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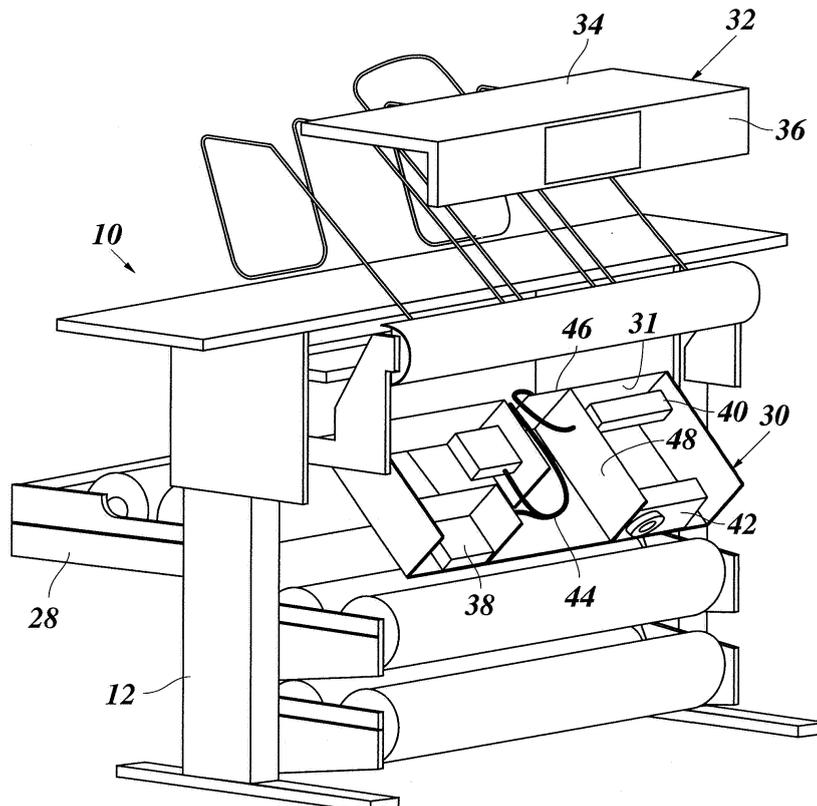
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(54) **Printer with control box**

(57) A printer having a bridge-like frame structure (10) with two uprights (12) and a cross-member (14), and functional components mounted to the frame structure (10) and connected to control circuitry (38), wherein the

control circuitry (38) is accommodated in a central control box (30) that has a top access (31) opening and is pivotally mounted between the uprights (12) and underneath the cross-member (14) as to be tilted into a position exposing the access opening.

Fig. 2



Description

[0001] The invention relates to a printer having a bridge-like frame structure with two uprights and a cross-member, and functional components mounted to the frame structure and connected to control circuitry.

[0002] An example of a printer with such a construction is an ink jet printer having a carriage carrying ink jet print-heads and arranged to move back and forth along the cross-member so as to print an image on a sheet of a recording medium that is advanced over a sheet support plate which is an essential part of the cross-member. The recording media may be provided as endless webs that are drawn off from reels, the reels being rotatably supported between the uprights in the lower part of the frame structure.

[0003] The printer has a number of functional components, such as the printheads, a carriage drive system, a sheet advance mechanism, cutting mechanisms for cutting the recording medium to length, a vacuum system for creating a suction pressure for holding the recording medium flat on the sheet support plate, the temperature control system for controlling the temperature of the sheet support plate, for example, when the printer operates with hot-melt ink, a discharge mechanism for discharging the printed sheets, a control panel for entering print instructions, and the like. The various functional components are connected to control circuitry comprising electronic control units arranged on printed circuit boards or the like for controlling the functions of the various components. The control circuitry is not limited to electronic circuitry but may also include pneumatic control circuits, for example.

[0004] It is an object of the invention to provide a printer which has a compact construction and nevertheless permits easy access to the control circuitry for maintenance purposes and the like.

