

①⑨



Europäisches Patentamt
European Patent Office
Office européen des brevets

①① Publication number:

0 197 340
B1

①②

EUROPEAN PATENT SPECIFICATION

④⑤ Date of publication of the patent specification:
13.12.89

⑤① Int. Cl. 4: **B41J 11/00**, B41J 13/00,
B41J 15/06

②① Application number: **86103215.9**

②② Date of filing: **11.03.86**

⑤④ Paper feed for a printer.

③⑩ Priority: **12.04.85 JP 76872/85**

④③ Date of publication of application:
15.10.86 Bulletin 86/42

④⑤ Publication of the grant of the patent:
13.12.89 Bulletin 89/50

⑧④ Designated Contracting States:
DE FR GB IT

⑤⑥ References cited:
CH-A- 626 832
DE-A- 3 421 535
US-A- 4 475 833

⑦③ Proprietor: **International Business Machines Corporation, Old Orchard Road, Armonk, N.Y. 10504(US)**

⑦② Inventor: **Tetsuo, Kanno, 3-chome 2-ban 7-goh, Matsugaoka Kugenuma, Fujisawa-shi Kanagawa-ken(JP)**

⑦④ Representative: **Atchley, Martin John Waldegrave, IBM United Kingdom Limited Intellectual Property Department Hursley Park, Winchester Hampshire SO21 2JN(GB)**

EP 0 197 340 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid (Art. 99(1) European patent convention).

Description

This invention relates to a printer in accordance with the preamble of claim 1.

In printing processes it is often required to use both long print paper with perforations for feed on its side edges (so-called continuous form) and short print paper without perforation (so-called cut form) in the same printer.

Japanese Laid-open Patent Specification No. 38175/82 shown in Fig. 2 relates to a feeding apparatus that can use the continuous form 6 and the cut form 15; however, it fails to provide a linear form feed path because it has a roller platen 20 opposite the printing head 1.

The continuous form is fed by a tractor 5 with pins. Guide plates 21 and 22 are used for the cut forms and the continuous forms, resp.

The roller platen 20 has been employed in printers for both the continuous and the cut forms because it feeds the print paper along a curved path and change of path can be easily attained. However, if the cut form 23 is of carbon copy type consisting of multiple sheets, for example, of five plies, the radius of each sheet from the center of platen varies with each other to cause slight difference D of feed for the upper and lower sheets, so that it has a problem to cause so-called shingling where the printing positions for the upper and lower sheets are gradually shifted.

On the other hand, when the feeding path for the cut form is overlapped with that for the continuous form by using the planar platen, there is such problem that the feeding means for the continuous form (pin feed tractor) becomes an obstacle when the cut form is inserted.

The insertion of the cut form is prevented by the facts that the pin feed tractor projects a plurality of pins over the continuous form surface, and that there is a paper holding plate over the pins.

CH-A 626 832 describes a printer having a print head (1), a platen (6) positioned opposite the print head, a pin feed tractor (7) for feeding a continuous form with perforations on its side by engaging with the perforations, and a pair of feed rollers (9) for feeding a cut form without perforations. In the arrangement illustrated in Figure 1 of this Specification, the pin feed tractor (7) and the feed rollers (9) are arranged along a linear form feeding path which passes through the platen (6). A continuous form can be passed along the linear form path from right to left as viewed in the Figure under the control of the pin feed tractor. A cut form can be passed along the linear path under the control of the feed rollers, initially from left to right and then from right to left as viewed in the Figure.

The right hand end of the form feeding path branches just to the left of the pin feed tractor (as viewed in the Figure) so as to form two parallel sections of the form feeding path. At the branching point is located a diverter 11 which is operated to guide cut forms moving from left to right into the upper path (as viewed in the Figure) and to allow continuous forms to be fed from the pin feed tractor into the main part of the form feed path. Therefore,

when cut forms are being fed it is not necessary to move the pin feed tractor out of the linear form feeding path. This arrangement has the disadvantage that it is necessary to provide two parallel form feed path sections in the region of the pin feed tractor and a diverter.

