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(54) Display of size of paper stored in printer paper tray

Einrichtung zur Anzeige der Grösse von Papier das in einer Drucker-kassette gespeichert ist

Dispositif d'affichage de la taille du papier emmagasiné dans la cassette d'une imprimante

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- **PATENT ABSTRACTS OF JAPAN vol. 1996, no. 10, 31 October 1996 (1996-10-31) & JP 08 157077 A (CANON INC), 18 June 1996 (1996-06-18)**
- **PATENT ABSTRACTS OF JAPAN vol. 1995, no. 09, 31 October 1995 (1995-10-31) -& JP 07 144759 A (RICOH CO LTD), 6 June 1995 (1995-06-06)**
- **PATENT ABSTRACTS OF JAPAN vol. 009, no. 198 (M-404), 15 August 1985 (1985-08-15) & JP 60 061426 A (RICOH KK), 9 April 1985 (1985-04-09)**

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Description

[0001] The present invention relates to a display of the size of paper stored in a paper tray of a printer, and more particularly, to a display of the size of paper stored in a paper tray of a printer, which allows a user within a visibility range to see the size of paper stored in the paper tray.

[0002] A typical electrophotographic printer such as a laser printer or a copying machine includes a laser scanning apparatus for forming an electrostatic latent image on a photosensitive medium, a developing apparatus for developing the electrostatic latent image, a transfer apparatus for transferring the developed image from the photosensitive medium to a sheet of paper, and a paper tray for storing the paper.

[0003] Referring to Figure 1 showing a typical printer, a paper tray 20 is installed capable of moving into or out of the main body of the printer 10.

[0004] Meanwhile, when the printer 10 is connected to a multitude of personal computers through a network, various sizes of paper may be stored in the paper tray 20. Thus, when one printer is shared by a number of users, a user must check before printing that the printing paper size coincides with the size of the paper stored in the paper tray 20, to suppress printing errors.

[0005] In the conventional art, the paper tray 20 must be ejected from the main body of the printer 10 to check the size of the paper stored therein.

[0006] JP-A-08/157077 discloses a circular paper size dial, biased by a linear spring.

[0007] JP-A-07/144759 discloses an electronic paper size indicator.

[0008] JP-A-60/061426 discloses an electronic paper size indicator.

[0009] With a view to solve or reduce the above problem, it is an aim of preferred embodiments of the present invention to provide a display of the size of paper stored in a paper tray of a printer, which allows a user within a visibility range to check the size of the paper stored in the paper tray without ejecting the paper tray from the printer.

[0010] According to an aspect of the present invention, there is provided apparatus for enabling the size of paper stored internally in a paper tray loaded in a printer to be viewed from the exterior, the apparatus comprising:

at least one control member capable of sliding linearly in a predetermined direction, installed in the paper tray to define the edges of the stored paper; rotatable means mounted for rotation about a point; and means for converting linear movement of the control member into corresponding rotary movement of the rotatable means,

wherein a portion of the rotatable means is ar-

ranged to be visible through a window of said printer, and paper size indicators are displayed in radially-divided regions of the rotatable means to show the paper size according to the position of the control member, characterised in that:

the linear/rotary movement converting means includes a wire for connecting the rotatable means to the control member along a predetermined path, and biasing means is provided for supplying restoring force to maintain tension in the wire with respect to the linear movement of the control member,

wherein said biasing means comprises a roll spring for supplying restoring force in a winding direction of said rotatable means,

wherein the roll spring is obtained by rolling a strip; and

wherein the rotatable means comprises a pulley wheel around which said wire is arranged to be wound or unwound according to the movement of the control member.

[0011] Said rotatable means is preferably mounted on a side portion of the paper tray.

[0012] The invention includes a printer tray incorporating the apparatus of the above aspect and a printer including such a printer tray.

[0013] For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings, in which:

Figure 1 is a perspective view of a typical printer;

Figure 2 is a partially exploded perspective view of a display of the size of paper stored in a paper tray of a printer, according to an embodiment of the present invention;

Figure 3 is a view showing interconnection of a rotary plate of the paper size display and a rotary shaft on the paper tray, through a roll spring; and

Figure 4 is a view showing the rotary plate of Figure 2 on which paper size indicators are displayed.