[0005] According to the invention, this object is achieved by a printer of the type indicated above, in which the control circuitry is accommodated in a central control box that has a top access opening and is pivotally mounted between the uprights and underneath the cross-member so as to be tilted into a position exposing the access opening.

[0006] Thus, in a normal condition of the printer, i.e. a condition in which the printer is ready to operate, the central control box accommodating the control circuitry or at least a major part thereof is arranged in a space-saving manner right underneath the cross-member. This, however, has the consequence that the top access opening of the control box is at least partly blocked by the cross-member. In order to permit access to the various control units in the control box, the latter is tilted into an inclined position, so that the access opening is moved away from the cross member and may readily be accessed from the front side or the back side of the printer.

[0007] This construction has the remarkable advantage that practically the whole area of the cross member,

when seen in plan view, may be utilised for mounting a control box with relatively large dimensions and a correspondingly large top opening, so that a large number of control units may be arranged in a concise manner in one and the same control box. Thus, in case of maintenance or repair, the service engineer simply has to tilt the control box into the inclined position in order to get easy access to the control units for most or even all of the functional components of the printer. The pivotal arrangement of the control box has the further advantage that the box may be moved from the normal position to the exposed position without requiring a substantial extra length for the cables, hoses and the like connecting the functional components of the printer to the respectively associated control units.

[0008] The invention is particularly useful for a printer having a modular construction in which functional components may be added or changed in order to meet the specific demands of the customers. When, for example, the functionality of a specific functional components needs to be altered, the control circuitry may easily be adapted by opening the control box and replacing the pertinent control unit by another one which implements the desired functions. Similarly, if a control unit or the control circuitry as a whole has a defect that cannot be diagnosed and/or amended on the spot, it is a simple matter to remove the pertinent control unit or even the control box as a whole and to replace it by a new one while the defective unit or control box is shipped to the manufacturer for repair.

[0009] The dependent claims relate to useful details of the invention which permit a particularly compact construction and an easy adjustment of the control box between its operating and maintenance positions.

[0010] An embodiment example will now be described in conjunction with drawings, in which:

Fig. 1 shows a schematic perspective view of an ink jet printer according to the invention with a control box in an operating position;

Fig. 2 the printer of figure 1 with the control box in a maintenance position;

Fig. 3 to 5 detailed perspective views of a mounting structure for the control box in different positions.

[0011] As is shown in figure 1, an ink jet printer comprises a bridge-like frame structure 10 which is essentially formed by two uprights 12 and a cross-member 14 interconnecting the top ends of the uprights.

[0012] The cross-member 14 comprises an essentially horizontal sheet support plate 16 and a sub-frame 18 arranged above the sheet support plate for supporting and guiding a carriage (not shown) which carries a number of ink jet printheads and is moved back and forth between the uprights 12 so as to print an image on a

sheet of a recording medium that is advanced over the sheet support plate 16. A sheet discharge mechanism D is arranged at a downstream end of the sheet support plate 16 and comprises an arcuate guide member 20 for upwardly deflecting and reversing a printed sheet which will eventually be discharged in an upwardly inclined tray 22. In the example shown, the tray 22 is formed by appropriately bent metal bars 24 and is adapted to accommodate printed sheets of various sizes ranging from A4 portrait to A0 landscape, for example.

[0013] Sheets of recording media of different types may be drawn off from reels 26 that are rotatably supported in three drawers 28 between the uprights 12 in the lower part of the frame structure 10. A feed mechanism F is mounter in the frame structure for feeding a web of recording medium from a selected one of the reels 26 towards the upstream end of the sheet support plate 16 and past a cutting mechanism (not shown) for cutting the web to the desired sheet length.

[0014] It is observed that figure 1 shows the printer from the back side, so that the front side or operating side of the printer is the side facing away from the viewer in figure 1. In order to replace a reel 26 that has become exhausted, the drawers 28 may be drawn-out towards the operating side of the printer.

