

Description

The invention relates to printers.

Printers using a long sheet, *i.e.*, a continuous web, include one in which a push-type pin tractor is disposed at the rear of the print position, as disclosed in Japanese Patent Unexamined Publication No. 71453/86, and one in which the push-type pin tractor is disposed in front of the print position, as proposed in Japanese Patent Unexamined Publication No. 163084/1989.

The former type of printer has the advantages that the web does not pass through the front of the printer, the printer can be installed on a computer body or monitor, and the web can be located at the rear of the computer or on the floor, making it suitable for use in small space. However, its disadvantage is that replacement of the paper web is not easy. On the other hand, the latter type printer has the advantage that the web can be replaced from the front of the printer, but it also has the disadvantage that the location of the printer or web is limited because the web passes through the printer in the front, thereby making it unsuitable for use in a small space.

To solve the above problems, a printer such as disclosed in Japanese Patent Unexamined Publication No. 8070/1989 has two push-type pin tractors in front and at the rear of the print position. In this type of printer, however, the pin tractors cannot be detached, even though they may not be used depending on printing requirements. Thus, the printer is too expensive for some applications.

The invention has been made in view of the above problems, and has as an object the provision of a printer in which the sheet feed path can be easily changed in accordance with the location of installation. This object is solved by the printer of independent claim 1. Further advantageous features of the printer are evident from the dependent claims, the description and the drawings.

The printer of the invention is capable of arbitrarily changing the mounting position and number of tractor units.

Achieving the above object, the invention provides a printer which comprises at least two tractor unit mounting sections upstream of a print position in a sheet feed direction, means for transmitting a drive force to each of the tractor unit mounting sections, and at least one tractor unit removably mounted on each of the tractor unit mounting sections and coupled with one of the drive force transmitting means at the time the tractor unit is mounted on the printer.

With the above construction, sheets can be fed from any direction suitable for the installation of the printer merely by changing the mounting position of the tractor unit. In addition, a plurality of webs

can be used with a single printer by increasing the number of tractor units, allowing the webs to be used selectively.

Figs. 1(a) and 1(b) are side views showing the construction of a printer of a preferred embodiment of the invention;

Fig. 2 is a perspective view showing a tractor unit used with the printer device of Fig. 1;

Figs. 3(a) through 3(d) are diagrams illustrating different modes of mounting tractor units.

A preferred embodiment of the invention will now be described with reference to the attached drawings.

Figs. 1(a) and 1(b) show a frame mechanism and a structure of wheels in tandem of a printer.

In these drawings, a frame 1 has a platen shaft 10 that is releasably supported in the middle part of the frame 1. Interposing the shaft supporting section, tractor unit mounting sections 2A, 2B and 2C are arranged at lower front and rear positions, and/or at an upper rear position if desired. Each of the tractor unit mounting sections can removably accommodate a tractor unit 20 (described later).

A switching lever 14 is rotatably and pivotally supported at one end of the platen shaft 10. The switching lever 14 pivotally supports a planetary gear 13 that engages a platen gear 11. Toward the front and rear of the frame 1 of the printer body are provided idler gears 15, 16 and 17 which are pivotally supported. The idler gears 15, 16 and 17 transmit a force for driving a tractor unit 20 mounted on one of the tractor unit mounting sections 2A and 2B through the planetary gear 13. If necessary, an idler gear 18 for transmitting a drive force to a tractor unit 20 mounted on the mounting section 2C is disposed at the upper rear position of the frame 1.

Fig. 2 shows the tractor unit 20 to be releasably mounted on the tractor unit mounting sections 2A, 2B and 2C. Unit frames 21 disposed at both ends in the width direction of the tractor unit 20 support a drive shaft 23 having drive gears 22 at its ends and a guide shaft 24. A pair of tractor sets 26, each having a tractor belt 25, is slidably mounted on the shafts 23 and 24. Each of the frames 21 has an engaging recessed portion 27 arranged at one end on the drive shaft 23 side. Each engaging recessed portion 27 is engageable with a positioning pin 3 located closer to the platen shaft 10 arranged on the tractor unit mounting section 2 of the frame 1. On the bottom side of each unit frame 21 is a deeply recessed portion 28 for receiving another positioning pin 4. The drive shaft 23 is inserted into a recess 5 arranged on the tractor unit mounting section 2 so that the positioning pins 3 and 4 are engaged with the engaging recessed portions 27 and 28, respectively. Each positioning pin 4 inserted into each engaging recessed portion

28 is embraced by a lock lever 29 biased outwardly by a spring so that the tractor unit 20 is positioned and fixed on the mounting section 2.