The object of the present invention is to provide a printer of the aforementioned kind that allows both continuous and cut-forms to be printed without the problems encountered in the prior art.

This object is achieved by the invention as described in claim 1; embodiments of the invention are characterized in the dependent claims 1.

The printer of the invention for both continuous and cut forms can eliminate the problem of displacement of printing because it does not have a roller platen providing a curved feeding path and does not cause shingling when a multiply cut form is used. Instead, a planar platen is used and arranged to provide a linear feeding path. The pin feed tractor is removed from the form feeding path to have a free path for the cut form; at the same time, the drive transmission is disconnected from the pin feed tractor, so that it is not necessary to dismount the remaining continuous form from the pin feed tractor; productivity of the printing operation is therefore improved. An embodiment of the invention is now described in detail with reference to the drawings in which:

Figure 1 is a perspective view of overall configuration of the invention; Figure 2 is a schematic view of the prior art;

Figure 3 is a diagram showing problems in a roller platen;

Figure 4 is a schematic view when a continuous form is fed, and Figure 5 is a schematic view showing positional relations when a cut form is inserted.

A printer shown in Figure 1 comprises a printing head 1, a planar platen 2 that provides an opposite plane to the printing head, feed rollers 3 and 4, and a pin feed tractor for feeding a continuous form.

Since platen 2 need only have a portion which holds the form during printing on a linear path, it may have any cross sectional configuration including a trapezoid, a rectangular and a circle with subtense. The rollers 3 and 4 feed the form by holding it between their upper and lower rollers. The roller 4 is for feeding the leading edge of print paper toward the platen 2, and may be eliminated.

The pin feed tractor 5 has a series of pins 5a engaging with feed perforation of the continuous form, a paper holding plate 5b, and a hinge 5c mounting the paper holding plate on the pin feed tractor body in such a manner that the plate is permitted to be freely opened or closed. The series of pins 5a are driven by a gear 7, which is in turn engaged with a gear 8 that is driven by a motor 10 through a toothed belt 9.

Figure 4 is a side elevational view of a state feeding the continuous form that is perspectively shown in Figure 1. The pin feed tractor 5 feeds the continuous form 6 linearly along the form feed line connecting the upper surface of the platen 2 and

the holding point of the feed roll 3. Because the path of the continuous form 6 shown in Figure 4 is inclined by about 45°, it is convenient for observation of printing condition, or insertion or removal of a cut form. The inclination may be set at any angle from 0° to 90° if required.

Now, it is assumed that it is required to switch the paper to the cut form. Although it is not required to remove the continuous form being used from the pin feed tractor 5, it is required to cut or reversely feed the continuous form so that its remaining portion does not protrude from the end of pin feed tractor near the platen (see 6a in Figure 5). Then, when a lever 12 is rotated clockwise (in Figure 1) around a pivot 13 by a cam 11 (or any other means such as an electromagnet), the end of pin feed tractor 5 near the platen 2 is rotated clockwise around a shaft 14 and evacuated under the form feed plane A-A. At that moment, the gear 7 is disengaged from the gear 8. Therefore, there arises no trouble even if the remaining continuous form on the pin feed tractor is not removed. A cut form 15 is inserted from the upper right portion of Figure 5. At that moment, the lower end 15a of the cut form 15 slides over the paper holding plate 5b of the pin feed tractor 15 and the continuous form left thereon to maintain a substantially linear feeding path. If there is no continuous form 6, the lower end 15a of the cut form 15 slides over the paper holding plate 15a and an intermediate guide plate 16 to maintain a substantially linear feeding path. The cut form 15 may be inserted from the lower left portion to the upper right portion with inclination in the figure.