[0014] Referring to Figure 2, in a paper tray 30, one or more control members such as first control plate 41 capable of linear movement to divide a paper storing space in a first direction, and second control plates 42 and 43 facing each other, capable of linear movement in a second direction perpendicular to the first direction, are provided.

[0015] The first control plate 41 engages with a multitude of guide notches 44 in a row on the bottom surface of the paper tray 30. Also, the second control plates 42 and 43 engage with a multitude of guide notches (not

shown) in a row on the bottom surface of the paper tray 30. The distance between adjacent guide notches 44 is the minimum movement distance of the first control plate 41. A window 33 of a predetermined size for showing the inside of the paper tray 30 is provided on one side of the front side 32 of the paper tray 30 having a handle grip 31 for ejecting the paper tray 30. The window 33 may be a hole or formed of a transparent material.

[0016] Rotatable means comprising pulley wheel 46 capable of rotating around a rotary shaft 45 protruding from an inner wall 34a of a groove 34 of the paper tray 30 is provided inside the paper tray 30 behind the window 33.

[0017] As a linear/rotating movement converting means for rotating the pulley wheel 46 with the linear movement of the first control plate 41, there are provided a wire 47 having one end connected to one side of the pulley wheel 46 and the other end connected to the side of the first control plate 41 which faces away from the paper, and a roll spring 48 having its ends connected between the pulley wheel 46 and the rotary shaft 45 on the inner wall 34a, for supplying restoring force with respect to the rotation of the pulley wheel 46 to a predetermined rotation position as shown in Figure 3, to maintain tension in the wire 47 regardless of the position of the first control plate 41.

[0018] The roll spring 48 may be replaced by other resilient biasing means such as a rubber band.

[0019] The restoring force of the roll spring 48 must only tension the wire 47, without moving the first control plate 41.

[0020] A roller 49 allows the wire to slide easily.

[0021] According to the display of paper size, when paper size indicators corresponding to the distance between a rear wall 35 of the paper tray 30 and the first control plate 41 are arranged on a region of the pulley wheel 46 facing the window 33 as shown in Figure 4, a user can see paper size indicator which corresponds to the size of paper in the paper tray 30 by control of the first control plate 41.

[0022] The pulley wheel 46 and the window 33 facing thereto may be positioned considering the appearance of the printer and position of the paper tray 30.

[0023] Meanwhile, the display of the paper size can be based on relative movement between the second control plates 42 and 43 and the pulley wheel 46, as well as relative movement between the first control plate 41 and the pulley wheel 46.

[0024] As described above, according to the display of the size of paper stored in the paper tray for the printer the size of the paper stored in the paper tray can be seen from the outside, so that the paper tray need not be opened to check the size of the stored paper.

Claims

1. Apparatus for enabling the size of paper stored in-

ternally in a paper tray (30) loaded in a printer to be viewed from the exterior, the apparatus comprising:

at least one control member (41) capable of sliding linearly in a predetermined direction, installed in the paper tray (30) to define the edges of the stored paper;

rotatable means (46) mounted for rotation about a point (45); and

means for converting linear movement of the control member (41) into corresponding rotary movement of the rotatable means (46),

wherein a portion of the rotatable means (46) is arranged to be visible through a window (33) of said printer, and paper size indicators are displayed in radially-divided regions of the rotatable means (46) to show the paper size according to the position of the control member (41), **characterised in that:**

the linear/rotary movement converting means includes a wire (47) for connecting the rotatable means (46) to the control member (41) along a predetermined path, and biasing means (48) is provided for supplying restoring force to maintain tension in the wire (47) with respect to the linear movement of the control member (41),

wherein said biasing means (48) comprises a roll spring for supplying restoring force in a winding direction of said rotatable means (46),

wherein the roll spring is obtained by rolling a strip; and

wherein the rotatable means (46) comprises a pulley wheel around which said wire (47) is arranged to be wound or unwound according to the movement of the control member (41).