In Fig. 3, reference numeral 18 designates a platen, and 19, a print head.

In the printer thus constructed, a web S_1 may be selectively fed from the front of the printer in accordance with the conditions of installation of the printer. In this case, as shown in Fig. 1(a), the tractor unit 20 is mounted on the tractor unit mounting section 2A arranged at the lower front position of the frame 1 of the printer. Specifically, the engaging recessed portions 27 arranged at first ends of the unit frames 21 are engaged with the positioning pins 3 which are located closer to the platen shaft 10, and then the other positioning pins 4 are inserted into the deeply recessed portions 28 with the lock levers 29 moved toward the drive shaft 23 against the force of the spring. Then, the biasing forces of the lock levers 29 are released to hold pawls 29a arranged at the tips of the lock levers 29, and the tractor unit 20 is fixed on the mounting section 2A of the frame 1 with the drive gear 22 meshed with the idler gear 16.

Under this state, the switching lever 14 is turned counterclockwise (in Fig. 1(a)) to cause the planetary gear 13 mesh with the idler gear 15 in front of the frame 1. As a result, the printer is, as shown in Fig. 3(a), set up as a front-feed printer with the mounted tractor unit 20 serving as a push tractor.

To set up the printer as a rear-feed type, the tractor unit 20 is located in reverse from front to rear as shown in Fig. 1(b). The drive gear 22 of the tractor unit 20 is attached to the tractor unit mounting section 2B arranged at the lower rear position of the frame 1 of the printer body so as to mesh with the idler gear 17, and the switching lever 14 is turned clockwise (in Fig. 1(b)) to cause the planetary gear 13 to mesh with the idler gear 17 disposed at the rear of the frame 1. Accordingly, as shown in Fig. 3(b), the printer is set up as a rear-feed type.

Similarly, if the tractor unit 20 is mounted on the tractor unit mounting section 2C at the upper rear position as the case may require, the tractor unit 20 can be used as a pull tractor, as shown in Fig. 3(c), so that the web S_1 can be pulled onto the platen 18 from the front (or from the rear) of the printer.

Although not shown in Figs. 3(a) and 3(b), another tractor unit 20 in addition to the tractor unit 20 may be mounted on the tractor unit mounting section 2A (or 2B) arranged at the lower front (or rear) position of the frame 1 of the printer body so that a printer using both a push/pull tractor-fed type can be set up.

Moreover, if two tractor units 20 are mounted on the tractor unit mounting section 2A or 2B at the lower front and rear positions of the frame 1 and the switching lever 14 is turned either clockwise or counterclockwise, the selected web S_1 will be fed to the platen 18, as shown in Fig. 3(d).

In the case where the invention is applied to a printer having a cut sheet feeder, the tractor unit 20 can be mounted at the lower front position so that the printer can select between cut sheet feeding and web feeding.

As described above, according to the invention, the printer includes at least two tractor unit mounting sections upstream of the print position in the sheet feed direction, and at least one tractor unit can be mounted on either of these tractor unit mounting sections. Therefore, the sheet feeding direction can be selected freely in accordance with the web replacement frequency or the printer installation location merely by changing the mounting position of the tractor unit. In addition, if the number of tractor units is increased, a plurality of webs can be set up simultaneously and used selectively.