[0015] A space between the bottom side of the cross-member 14 and the top one of the drawers 28 is occupied by a rectangular control box 30 that accommodates essentially all the control units and circuitry needed for controlling the various functional components of the printer, such as the prinheads, the feed mechanism F, the discharge mechanism D and the like. The control box 30 spans almost the entire interval between the two uprights 12 and is disposed with a slight vertical clearance underneath the sheet support plate 16. The length of the control box 30 (in the direction perpendicular to the cross-member 14) is approximately equal to the length of the sheet support plate 16, including the guide member 20 of the sheet discharge mechanism.

[0016] When a service engineer needs to get access to one or more of the control units in the control box 30, for the purpose of maintenance, diagnosis or repair or for exchanging or adding a control unit, the top drawer 28 is drawn out towards the operating side of the printer, so as to enlarge the free space underneath the rear end of the control box 30, as is shown in figure 2. The control box 30 is pivotally supported in the frame structure 10 and has a pivotal axis extending horizontally near the front bottom edge of the control box. In figure 2, the control box has been tilted about this pivotal axis by an angle of approximately 45° so as to expose a large access opening 31 at the top and rear sides of the control box. A lid 32 forming a top wall 34 and a rear wall 36 of the control box has been removed, so that the interior of the control box is readily accessible for the service engineer. A number of electronic control units 38 for the various functional components of the printer have schematically been shown in figure 2. The control box 30 also includes

power supply units 40, blowers 42 and the like. Cables 44 connecting the control units 38 to the functional components respectively associated therewith are fed-out through an opening in the front wall 46 of the control box.

Since this opening is disposed in the vicinity of the pivotal axis of the control box, the required length of cables is practically not affected by the tilt position of the control box. As is further shown in figure 2, the interior of the control box 30 is divided into several compartments by means of separating walls 48, so that the control units and other components of the control circuitry may be arranged in the control box 30 in a well organised and concise manner, with heat sensitive components being shielded from heat generating components.

[0017] It will be understood that the cables 44 are connected to the control units 38 through plug connectors which have not been shown in detail, so that the various units accommodated in the control box 30 may easily be disconnected and removed, if necessary.

[0018] Figures 3 to 5 show an example of a mounting structure for pivotally mounting the control box 30 in the frame structure 10. Figure 3 shows one end of the control box 30 in the operating state (as in figure 1). This end of the control box is closed-off by an end wall 50 including switches 52, a main power connector 54, a grid 56 for a blower, and the like. The lower front edge of the control box 30 is pivotally supported at a crosspiece 58, e.g. by means of hinges 60 only a small part of which is shown in figure 3. The crosspiece 58 is connected between the uprights 12 of the frame structure and carries a vertical post 62 which has a horizontally projecting pin 64 at its top end.

[0019] In figure 4, the post 62 has been removed, so that the pin 64 can be seen more clearly. An articulated link 66 is disposed in parallel with the end wall 50 of the control box and has one end rotatably connected to the pin 64 and the other end connected to a pivot 68 projecting outwardly from the top edge of the end wall 50. A T-shaped hook member 70 is rotatably supported on the same pivot 68.

[0020] As can be seen more clearly in figure 5, one end of the cross-bar of the T-shaped hook member 70 forms a hook 72, and the opposite end forms a tab 74 serving a manual grip. In the condition shown in figures 3 and 4, the hook 72 engages the pin 64, so that the control box 30 is arrested in its horizontal position. When a user or a service engineer wishes to tilt the control box 30 into the inclined position shown in figure 2, he depresses the tab 74 with his finger, so that the hook member 70 rotates about the pivot 68, and the hook 72 is released from the pin 64. Then, the control box 30 can be tilted about its pivotal axis A, as is indicated in figure 5. The control box 30 is arrested in the inclined position when the articulated link 66 reaches an almost stretched condition. A stop (not shown) at one of the two members of the articulated link 66 prevents the same from reaching a fully stretched dead-center position, so that the link will yield again when the opposite ends thereof are pushed

together.

