300** has connected as a result of the network setup. Specifically, the CPU **311** checks whether the printer **300** having established a connection to the network has signed up with, for example, a flat

rate service. The contract status is checked by sending a contract status inquiry to the cloud server (S**907** in FIG. **9**). Subsequently, in S**1407**, the CPU **311** determines whether the printer **300** can be used with the checked contract status. The CPU **311** proceeds to S**1408** if determining that the printer **300** can be used.

(101) On the other hand, if determining that the printer **300** cannot be used, the CPU **311** returns to S**1406** and continues checking the contract status. In this case, the user needs to sign another service contract that allows the printer **300** to be used, for example, via the Internet.

(102) In the present embodiment, the contents of the contract checked in S**1407** are not particularly defined. For example, the contract may be an ink subscription contract with an upper limit or a contract to rent only the printer **300**.

(103) If determining in S**1407** that the contract is one that allows the printer to be used, the CPU **311** performs an ink setup permission process in S**1408**. This is a process to cancel the ink setup prohibition process performed in S**1403**. Specifically, with the ink tank-integrated type or the ink tank-separated type, the printer head **324** is shifted to an ink setup-possible position as illustrated in FIG. **11**A. With ink tank-incorporated type, ink setup becomes possible (the covers are not locked) as illustrated in FIG. **13**A.

(104) Performing the ink setup permission process in S**1408** makes it possible for the user to perform ink setup in S**1409**. Specifically, the user uses any of the methods illustrated in FIGS. **10**A to **13**B. Finishing the ink setup in S**1409** completes the initial setup of the printer **300**, so that the printer is now ready to use. Thus, in S**1410**, the CPU **311** updates the information indicating whether initial setup is being performed. In this way, the next or subsequent time the printer **300** shifts to the software-on state, it will be possible to indicate that initial setup is not being performed. After the process of S**1410**, the CPU **311** terminates the flowchart.

(105) In the present embodiment, the network setup S**1404** and the ink setup S**1409** are presented as the types of setup which the user performs in the initial setup. In the actual initial setup, other types of setup may be performed. Other types of setup than the network setup and the ink setup may be performed with any timing. For example, setup of the display language on the operation panel **305** of the printer **300**, setup of the country where the printer **300** is used, and setup of the current time may be performed in steps before the network setup S**1404**. Also, the printer **300** may execute a process of receiving answers to a questionnaire from the user between S**1409** and S**1410**. The timing to execute this process is not limited, and the process may be performed in a step before the network setup S**1404**, for example.

(106) By the flow described above with reference to FIG. **14**, the user can authenticate through the network in advance that a service contract supported by the printer **300** has been signed, and then perform ink setup of the printer **300**.

(107) Next, details of the ink setup prohibition process in S**1403** in FIG. **14** will be described using FIG. **15** for the ink tank-separated type and the ink tank-integrated type and FIG. **16** for the ink tank-incorporated type.

(108) FIG. **15** illustrates a flow of the ink setup prohibition process for the ink tank-separated or ink tank-integrated configuration.

(109) First, in S**1501**, the CPU **311** of the printer **300** deactivates an ink setup sequence. Specifically, the CPU **311** changes an internal setting to indicate that ink setup of the printer **300** is being prohibited.

(110) Then, in S**1502**, the CPU **311** detects the position of the printer head. In one example method of detecting the position of the printer head **324**, the position of the carriage or the head mount **1001** is stored in the data memory **314** with a counter to identify where the printer head **324** is located in the printer **300**. The position may be detected by a method other than the above method.

(111) Then, in S**1503**, the CPU **311** determines whether the printer head **324** is currently at an ink setup-possible position. The CPU **311** proceeds to S**1504** if determining that the printer head **324** is currently at the ink setup-possible position. On the other hand, if determining that the printer head

324 is not currently at the ink setup-possible position, the CPU **311** maintains the position of the printer head **324** at the current position and terminates the ink setup prohibition process since it is physically impossible for the user to perform ink setup.

(112) In S**1504**, the CPU **311** moves the printer head **324** to an ink setup-impossible position. The ink setup-impossible position is the position illustrated in FIG. **11**B, but may be another position as long as the user cannot perform ink setup at that position. The printer head **324** may be initially set at the ink setup-impossible position at the time of shipment. The above is a flow of the ink setup prohibition process for the ink tank-separated or ink tank-integrated configuration.