Claims

1. A printer comprising: a frame (1) having at least two tractor unit mounting sections (2A;2B;2C) disposed upstream of a printing position in said printer in a sheet feeding direction; means (11,13,14,15,16; 11,13,14,17;11,18) for selectively transmitting a drive force to each of said tractor unit mounting sections (2A;2B;2C); at least one tractor unit (20); means for removably and interchangeably mounting said tractor unit (20) on any selected one of said tractor unit mounting sections (2A;2B;2C) and coupling said drive force transmitting means (11,13,14,15,16;11,13,14,17; 11,18) to said tractor unit (20) at the time said tractor unit (20) is mounted.
2. The printer of claim 1, wherein said frame (1) rotatably supporting a platen shaft (10) supporting a platen and platen gear (11), and said means for transmitting a drive force comprises a switchable lever (14) rotatably mounted on said platen shaft (10) and a planetary gear (13) rotatably mounted on an end portion of said lever (14) and engaged with said platen gear (11).
3. The printer of claim 1 or 2, wherein said means for transmitting a drive force comprises a plurality of idler gears (15,16;17;18) at least one of said idler gears (15,16;17) being provided for each of said tractor unit mounting sections (2A;2B;2C), said switchable lever (14)

28 is embraced by a lock lever 29 biased outwardly by a spring so that the tractor unit 20 is positioned and fixed on the mounting section 2.

In Fig. 3, reference numeral 18 designates a platen, and 19, a print head.

In the printer thus constructed, a web S_1 may be selectively fed from the front of the printer in accordance with the conditions of installation of the printer. In this case, as shown in Fig. 1(a), the tractor unit 20 is mounted on the tractor unit mounting section 2A arranged at the lower front position of the frame 1 of the printer. Specifically, the engaging recessed portions 27 arranged at first ends of the unit frames 21 are engaged with the positioning pins 3 which are located closer to the platen shaft 10, and then the other positioning pins 4 are inserted into the deeply recessed portions 28 with the lock levers 29 moved toward the drive shaft 23 against the force of the spring. Then, the biasing forces of the lock levers 29 are released to hold pawls 29a arranged at the tips of the lock levers 29, and the tractor unit 20 is fixed on the mounting section 2A of the frame 1 with the drive gear 22 meshed with the idler gear 16.

Under this state, the switching lever 14 is turned counterclockwise (in Fig. 1(a)) to cause the planetary gear 13 mesh with the idler gear 15 in front of the frame 1. As a result, the printer is, as shown in Fig. 3(a), set up as a front-feed printer with the mounted tractor unit 20 serving as a push tractor.

To set up the printer as a rear-feed type, the tractor unit 20 is located in reverse from front to rear as shown in Fig. 1(b). The drive gear 22 of the tractor unit 20 is attached to the tractor unit mounting section 2B arranged at the lower rear position of the frame 1 of the printer body so as to mesh with the idler gear 17, and the switching lever 14 is turned clockwise (in Fig. 1(b)) to cause the planetary gear 13 to mesh with the idler gear 17 disposed at the rear of the frame 1. Accordingly, as shown in Fig. 3(b), the printer is set up as a rear-feed type.

Similarly, if the tractor unit 20 is mounted on the tractor unit mounting section 2C at the upper rear position as the case may require, the tractor unit 20 can be used as a pull tractor, as shown in Fig. 3(c), so that the web S_1 can be pulled onto the platen 18 from the front (or from the rear) of the printer.

Although not shown in Figs. 3(a) and 3(b), another tractor unit 20 in addition to the tractor unit 20 may be mounted on the tractor unit mounting section 2A (or 2B) arranged at the lower front (or rear) position of the frame 1 of the printer body so that a printer using both a push/pull tractor-fed type can be set up.

Moreover, if two tractor units 20 are mounted on the tractor unit mounting section 2A or 2B at the lower front and rear positions of the frame 1 and the switching lever 14 is turned either clockwise or counterclockwise, the selected web S_1 will be fed to the platen 18, as shown in Fig. 3(d).

In the case where the invention is applied to a printer having a cut sheet feeder, the tractor unit 20 can be mounted at the lower front position so that the printer can select between cut sheet feeding and web feeding.

As described above, according to the invention, the printer includes at least two tractor unit mounting sections upstream of the print position in the sheet feed direction, and at least one tractor unit can be mounted on either of these tractor unit mounting sections. Therefore, the sheet feeding direction can be selected freely in accordance with the web replacement frequency or the printer installation location merely by changing the mounting position of the tractor unit. In addition, if the number of tractor units is increased, a plurality of webs can be set up simultaneously and used selectively.

