

The present invention relates to a printing apparatus.

In general network system, a laser printer such as a page printer having a high-speed printing performance has been connected to a plurality of word processors or personal computers through a network so that the printer can commonly be used.

In this case, several different printed documents are conventionally stacked on a single paper tray with mixed condition, and one can unintentionally observe the documents for the other person when he picks up his printed documents, so that a secrecy cannot be preserved that may cause a problem..

The present invention was made in view of the foregoing problem accompanying the conventional printer connected onto the network. Accordingly, an object of the present invention is to provide a laser printer capable of stacking printed documents while preserving a secrecy of the documents.

This object is solved by the printing apparatus of independent claim 1. Further advantageous features, aspects and details of the invention are evident from the dependent claims, the description and the drawings. The claims are intended to be understood as a first non-limiting approach of defining the invention in general terms.

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The invention provides a printing apparatus suitable for printing print data supplied from word processors or personal computers connected to one another through a network system. More particularly, according to a specific aspect, the invention provides a laser printer so called as a page printer connected onto a network system, having a secrecy preserving structure.

Further, another aspect of the invention is to provide
5 a laser printer which can sort printed documents into compartments if required while preserving a secrecy.

The above and other aspects can be achieved according to an embodiment of the invention by a provision of a laser printer connected onto a network which, according to the present invention, includes a housing body
10 accommodating therein a printing mechanism having an electrophotograph system, a plurality of trays arranged vertically on an upper portion of the housing body, a locking structure for locking at least one of the trays to the housing body, means for changing a paper feeding path of printed papers which are
15 fed out of the printing mechanism to connect to the locked tray when a secret preservation command is supplied, and means for comparing a password input from the outside with a password which is previously recorded in the printer and releasing the locking mechanism if the input password coincides with the
20 recorded password.

During the normal condition where no secret documents are to be printed the printing operation can be carried out with releasing the locking mechanism and printed documents are stacked on a plurality of trays after being sorted into
25 compartments. On the other hand, in case of printing secret documents where the secrecy of the documents has to be



preserved, the locking mechanism locks one of trays and the paper feeding path is changed to connect to the locked tray before printing. In this condition, the secret documents are fed out on the locked tray from which the stacked papers can be taken out after being unlocked.

According to another aspect of the invention, in case of printing secret documents wherein the secrecy of the documents has to be preserved, the locking mechanism locks a tray and the paper feeding path is changed to connect to the locked tray before printing. Afterwards, the secret documents can be taken out only when the locking mechanism is released by inputting a correct password or by using another unlocking system only available to a specific person.

In the following, the invention will be described on the example of a laser printer. It is, however, to be understood that the invention is not limited to be used only in the context of laser printers, but that it can be embodied in other types of printers as well, as e.g., in dot printers.

Fig. 1A is a schematic perspective view showing a laser printer according to a first embodiment of the present invention;

Fig. 1B shows a drawer applicable to the laser printer shown in Fig. 1A;

Fig. 2A is a sectional view showing essential portions of the laser printer according to the first embodiment of the invention where a gate member is open;

Fig. 2B is a sectional view of the laser printer where the gate member is operated;

Fig. 3 is a perspective view showing a laser printer of one arrangement of the first embodiment shown in Fig. 1A;



Fig. 4 is a schematic perspective view showing a laser printer according to a second embodiment of the present invention;

5 Fig. 5A is a sectional view showing essential portions of the laser printer according to the second embodiment of the invention where a gate member is open;

Fig. 5B is a sectional view of the laser printer where the gate member is operated;

10 Fig. 6 is a block diagram for explaining a function of a control device 30 which can be a microcomputer for controlling the lock and unlock operation; and

Fig. 7 is a perspective view showing a laser printer of one arrangement of the second embodiment shown in Fig. 4.

15 The preferred embodiments of the present invention will now be described with reference to accompanying drawings.

20 Fig. 1A is a schematic perspective view showing a laser printer according to a first embodiment of the present invention, and Fig. 1B shows a drawer applicable to the laser printer shown in Fig. 1A. Fig. 2A is a sectional view showing essential portion of the laser printer according to the first embodiment of the invention where a gate member is open, and Fig. 2B is a sectional view of the laser printer where the gate member is operated.

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The laser printer is provided with a housing body 1 accommodating therein a printing mechanism. As shown in Figs. 2A and 2B in more detail, the housing body 1 houses therein the printing mechanism capable of printing recording sheets by means of an electrostatography system having a photosensitive drum 2 and transferring unit 3 and the like. The printing mechanism forms latent on the photosensitive drum 2 by a laser beam in accordance with printing data supplied from a host apparatus such as a host computer connected onto the network, transfers a toner image to a recording sheet, and feeds the sheet out to a fixing unit 4 disposed at an upper side of the drum 2 to thereby fix the image onto the sheet by heat.