2. The apparatus according to claim 1, wherein said rotatable means (46) is mounted on a side portion of the paper tray (30).
3. A printer tray (30) incorporating the apparatus of any preceding claim.
4. A printer incorporating the printer tray (30) according to claim 3 or incorporating the apparatus according to claim 1 or 2.

Patentansprüche

1. Vorrichtung, die es ermöglicht, die Größe von Papier, das in einer in einen Drucker eingelegten Papierkassette (30) aufbewahrt wird, von außen zu sehen, wobei die Vorrichtung umfasst:

wenigstens ein Steuerelement (41), das sich li-

near in einer vorgegebenen Richtung verschieben kann und in der Papierkassette (30) installiert ist, um die Ränder des aufbewahrten Papiers zu bestimmen,

eine drehbare Einrichtung (46), die zur Drehung um einen Punkt (45) angebracht ist, und eine Einrichtung zum Umwandeln der linearen Bewegung des Steuerelements (41) in eine entsprechende Drehbewegung der drehbaren Einrichtung (46),

wobei ein Teil der drehbaren Einrichtung (46) so angeordnet ist, dass er durch ein Fenster (33) des Druckers hindurch sichtbar ist, und Papiergrößenanzeiger in radial unterteilten Bereichen der drehbaren Einrichtung (46) vorhanden sind, um die Papiergröße entsprechend der Position des Steuerelements (41) anzuzeigen, **dadurch gekennzeichnet, dass**

die Umwandlungseinrichtung für die Linear-/Drehbewegung einen Draht (47) zum Verbinden der drehbaren Einrichtung (46) mit dem Steuerelement (41) auf einem vorgegebenen Weg aufweist und eine Vorspanneinrichtung (48) zum Zuführen einer Rückführkraft vorhanden ist, um die Spannung im Draht (47) in Bezug auf die lineare Bewegung des Steuerelements (41) aufrechtzuerhalten, wobei die Vorspanneinrichtung (48) eine Rollfeder zum Zuführen einer Rückführkraft in Wickelrichtung der drehbaren Einrichtung (46) umfasst, wobei die Rollfeder durch Aufrollen eines Streifens entsteht und wobei die drehbare Einrichtung (46) ein Scheibensrad aufweist, um welches herum der Draht (47) angeordnet ist, sodass er entsprechend der Bewegung des Steuerelements (41) auf- oder abgewickelt wird.

2. Vorrichtung nach Anspruch 1, wobei die drehbare Einrichtung (46) an einem Seitenteil der Papierkassette (30) befestigt ist.
3. Papierkassette (30), in welche die Vorrichtung nach einem vorangehenden Anspruch eingebaut ist.
4. Drucker, in welchen die Druckerkassette (30) nach Anspruch 3 oder die Vorrichtung nach Anspruch 1 oder 2 eingebaut ist.

Revendications

1. Dispositif permettant de voir de l'extérieur le format de papier rangé à l'intérieur d'un bac (30) d'alimentation en papier chargé dans une imprimante, le dispositif comprenant :

au moins un élément de commande (41) pou-

vant coulisser de manière linéaire dans une direction prédéterminée, installé dans le bac (30) d'alimentation en papier pour définir les bords du papier rangé ;

un moyen rotatif (46) monté pour tourner autour d'un point (45) ; et

un moyen pour convertir un mouvement linéaire de l'élément de commande (41) en mouvement de rotation correspondant du moyen rotatif (46),

dans lequel une partie du moyen rotatif (46) est conçue pour être visible à travers une fenêtre (33) de ladite imprimante, et des indicateurs de format de papier sont présentés dans des divisions radiales du moyen rotatif (46) pour indiquer le format de papier d'après la position de l'élément de commande (41), **caractérisé en ce que :**

le moyen de conversion de mouvement linéaire en mouvement de rotation comporte un fil (47) pour connecter le moyen rotatif (46) à l'élément de commande (41) sur un trajet prédéterminé, et un moyen de sollicitation (48) est prévu pour fournir une force de rappel pour maintenir le fil (47) tendu par rapport au mouvement linéaire de l'élément de commande (41),

ledit moyen de sollicitation (48) comportant un ressort enroulé pour fournir une force de rappel dans la direction d'enroulement dudit moyen rotatif (46),

le ressort enroulé étant réalisé en enroulant une tôle en bande ; et

le moyen rotatif (46) comportant une poulie autour de laquelle ledit fil (47) est destiné à s'enrouler ou se dérouler selon le mouvement de l'élément de commande (41).