Claims

1. A printer comprising: a frame (1) having at least two tractor unit mounting sections (2A;2B;2C) disposed upstream of a printing position in said printer in a sheet feeding direction; means (11,13,14,15,16; 11,13,14,17;11,18) for selectively transmitting a drive force to each of said tractor unit mounting sections (2A;2B;2C); at least one tractor unit (20); means for removably and interchangeably mounting said tractor unit (20) on any selected one of said tractor unit mounting sections (2A;2B;2C) and coupling said drive force transmitting means (11,13,14,15,16;11,13,14,17; 11,18) to said tractor unit (20) at the time said tractor unit (20) is mounted.
2. The printer of claim 1, wherein said frame (1) rotatably supporting a platen shaft (10) supporting a platen and platen gear (11), and said means for transmitting a drive force comprises a switchable lever (14) rotatably mounted on said platen shaft (10) and a planetary gear (13) rotatably mounted on an end portion of said lever (14) and engaged with said platen gear (11).
3. The printer of claim 1 or 2, wherein said means for transmitting a drive force comprises a plurality of idler gears (15,16;17;18) at least one of said idler gears (15,16;17) being provided for each of said tractor unit mounting sections (2A;2B;2C), said switchable lever (14)



being rotatable to engage said planetary gear with a selected one (15;17) of said idler gears.

4. The printer of any one of the preceding claims, wherein each of said tractor unit mounting sections (2A;2B;2C) comprises a recess (5) formed in said frame (1), a pair of positioning pins (3,4) being disposed on opposed sides of said recess (5).
5. The printer of claim 4, wherein said tractor unit (20) comprises a guide shaft (24), a drive shaft (23), at least one drive gear (22) mounted at the end of said drive shaft (23), and a pair of unit frames disposed at opposite ends of said tractor unit and supporting said guide shaft and said drive shaft, each of said unit frames (21) having a first recessed portion (27) formed in an end part thereof, said first recessed portion (27) being engageable with a respective one (3) of said positioning pins (3,4) of each of said tractor mounting sections (2A;2B;2C) on a side of said recess closer to said platen shaft (10) and each of said unit frames further having a second recessed portion (28) formed in a bottom part thereof said second recessed portion being engageable with the other (4) of said positioning pins (3,4), each of said tractor unit mounting sections having an idler gear, said drive gear (22) being engaged with said idler gear (16;17;18) of a selected one of said tractor unit mounting sections (2A;2B;2C) when said tractor (20) is mounted on said printer.
6. The printer of claim 5, wherein said tractor unit (20) further comprises a spring-biased locking lever (29) disposed adjacent said second recessed portions (28) of said unit frames (21) and engageable with said other (4) of said positioning pins (3,4) of said selected one of said tractor unit mounting sections (2A;2B;2C) when said tractor (20) is mounted on said printer.
7. The printer of one of the preceding claims, wherein ones of said tractor unit mounting sections (2A;2B;2C) are respectively provided at positions below and forward, below and rearward of said platen (18) and/or above and rearward of said platen (18).

Patentansprüche

1. Drucker mit einem Rahmen (1), der mindestens zwei Traktoreinheit-Befestigungsabschnitte (2A; 2B; 2C), die oberhalb einer Druckposition in dem Drucker in einer Blattzuführrichtung angeordnet sind, sowie Mittel (11,

13, 14, 15, 16; 11, 13, 14, 17; 11, 18) zur selektiven Übertragung einer Antriebskraft auf jeden dieser Traktoreinheit-Befestigungsabschnitte (2A; 2B; 2C), mindestens eine Traktoreinheit (20), Mittel zum Befestigen der Traktoreinheit (20) auf einem ausgewählten Traktoreinheit-Befestigungsabschnitt (2A; 2B; 2C) derart, daß sie abnehmbar und austauschbar ist, und zum Anschließen der Antriebskraft-Übertragungsmittel (11, 13, 14, 15, 16; 11, 13, 14, 17; 11, 18) an die Traktoreinheit (20), wenn die Traktoreinheit (20) angebracht ist, aufweist.