A cassette 5 for stocking printing papers P is provided at a lower side of the housing body 1, and a single recording sheet taken out of the papers P by a sheet feeding roller 6 is conveyed to the photosensitive drum 2 through a paper guide 7.

The housing body 1 further includes a first and second trays 9 and 10 arranged vertically at an upper portion of the body 1. The first tray 9 is open to upper side and front side (left side in the figures), while the second tray 10 has an opening 10a at a front side thereof in which a drawer 11 is inserted. Further, a couple of feed-out rollers 12, 13 are disposed at a rear end (right side in the figures) of the first and second trays 9 and 10, respectively, for feeding the recording sheet fed out of a paper feed-out mechanism 15 (described later).



The paper feed-out mechanism 15, a lowermost end of which is positioned in the vicinity of the paper feed-out portion of the fixing unit 4, has a gate member 17 engaging with an electromagnetic member 16 such as a solenoid. The gate member 17 is disposed in a room facing the second tray 10 which is shielded at a periphery thereof by the housing body 1. Accordingly, a recording sheet which has been printed is selectively guided to either one of the first tray 9 or second tray 10. The drawer 11 is inserted in the second tray 10 and has a structure wherein the opening 10a can be locked to be closed state while the drawer 11 is inserted in the second tray 10. The drawer 11 has a concave portion 19 which is engageable with a locking mechanism 18 disposed on the housing body 1. The housing body 1 is further provided with guide plates 20 and 21 for guiding the recording sheet to the trays.

The operation of the laser printer thus constructed will be described hereinbelow.

When printing data is supplied from a host computer, a single recording sheet is taken out of the lower cassette 5 by the paper feeding roller 6, conveyed to the photosensitive drum 2 where a toner image is transferred to the sheet, and further fed to the fixing unit 4 where the transferred toner image is fixed. In this normal operation, since the gate member 17 is open as shown in Fig. 2A, the recording sheet is conveyed to the upper end portion of the paper feed-out mechanism 15 and

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then fed out into the first tray 9 by the paper feed-out roller 12 disposed at the upper end portion of the mechanism 15.

If the next document is to be fed into another compartment, that is, the second tray 10, a drive signal is applied to the electromagnetic drive means 16 so that the gate member 17 rotates to locate on a paper feeding path as shown in Fig. 2B. When the printing operation is performed in this condition, the recording sheet fed out of the fixing unit 4 is guided by the gate member 17 and the guide plate 21 to the paper feeding roller 13 so that the sheet is fed out to the second tray 10. Accordingly, the two different documents can properly be stacked in the respective first and second trays.

On the other hand, if a confidential document is to be printed a secrecy of which must be preserved, the drawer 11 is inserted in the second tray 10, the second tray 10 is locked to the housing body 1 by operating the locking mechanism 18, and the gate member 17 is pivotally rotated to locate on the paper feeding path as shown in Fig. 2B. If the printing operation is finished in this condition, the recording sheet fed out of the fixing unit 4 is guided by the gate member 17 to the second tray 10 and stacked in the drawer 11 which is inserted in the second tray 10. By this operation, the secret document can be stored in the tray while being shielded at a periphery thereof, that is, while preserving secrecy of the document to thereby prevent the secret document from being observed undesirably by the other people. When the printing operation is finished, the



subject document can be taken out by releasing the locking mechanism 18 by a key or the like to draw the drawer 11 from the tray 10.

According to the first embodiment described above, the
5 drawer 11 can be inserted in the tray 10 and the drawer 11 is locked. However, another arrangement may be applicable in which, as shown in Fig. 3, a door 20a is provided at the opening 10a of the second tray 10, which is locked to the housing body 1 by the locking mechanism 18 which is operable with a key.
10 This arrangement also performs similar function to the first embodiment described above.

Further, in the first embodiment the locking mechanism 18 and the gate member 17 are independently operated. However, a detector for detecting whether the tray is locked may be
15 provided and the electromagnetic drive member 16 is operated by an output signal of the detector to thereby automatically drive the gate member 17 to rotate to locate on the paper path at the same time when the tray is locked.

Furthermore, the second lower tray 10 can be closed
20 according to the first embodiment. However, the first upper tray may also be shielded by a top plate whereas a drawer may be inserted in the upper tray or the upper tray may have a door, and these member may be locked.