(113) FIG. **16** is a flow of the ink setup prohibition process for the ink tank-incorporated configuration.

(114) First, in S**1601**, the CPU **311** of the printer **300** deactivates an ink setup sequence. Specifically, the CPU **311** changes an internal setting to indicate that ink setup of the printer **300** is being prohibited.

(115) Then, in S**1602**, the CPU **311** detects the open/closed states of covers. In an example method of detecting the states of the covers **326**, whether the covers **326** are closed or open is identified with the cover sensors **1101**. Then, in S**1603**, the CPU **311** determines whether the covers are locked. This determination is performed by detecting the states of the solenoids. If determining that the covers are locked, the CPU **311** terminates the flow without a further step since it is physically impossible for the user to perform ink setup. If determining that the covers are not locked, the CPU **311** proceeds to S**1604** and locks the covers **326** with the solenoids. The ink setup-impossible position represents the state illustrated in FIG. **13**B, but another arrangement may be used as long as the user cannot perform ink setup. For example, an arrangement in which a valve is provided at each ink inlet port **1243** and is opened or closed with a solenoid may be employed. The above is a flow of the ink setup prohibition process for the ink tank-incorporated configuration.

(116) FIGS. **17**A and **17**B are diagrams illustrating display screens on the printer **300**. As illustrated in FIGS. **17**A and **17**B, during the ink setup prohibition process, the printer **300** may notify the operation panel **305** of the printer **300** that ink setup is currently impossible. A display **1701** in FIG. **17**A is a display screen displayed in a case where network setup has not been completed during initial setup. A display **1702** represents an example of a display screen displayed in a case where a predetermined contract cannot be confirmed in the contract check which is a process after the completion of the network setup. The display contents are not limited to these, and display contents suitable for the situation are desirably displayed.

(117) As described above, according to the present embodiment, it is possible to obtain contract information on a contract related to the use of a printing apparatus connectable to a network, and more appropriately control the printing apparatus. Specifically, in initial setup of a printer, network setup is performed before ink setup. In this way, even if the user fails to complete the network setup and ends up returning the printer, the cost for the initial setup is lower. Specifically, it is possible to prevent ink leakage during movement resulting from the return, maintenance work to reuse the printing apparatus, consumption of the inks in the setup, and the like.

OTHER EMBODIMENTS

(118) In the above, the ink setup prohibition process is canceled in a case where the result of the determination in S**1405** is YES and the result of the determination in S**1407** is YES. However, the present disclosure is not limited to this manner. For example, the ink setup prohibition process may be canceled before the process of S**1406** after the result of the determination in S**1405** is YES. That is, the ink setup prohibition process may be canceled simply in a case where the result of the determination in S**1405** is YES.

(119) In the above, the printer **300** is configured to be capable of performing printing only with inks provided to the user by a flat rate service. However, the printer **300** may be configured to be switchable between, for example, a first mode in which printing is performed with inks provided to the user by a flat rate service and a second mode in which printing is performed with inks prepared

by the user by any method which are different from the inks provided by the flat rate service. In this case, the printer **300** may be configured to determine whether it is in the first mode or in the second mode after S**1402**, execute S**1403** if determining that it is in the first mode, and not execute the prohibition process if determining that it is in the second mode. The printer **300** may execute ink setup before the network setup process if determining that it is in the second mode.

(120) The present disclosure can be implemented by providing a program that implements one or more of the functions of the above embodiment to a system or an apparatus via a network or a storage medium, and causing one or more processors in a computer of the system or the apparatus to read out and execute the program. Also, the present disclosure can be implemented with a circuit that implements one or more of the functions (e.g., application-specific integrated circuit (ASIC)).

OTHER EMBODIMENTS

(121) Embodiment(s) of the present invention can also be realized by a computer of a system or apparatus that reads out and executes computer executable instructions (e.g., one or more programs) recorded on a storage medium (which may also be referred to more fully as a 'non-transitory computer-readable storage medium') to perform the functions of one or more of the above-described embodiment(s) and/or that includes one or more circuits (e.g., application specific integrated circuit (ASIC)) for performing the functions of one or more of the above-described embodiment(s), and by a method performed by the computer of the system or apparatus by, for example, reading out and executing the computer executable instructions from the storage medium to perform the functions of one or more of the above-described embodiment(s) and/or controlling the one or more circuits to perform the functions of one or more of the above-described embodiment(s). The computer may comprise one or more processors (e.g., central processing unit (CPU), micro processing unit (MPU)) and may include a network of separate computers or separate processors to read out and execute the computer executable instructions. The computer executable instructions may be provided to the computer, for example, from a network or the storage medium. The storage medium may include, for example, one or more of a hard disk, a random-access memory (RAM), a read only memory (ROM), a storage of distributed computing systems, an optical disk (such as a compact disc (CD), digital versatile disc (DVD), or Blu-ray Disc (BD)™), a flash memory device, a memory card, and the like.