2. Drucker nach Anspruch 1, wobei der Rahmen (1) drehbar eine Walzenwelle (10) hält, auf der eine Walze und ein Walzengetrieberad (11) gelagert sind, und das Mittel zur Übertragung einer Antriebskraft einen schaltbaren Hebel (14) aufweist, der drehbar an der Walzenwelle (10) angebracht ist, sowie ein Umlaufgetrieberad (13), das drehbar an einem Endabschnitt des Hebels (14) angebracht ist und mit dem Walzengetrieberad (11) in Eingriff steht.
3. Drucker nach Anspruch 1 oder 2, wobei das Mittel zur Übertragung einer Antriebskraft eine Vielzahl von Tragrollengetrieberädern (15, 16; 17; 18) aufweist, wobei mindestens eines der Tragrollengetrieberäder (15, 16; 17) für jeden der Traktoreinheit-Befestigungsabschnitte (2A; 2B; 2C) vorgesehen ist, wobei der schaltbare Hebel (14) drehbar ist, um das Umlaufgetrieberad mit einem ausgewählten Tragrollengetrieberad (15; 17) in Eingriff zu bringen.
4. Drucker nach einem der vorhergehenden Ansprüche, wobei jeder der Traktoreinheit-Befestigungsabschnitte (2A; 2B; 2C) eine in dem Rahmen (1) ausgebildete Aussparung (5) aufweist, wobei ein Paar Positionierungsstifte (3, 4) an entgegengesetzten Seiten der Aussparung (5) angeordnet ist.
5. Drucker nach Anspruch 4, wobei die Traktoreinheit (20) eine Führungswelle (24), eine Antriebswelle (23), mindestens ein an dem Ende der Antriebswelle (23) angebrachtes Antriebsgetrieberad (22), und ein Paar Einheitsrahmen, die an entgegengesetzten Enden der Traktoreinheit angeordnet sind und die Führungswelle und die Antriebswelle halten, aufweist, wobei jeder der Einheitsrahmen (21) einen ersten ausgesparten Bereich (27) aufweist, der in einem Endteil davon ausgebildet ist, wobei der erste ausgesparte Bereich (27) mit einem (3) der Positionierungsstifte (3, 4) eines jeden Traktorbefestigungsabschnitts (2A; 2B; 2C) an einer Seite der Ausnehmung, die näher zur



Walzenwelle (10) liegt, in Eingriff bringbar ist, und jeder der Einheitsrahmen ferner einen zweiten ausgesparten Bereich (28) aufweist, der in einem Bodenteil davon ausgebildet ist, wobei der zweite ausgesparte Bereich mit dem anderen (4) der Positionierungsstifte (3, 4) in Eingriff bringbar ist, wobei jeder der Traktoreinheit-Befestigungsabschnitte ein Tragrollengetrieberad aufweist, wobei das Antriebsgetrieberad (22) mit dem Tragrollengetrieberad (16; 17; 18) eines ausgewählten Traktoreinheit-Befestigungsabschnitts (2A; 2B; 2C) in Eingriff steht, wenn der Traktor (20) an dem Drucker angebracht ist.

6. Drucker nach Anspruch 5, wobei die Traktoreinheit (20) ferner einen durch eine Feder vorgespannten Arretierungshebel (29) aufweist, der neben den zweiten ausgesparten Bereichen (28) der Einheitsrahmen (21) angeordnet und mit dem anderen (4) der Positionierungsstifte (3, 4) des ausgewählten Traktoreinheit-Befestigungsabschnitts (2A; 2B; 2C) in Eingriff bringbar ist, wenn der Traktor (20) an dem Drucker angebracht ist.
7. Drucker nach einem der vorhergehenden Ansprüche, wobei jeweils einer der Traktoreinheit-Befestigungsabschnitte (2A; 2B; 2C) an einer Position unterhalb und vor der Walze (18), unterhalb und hinter der Walze (18) und/oder oberhalb und hinter der Walze (18) angeordnet ist.

Revendications

1. Imprimante comportant: un châssis (1) ayant au moins deux parties de montage (2A; 2B; 2C) d'ensemble formant tracteur agencées en amont d'une position d'impression dans ladite imprimante dans une direction d'alimentation de feuille; des moyens (11, 13, 14, 15, 16; 11, 13, 14, 17; 11, 18) destinés à transmettre de manière sélective une force d'entraînement à chacune des parties de montage (2A; 2B; 2C) d'ensemble formant tracteur; au moins un ensemble formant tracteur (20); des moyens pour monter de manière amovible et interchangeable ledit ensemble formant tracteur (20) sur une partie quelconque sélectionnée desdites parties de montage (2A; 2B; 2C) d'ensemble formant tracteur et relier lesdits moyens (11, 13, 14, 15, 16; 11, 13, 14, 17; 11, 18) de transmission de force d'entraînement audit ensemble formant tracteur (20) au moment où ledit ensemble formant tracteur (20) est monté.