[0021] The hook member 70 may be biased towards its engaging position (clock-wise in figure 5) by means of a coil spring or the like. When the user wishes to return the control box 30 to the horizontal position, he tilts the control box upwardly and depresses the tab 74 with a finger. By the end of the upward tilt movement, the vertical leg of the hook member 70 will abut at the pin 64, and this will cause the hook member to rotate clock-wise, so that the pin 64 is again engaged by the hook 72, when the user releases the tab 74.

Claims

1. A printer having a bridge-like frame structure (10) with two uprights (12) and a cross-member (14), and functional components (F, D) mounted to the frame structure (10) and connected to control circuitry (38), **characterized in that** the control circuitry (38) is accommodated in a central control box (30) that has a top access (31) opening and is pivotally mounted between the uprights (12) and underneath the cross-member (14) as to be tilted into a position exposing the access opening.
2. The printer according to claim 1, wherein a drawer (28) is disposed underneath the control box (30) such that, when the drawer is drawn out, the control box is tiltable into a space that had been occupied by the drawer (28).
3. The printer according to claim 2, wherein the drawer (28) accommodates a reel (26) for an endless web of a print medium.
4. The printer according to any of the preceding claims, wherein the control box (30) spans essentially the whole width between the two uprights (12).
5. The printer according to any of the preceding claims, wherein the access opening (31) of the control box (30) extends over at least a major part of a top surface and a side surface of the control box opposite to the side where a pivotal axis (A) of the control box is located, and the access opening is covered by a removable lid (32).
6. The printer according to any of the preceding claims, wherein the control box (30) has a pivotal axis (A) extending near a lower edge thereof.
7. The printer according to claim 6, wherein a lower edge of the control box (30) is hinged to a member (58) of the frame structure, and an upper edge of the control box on the side that is hinged to said member (58) is connected to the frame structure by an articulated link (60).
8. The printer according to claim 7, wherein the articulated link (66) is disposed outside of and in parallel with an end wall (50) of the control box and has one end rotatably connected to a horizontally projecting pin (64) fixed to the frame structure, and a hook member (70) is rotatably supported at the same end wall (50) of the control box and engages said pin (64) to hold the control box in its non-tilted position.
9. The printer according to claim 8, wherein the hook member (70) has the shape of a letter T having a cross-bar, the central portion of which is rotatably supported on a pivot (68) which rotatably supports also one end of the articulated link (66), one end of the cross-bar forming a hook (72) for engaging the pin (64) and the opposite end of the cross-bar forming a tab (74) for releasing the hook from the pin, the vertical leg of the T-shaped hook member serving as an abutment for the pin (64).
10. The printer according to any of the preceding claims, the printer being an ink jet printer.