2. Dispositif selon la revendication 1, dans lequel ledit moyen rotatif (46) est monté sur une partie latérale du bac (30) d'alimentation en papier.
3. Bac d'alimentation (30) d'imprimante incluant le dispositif selon l'une quelconque des revendications précédentes.
4. Imprimante incluant le bac d'alimentation (30) d'imprimante selon la revendication 3 ou incluant le dispositif selon la revendication 1 ou 2.

FIG. 1

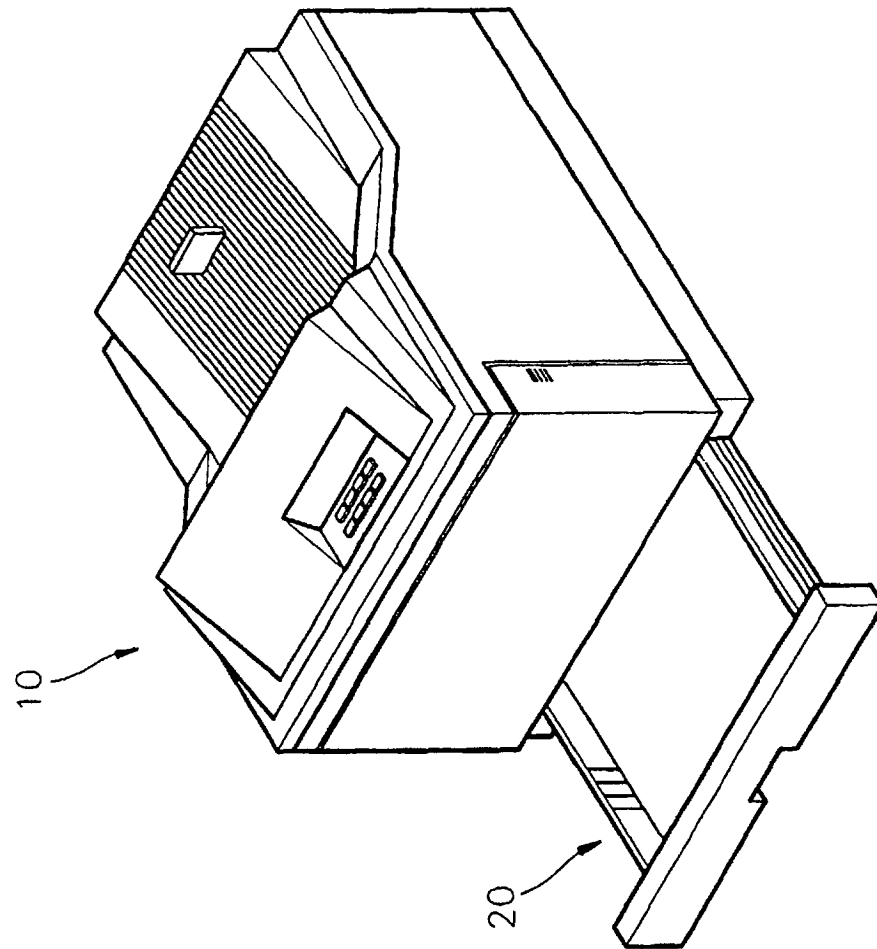


FIG. 2

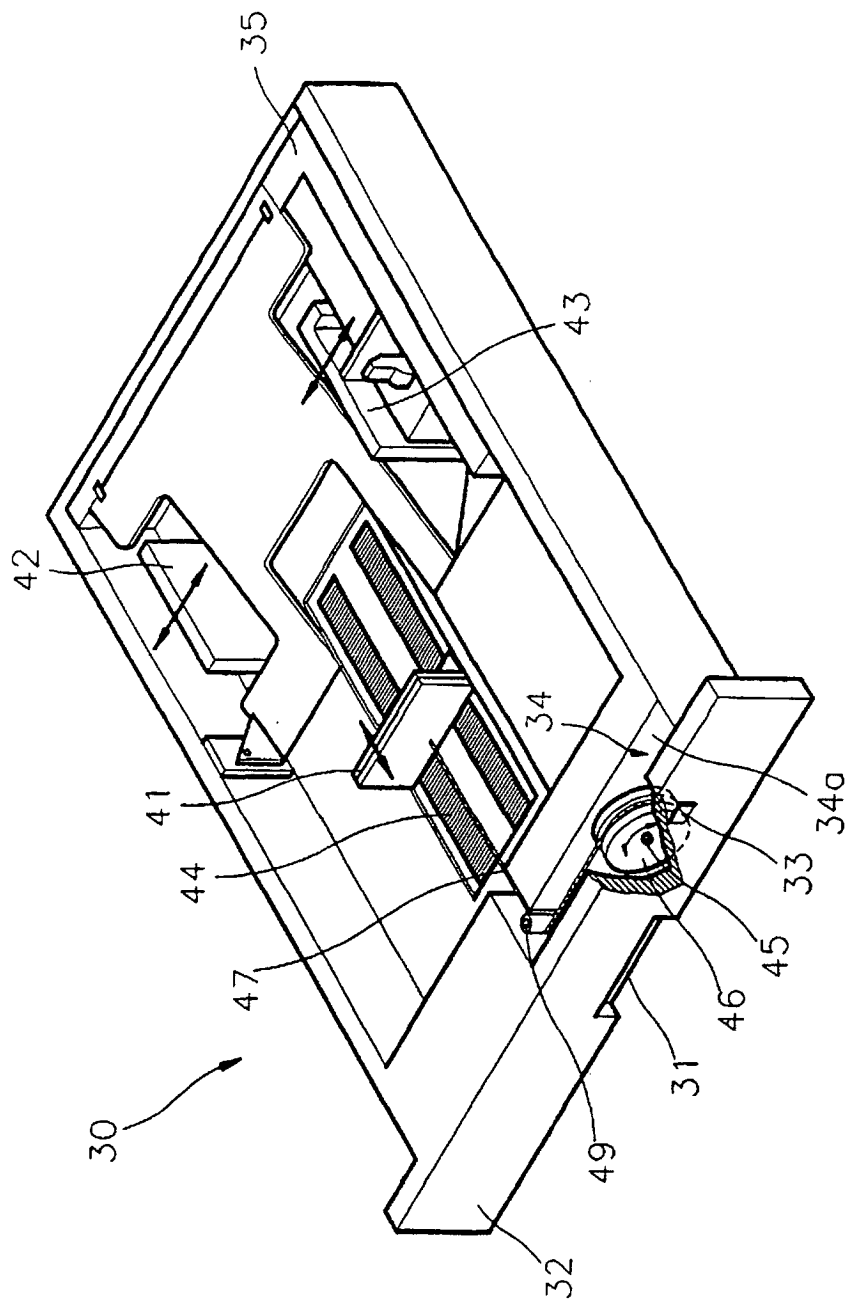


FIG. 3

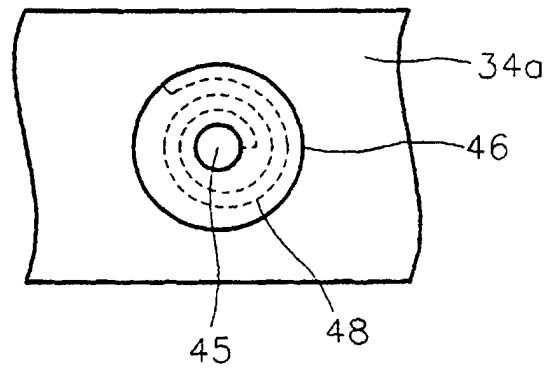


FIG. 4