(122) While the present invention has been described with reference to exemplary embodiments, it is to be understood that the invention is not limited to the disclosed exemplary embodiments. The scope of the following claims is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures and functions.

(123) This application claims the benefit of Japanese Patent Application No. 2022-140896, filed Sep. 5, 2022, which is hereby incorporated by reference herein in its entirety.

Claims

1. A printing apparatus capable of executing printing using a printing material, comprising: a memory for storing instructions; and and a processor for executing the instructions to operate as: an accepting unit that accepts an operation to power on the printing apparatus; a first determination unit that determines, in a case where the operation is accepted, whether the printing apparatus operates in a first mode in which printing is performed with a printing material provided by a subscription service or whether the printing apparatus operates in a second mode in which printing is performed with a printing material different from the printing material provided by the subscription service; a first control unit that executes, in a case where it is determined the printing apparatus operates in the first mode, predetermined control for preventing an operation of increasing the printing material included in the printing apparatus from being performed by a user and a network setup process for receiving connection information for connecting to an external access point of the printing apparatus from an external terminal apparatus of the printing apparatus

before execution of an ink setup process for accepting the operation of increasing the printing material included in the printing apparatus from the user, and executes, in a case where it is determined that the printing apparatus operates in the second mode, the network setup process after the execution of the ink setup process and without execution of the predetermined control; a second determination unit that determines, in a case where it is determined the printing apparatus operates in the first mode, whether the printing apparatus has connected to an Internet after the network setup process has been executed; a first display unit that displays a first screen on a display in a case where it is determined the printing apparatus has not connected to the Internet, the first screen including a message indicating the predetermined control is being executed and a message prompting a user to execute a process for connecting the printing apparatus to the Internet; an obtaining unit that obtains contract information through the Internet in a case where it is determined the printing apparatus has connected to the Internet, the contract information regarding a predetermined contract related to use of the printing apparatus; a confirmation unit that confirms whether the user can use the printing apparatus in a contract status indicated by the contract information; a second display unit that displays a second screen on the display in a case where it is not confirmed the user can use the printing apparatus in the contract status indicated by the contract information, the second screen including a message indicating the predetermined control is being executed and a message prompting the user to execute a procedure for the predetermined contract; and a cancellation unit that cancels the predetermined control in a case where the printing apparatus connects to the Internet and it is confirmed the user can use the printing apparatus in the contract status indicated by the contract information.

2. The printing apparatus according to claim 1, wherein the predetermined contract is a contract related to a subscription service.

3. The printing apparatus according to claim 1, wherein the operation of increasing the printing material included in the printing apparatus is an operation of attaching, by a user, a cartridge holding the printing material to a printer head, and the predetermined control is control that prevents the printer head from moving to a predetermined position for attaching the cartridge even in a case where a cover included in the printing apparatus is opened.

4. The printing apparatus according to claim 1, wherein the operation of increasing the printing material included in the printing apparatus is an operation of attaching, by a user, a cartridge holding the printing material to a printer head, the printer head is moved to a predetermined position for attaching the cartridge in a case where a cover included in the printing apparatus is opened, and the predetermined control is control that locks the cover included in the printing apparatus.

5. The printing apparatus according to claim 1, wherein the operation of increasing the printing material included in the printing apparatus is an operation of introducing, by a user, the printing material from a bottle to a tank included in the printing apparatus, and the predetermined control is control that locks a cover that covers an inlet port for introducing, by a user, the printing material from the bottle to the tank included in the printing apparatus.

6. The printing apparatus according to claim 1, wherein the predetermined control is not executed in a case where the operation is accepted after the initial setup of the printing apparatus is completed.

7. The printing apparatus according to claim 1, wherein the first screen and the second screen are not displayed in a case where the operation is accepted after the initial setup of the printing apparatus is completed.