Fig. 4 is a schematic perspective view showing a laser
25 printer according to a second embodiment of the present invention. Fig. 5A is a sectional view showing essential



components of the laser printer according to the second embodiment of the invention where a gate member is open, and Fig. 5B is a sectional view of the laser printer where the gate member is operated. In the drawings, like parts and components are designated by the same reference numerals as those of the first embodiment shown in Figs. 1 and 2 described above. Further, since the second embodiment has a fundamentally similar structure to that of the first embodiment, the description will merely be made with reference to the different parts.

According to the second embodiment, a locking mechanism 118 is provided with a solenoid 118a operated by an electrical signal supplied from a control device 30 described later and a rod member 118b which moves back and forth by an actuation of the solenoid 118a. The rod member 118b comes into engagement with a concave portion 119 formed on the drawer 11 to lock the drawer with respect to the housing body 1 while the solenoid 118a is not actuated.

On the other hand, the housing body 1 is provided with a panel arranging thereon a lock/unlock key 40, a tenkey 41 and a display device 42, which are operated for controlling the locking mechanism 118. The control device 30 is constituted by a microcomputer and outputs a signal to release a locked state of the locking mechanism 118 only when a password input from the tenkey 41 on the panel coincides with that previously recorded.



Fig. 6 is a block diagram for explaining a function of the microcomputer constituting the control device 30 for controlling the lock and unlock operations. The microcomputer is provided with a lock/unlock judgement device 31 for judging whether a lock or unlock command is received from a host computer connected on the network or from the lock/unlock key 40 disposed on the panel, performing the lock operation by a locking device actuating device 32 when the lock command is received from the host computer, and extracting a password from a signal supplied from the host computer. The microcomputer is further provided with a password output device 33 for converting input signal from the tenkey 41 of the panel into a password, a store/compare device 35 for storing the password extracted by the lock/unlock judgement device 31 in a password storage device 34, comparing the password input by depressing the lock/unlock key 40 after finishing the printing operation with the password stored in the password storage device 34, and releasing the locked condition by actuating the solenoid 118a through the locking device actuating device 32 if it is judged that these passwords coincide with each other, and a paper feeding path changing device 37 for changing the paper feeding path toward the second tray 110 by actuating the solenoid 16 when the lock command is supplied.

On the other hand, in case of preserving the secrecy of a document, the host computer outputs a lock command for selecting the second lockable tray 10. According to this



command, the gate member 17 is rotated to locate on the paper feeding path to thereby feed the recorded sheets conveyed from the printing mechanism to the second tray 110. Then, when the password is input from the host computer or the tenkey 41 on the panel the lock/unlock judgement device 31 detects the password and stores it in the password storage device 34 through the store/compare device 35.

When the document to be kept secret is printed during this locked condition of the printer, the printed sheet fed out of the fixing unit 4 is guided by the gate member 17 and the guide plate 21 to the second tray 110 and stacked in the drawer 11 inserted in the tray 10. Accordingly, the secret documents can be stored in the tray while being shielded at a periphery thereof, that is, while preserving secrecy of the document to thereby prevent the secret document from being observed undesirably by the other people.

If a power applied to the printer is unintentionally turned off during the secret condition, since the locking mechanism 118 keeps the locking state where the solenoid 118a is not actuated, the drawer 11 cannot be taken out of the housing body 1 and, therefore, the secrecy of the documents can safely be preserved.

When the lock/unlock key 40 is depressed after finishing the printing operation the display device 42 indicates a message for inputting a password, and an operator inputs from the tenkey 41 the password which should be the same



as that inputted before the printing. The code of the key-in signal is output as a password through the password output device 33 to the store/compare device 35 where the input password is compared with that which is previously stored in the password storage device 34 before the printing operation. If the store/compare device 35 judges that the input password is correct then the solenoid 118a is actuated by the locking device actuating device 32 so that the locking condition of the tray 10 is released. After that, the operator can pick up the documents from the drawer 11.

According to the second embodiment described above, one of the trays is always locked. However, the invention is not limited thereto or thereby. For example, the locking operation may be performed in accordance with a lock command supplied from the host computer or a key input from the panel before the printing operation and, at the same time, a password may be allowed to be recorded.

Further, although a password is recorded every time when the printing operation is carried out to preserve secrecy of the documents for a plurality of operators in the above embodiments, a single password may always be stored to thereby eliminate the bothersome password recording operation every time of the printing.

According to the second embodiment, the drawer 11 can be inserted in the second tray 10 and locked. However, another arrangement may also be applicable in which, as shown in Fig.