Fig. 1

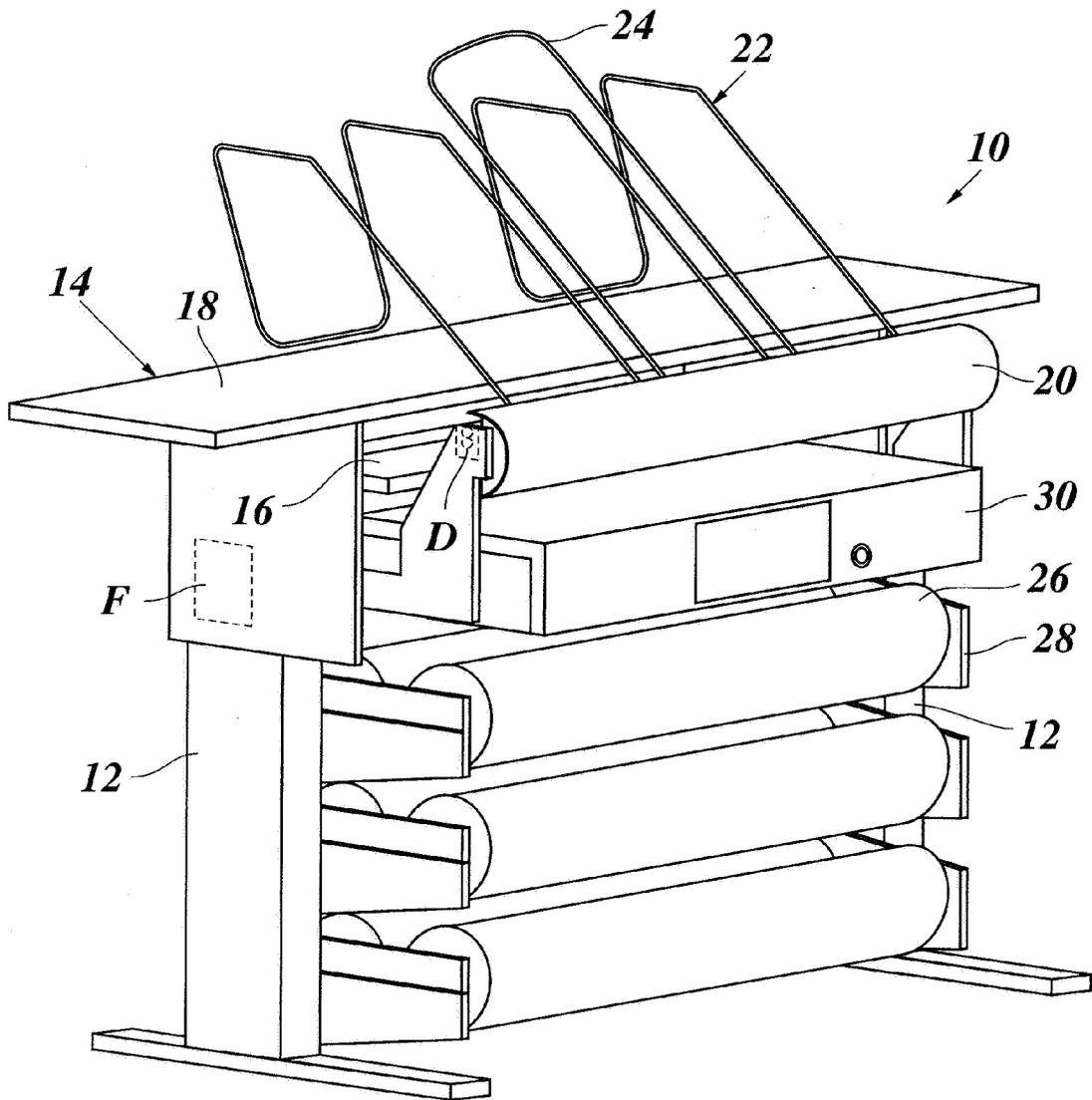


Fig. 3

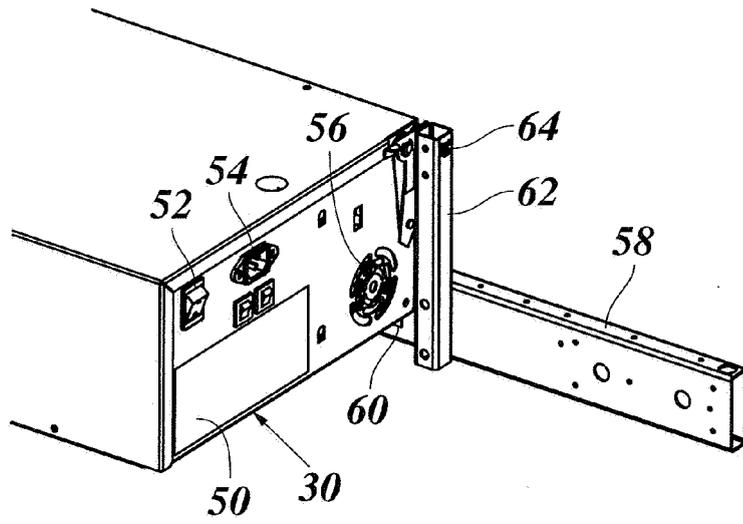


Fig. 4

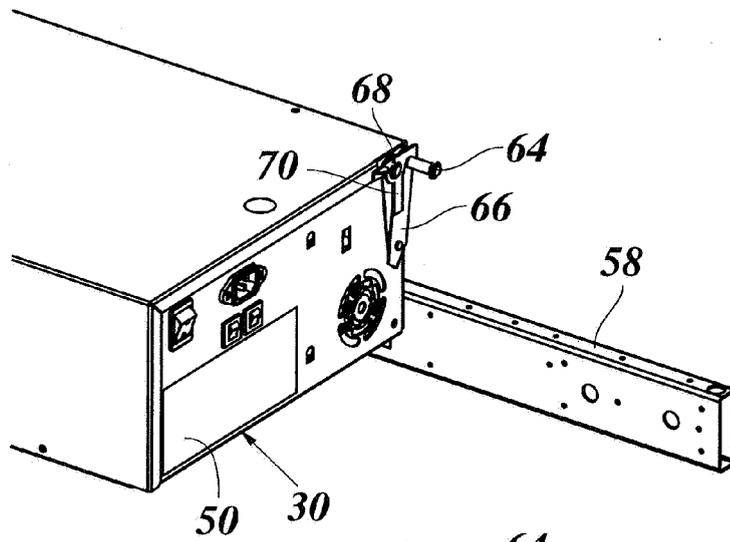
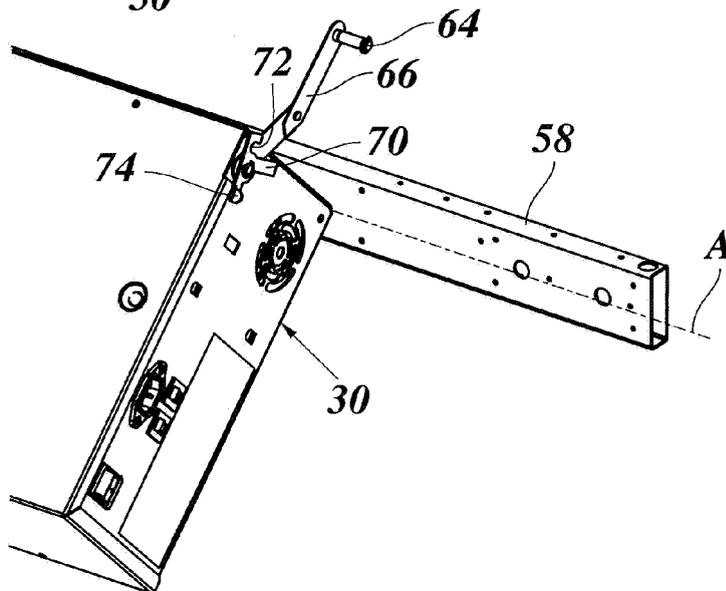


Fig. 5





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 6 068 420 A (AUSTIN ET AL) 30 May 2000 (2000-05-30) * column 7, line 8 - line 32 * * figure 6 *	1,4,6,10	B41J29/02
A	----- US 5 028 154 A (CULL ET AL) 2 July 1991 (1991-07-02) * the whole document *	1	
A	----- US 5 087 932 A (CHIKANO ET AL) 11 February 1992 (1992-02-11) * column 3, line 48 - column 4, line 35 * * figures 2,3 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			B41J
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		18 January 2006	Didenot, B
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 10 8845

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18-01-2006

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6068420	A	30-05-2000	US 6088049 A US 5751330 A	11-07-2000 12-05-1998
US 5028154	A	02-07-1991	NONE	
US 5087932	A	11-02-1992	JP 2308178 A	21-12-1990

EPO FORM P0459

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