8. The printing apparatus according to claim 1, wherein the processor further executes instructions to operate as: a third display unit that displays a third screen on the display in a case where the predetermined control is cancelled, the third screen including a message indicating that a user can execute the operation of increasing the printing material included in the printing apparatus.

9. A method of controlling a printing apparatus capable of executing printing using a printing

material, the method comprising: an accepting step of accepting an operation to power on the printing apparatus; a first determination step of determining, in a case where the operation is accepted, whether the printing apparatus operates in a first mode in which printing is performed with a printing material provided by a subscription service or whether the printing apparatus operates in a second mode in which printing is performed with a printing material different from the printing material provided by the subscription service; a first control step of executing, in a case where it is determined the printing apparatus operates in the first mode, predetermined control for preventing an operation of increasing the printing material included in the printing apparatus from being performed by a user and a network setup process for receiving connection information for connecting to an external access point of the printing apparatus from an external terminal apparatus of the printing apparatus before execution of an ink setup process for accepting the operation of increasing the printing material included in the printing apparatus from the user, and executing, in a case where it is determined that the printing apparatus operates in the second mode, the network setup process after the execution of the ink setup process and without execution of the predetermined control; a second determination step of determining, in a case where it is determined the printing apparatus operates in the first mode, whether the printing apparatus has connected to an Internet after the network setup process has been executed; a first display step of displaying a first screen on a display in a case where it is determined the printing apparatus has not connected to the Internet, the first screen including a message indicating the predetermined control is being executed and a message prompting a user to execute a process for connecting the printing apparatus to the Internet; an obtaining step of obtaining contract information through the Internet in a case where it is determined the printing apparatus has connected to the Internet, the contract information regarding a predetermined contract related to use of the printing apparatus; a confirmation step of confirming whether the user can use the printing apparatus in a contract status indicated by the contract information; a second display step of displaying a second screen on the display in a case where it is not confirmed the user can use the printing apparatus in the contract status indicated by the contract information, the second screen including a message indicating the predetermined control is being executed and a message prompting the user to execute a procedure for the predetermined contract; and a cancellation step of cancelling the predetermined control in a case where the printing apparatus connects to the Internet and it is confirmed the user can use the printing apparatus in the contract status indicated by the contract information.

10. A non-transitory computer readable storage medium storing a program which functions in a printing apparatus and causes the printing apparatus to function as: an accepting unit that accepts an operation to power on the printing apparatus; a first determination unit that determines, in a case where the operation is accepted, whether the printing apparatus operates in a first mode in which printing is performed with a printing material provided by a subscription service or whether the printing apparatus operates in a second mode in which printing is performed with a printing material different from the printing material provided by the subscription service; a first control unit that executes, in a case where it is determined the printing apparatus operates in the first mode, predetermined control for preventing an operation of increasing the printing material included in the printing apparatus from being performed by a user and a network setup process for receiving connection information for connecting to an external access point of the printing apparatus from an external terminal apparatus of the printing apparatus before execution of an ink setup process for accepting the operation of increasing the printing material included in the printing apparatus from the user, and executes, in a case where it is determined that the printing apparatus operates in the second mode, the network setup process after the execution of the ink setup process and without execution of the predetermined control; a second determination unit that determines, in a case where it is determined the printing apparatus operates in the first mode, whether the printing apparatus has connected to an Internet after the network setup process has been executed; a first display unit that displays a first screen on a display in a case where it is determined the printing

apparatus has not connected to the Internet, the first screen including a message indicating the predetermined control is being executed and a message prompting a user to execute a process for connecting the printing apparatus to the Internet; an obtaining unit that obtains contract information through the Internet in a case where it is determined the printing apparatus has connected to the Internet, the contract information regarding a predetermined contract related to use of the printing apparatus; a confirmation unit that confirms whether the user can use the printing apparatus in a contract status indicated by the contract information; a second display unit that displays a second screen on the display in a case where it is not confirmed the user can use the printing apparatus in the contract status indicated by the contract information, the second screen including a message indicating the predetermined control is being executed and a message prompting the user to execute a procedure for the predetermined contract; and a cancellation unit that cancels the predetermined control in a case where the printing apparatus connects to the Internet and it is confirmed the user can use the printing apparatus in the contract status indicated by the contract information.