7 as similarly to the arrangement shown in Fig. 3, a door 120 is provided at the opening 110a of the second tray 110, which is locked to the housing body 1 by a locking mechanism 118b which is operable with a key. This arrangement also performs
5 similar function to the second embodiment described above.

As described above, a laser printer according to the present invention includes a housing body accommodating therein a printing mechanism of an electro-photograph system, a plurality of trays arranged vertically on an upper portion of
10 the housing body, a locking structure for locking at least one of the trays to the housing body, and means for changing a paper feeding path for printed papers. Therefore, the secret documents are fed out to the locked tray thereby preventing the documents from being observed by the other person, whereas the
15 normal documents can be stacked on a plurality of trays with sorting into compartments.

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CLAIMS



1. A printing apparatus connected or connectable onto a network system comprising:
a housing body (1),
a printing mechanism (2, 3, 4),
means (6, 7) for feeding printing paper (P) to the printing mechanism,
a plurality of trays (9, 10; 110) for stacking sheets printed by said printing mechanism (2, 3, 4),
a paper feeding path (15) for feeding the printed sheets to said trays (9, 10; 110), and
means (16, 17) for selectively changing said paper feeding path to one of said trays (9, 10; 110).
2. The printing apparatus of claim 1 wherein said housing body (1) comprises a cassette (5) for stacking printing papers and/or wherein said paper feeding path is disposed inside said housing body (1).
3. The printing apparatus of any one of the preceding claims, wherein said plurality of trays comprises a first tray (9) and second tray (10; 110).
4. The printing apparatus of any one of the preceding claims, wherein said changing means (16, 17) comprises a gate means (17) for guiding the printed sheet to said second tray (10; 110), and means (16) for rotating said gate means (17).
5. The printing apparatus of claim 4, wherein said gate means (17) rotating means comprises an electromagnetic means (16).

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6. The printing apparatus of claim 6, wherein said electromagnetic means comprises a solenoid (16).
7. The printing apparatus of claim 7, further comprising means (18; 118) for locking at least one of said trays (10; 110).
8. The printing apparatus of any one of claims 9 or 10, further comprising an operating means (40, 41, 42) preferably disposed on a surface of said housing body (1) for actuating said locking means (18; 118).
9. The printing apparatus of claim 7 or 8, wherein said locking means is locked/unlocked by a key.
10. The printing apparatus of any one of claims 7 to 9, wherein said locking means (118) comprises:
a concave member (119) provided on said second tray (110);
a rod member (118b) for engaging with said concave member (119); and
means (118a) for driving said rod member (118b).
11. The printing apparatus of claim 10, wherein said rod member driving means (118a) comprises an electromagnetic means, preferably a solenoid.
12. The printing apparatus of any one of claims 7 to 11, further comprising controlling means (30) for controlling said means (18; 118) for locking at least one of said trays (9, 10; 110) in accordance with a signal from a host apparatus connected on the network and an input signal.
13. The printing apparatus of claim 12, wherein said control means (30) comprises a microcomputer.

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14. The printing apparatus of claim 12 or 13, wherein said controlling means (30) comprises operating means comprising a lock/unlock key (40) and a tenkey (41).
15. The printing apparatus of any one of claims 12 to 14, wherein said control means (30) comprises:
means (37) for driving said paper feeding path changing means (16);
a password output means (33) for converting input signal from said operating means (40, 41) into a first password;
a lock/unlock judgement means (31) for judging whether one of a lock or unlock command is received from the host connected on the network, said lock/unlock judgment means extracting a second password from a signal supplied from the host apparatus, said lock/unlock judgement means (31) driving said paper feeding path changing means (37) to a selected tray, preferably said second tray (10; 110);
a password storage means (34) for storing said second password supplied from said lock/unlock judgement means;
means (35) for comparing said first password with said second password stored in the password storage means (34), said comparing means (35) actuating the locking device actuating means (32) to unlock said locking means (18; 118) when said first password coincides with said second password.
16. The printing apparatus of claim 4 and any claim dependent on claim 4, further comprising means for detecting a locked state of said selected tray, preferably the second tray (10; 110), said detecting means producing an output signal for operating said gate rotating means (16) for rotating said gate means (17).
17. The printing apparatus of any one of claims 2 to 16, wherein said selected tray (10; 110) is shielded by a top





plate, and a drawer (11) is inserted in said tray, said drawer (11) being selectively locked.

18. The printing apparatus of any one of the preceding claims, wherein said printing apparatus is a laser printer of an electrophotograph type.
19. The printing apparatus of Claim 18, wherein said laser printer is a page printer.

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