2. Imprimante selon la revendication 1, dans laquelle ledit châssis (1) supporte de manière rotative un arbre (10) de cylindre supportant un cylindre et un engrenage (11) de cylindre, et lesdits moyens destinés à transmettre une force d'entraînement comportent un levier pouvant être commuté (14) monté de manière rotative sur ledit arbre (10) de cylindre et un engrenage planétaire (13) monté de manière rotative sur une partie formant extrémité dudit levier (14) et mis en prise avec ledit engrenage (11) de cylindre.
3. Imprimante selon la revendication 1 ou 2, dans laquelle lesdits moyens destinés à transmettre une force d'entraînement comportent plusieurs engrenages montés fous (15, 16; 17; 18), au moins un desdits engrenages montés fous (15, 16; 17) existe pour chacune desdites parties de montage (2A; 2B; 2C) d'ensemble formant tracteur, ledit levier pouvant être commuté (14) peut être mis en rotation pour mettre en prise ledit engrenage planétaire avec un engrenage sélectionné (15; 17) desdits engrenages montés fous.
4. Imprimante selon l'une quelconque des revendications précédentes, dans laquelle chacune desdites parties de montage (2A; 2B; 2C) d'ensemble formant tracteur comporte une cavité (5) formée dans ledit châssis (1), une paire de doigts (3, 4) de positionnement étant agencée sur les côtés opposés de ladite cavité (5).
5. Imprimante selon la revendication 4, dans laquelle ledit ensemble formant tracteur (20) comporte un arbre de guidage (24), un arbre d'entraînement (23), au moins un engrenage d'entraînement (22) monté au niveau de l'extrémité dudit arbre d'entraînement (23), et une paire de châssis d'ensemble agencée au niveau des extrémités opposées dudit ensemble formant tracteur et supportant ledit arbre de guidage et ledit arbre d'entraînement, chacun desdits châssis (21) d'ensemble ayant une première partie évidée (27) formée dans une partie formant extrémité de ceux-ci, ladite première partie évidée (27) pouvant être mise en prise avec un doigt (3) respectif desdits doigts (3, 4) de positionnement de chacune desdites parties de montage (2A; 2B; 2C) de tracteur situé sur le côté de ladite cavité plus proche dudit arbre (10) de cylindre et chacun desdits châssis d'ensemble ayant en outre une seconde partie évidée (28) formée dans une partie formant fond de ceux-ci, ladite seconde partie évidée pouvant être en prise avec l'autre (4) desdits doigts (3, 4) de positionnement, cha-



cune desdites parties de montage d'ensemble formant tracteur ayant un engrenage monté fou, ledit engrenage d'entraînement (22) étant en prise avec ledit engrenage monté fou (16; 17; 18) d'une partie sélectionnée parmi les parties de montage (2A; 2B; 2C) d'ensemble formant tracteur lorsque ledit tracteur (20) est monté sur ladite imprimante.

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6. Imprimante selon la revendication 5, dans laquelle ledit ensemble formant tracteur (20) comporte en outre un levier de verrouillage rappelé par ressort (29) agencé adjacent à ladite seconde partie évidée (28) desdits châssis (21) d'ensemble et pouvant être en prise avec ledit autre (4) desdits doigts (3, 4) de positionnement de ladite partie sélectionnée parmi les parties de montage (2A; 2B; 2C) d'ensemble formant tracteur lorsque ledit tracteur (20) est agencé sur ladite imprimante.

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7. Imprimante selon l'une quelconque des revendications précédentes, dans laquelle lesdites parties de montage (2A; 2B; 2C) d'ensemble formant tracteur sont fournies de manière respective au niveau de positions situées en dessous et vers l'avant, en dessous et vers l'arrière dudit cylindre (18) et/ou au dessus et vers l'arrière dudit cylindre (18).

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