Operation is described when the continuous form is used again. When the lever 12 is rotated counterclockwise by the cam 11, the pin feed tractor 5 returns on the form feeding path. At that moment, the gear 7 engages with the gear 8 to complete the drive transmission relation. At that moment, if good meshing between the gears is not obtained because their teeth abut with each other, it is sufficient to slightly vibrate the gear 8 clockwise and counterclockwise by supplying control signals for a moment to normally and reversely rotate the motor 10.

Claims

1. Printer comprising a printing head (1), a platen (2) positioned opposite to said print head, a pin feed tractor (5) for feeding a continuous form with perforations on its side edges by engaging with said perforations, and at least a pair of feed rollers (3), for a cut form without perforation, the pin feed tractor (5) and the feed rollers (3) being arranged along a linear form feeding path (A-A) passing through the platen (2), characterized in that means (11-14) are provided to remove at least the end portion of the pin feed tractor (5) near the platen (2) from the linear form feeding path when a cut form is fed.

2. The printer of claim 1, wherein the driving force supplied to the pin feed tractor (5) is disconnected when the pin feed tractor is removed from the form feeding path.

3. The printer of claim 1 or 2, wherein the platen

(2) has a planar plane opposite to the printing head (1).

4. The printer of one of the claims 1 to 3, wherein the means for removing the pin feed tractor (5) from the form feeding path comprise a pivoting axis (14) arranged excentrically within the pin feed tractor and a lever (12) in engagement with the driving rod of the pin feed tractor for pivoting the tractor.

Patentansprüche

1. Drucker mit einem Druckkopf (1), einer vor dem besagten Druckkopf angeordneten Walze (2), einer Nadel-Zugvorrichtung (5) für die Führung eines durchgehenden Formulars mit Lochungen an den seitlichen Rädern durch Eingreifen in besagte Lochungen und mindestens einem Paar Vorschubwalzen (3), für ein geschnittenes Papier ohne Lochung, wobei die Nadelzugvorrichtung (5) und die Vorschubwalzen (3) an einem linearen Vorschubweg (A-A) angeordnet sind, der durch die Walze (2) führt, dadurch gekennzeichnet, daß: Mittel (11-14) vorgesehen sind, um mindestens den Endabschnitt der Nadelzugvorrichtung (5) an der Walze (2) vom linearen Vorschubweg zu entfernen, wenn ein zugeschnittenes Formular eingeführt wird.

2. Drucker gemäß Anspruch 1, in dem die Antriebskraft, die an die Nadelzugvorrichtung (5) angelegt wird, abgeschaltet wird, wenn die Nadelzugvorrichtung vom Formularzufuhrweg weggenommen wird.

3. Drucker gemäß Anspruch 1 oder 2, in dem die Walze (2) dem Druckkopf (1) gegenüber eine ebene Fläche besitzt.

4. Drucker nach einem der Ansprüche 1 bis 3, in dem das Mittel für die Entfernung der Nadelzugvorrichtung (5) vom Blattvorschubweg eine Schwenkachse (14) enthält, die exzentrisch zur Nadelzugmaschine angeordnet ist, und einen Hebel (12), der in die Antriebsstange der Nadelzugvorrichtung eingreift, um die Zugvorrichtung zu schwenken.

Revendications

1. Imprimante comportant une tête d'impression (1), une platine d'impression (2) disposée en vis-à-vis de ladite tête d'impression, un tracteur (5) d'entraînement à picots servant à faire avancer une bande continue comportant des perforations sur ses bords latéraux, par engrènement avec lesdites perforations, et au moins un couple de galets d'entraînement (3), pour une feuille découpée ne comportant aucune perforation, le tracteur (5) d'entraînement à picots et les galets d'entraînement (3) étant disposés le long d'un trajet linéaire (A-A) d'avance de la feuille passant au niveau de la platine d'impression (2), caractérisée en ce que des moyens (11-14) sont prévus pour écarter, de la trajectoire linéaire d'entraînement de la feuille, au moins la partie d'extrémité du tracteur (5) d'entraînement à picots, à proximité de la platine (2), lors de l'entraînement d'une feuille découpée.

2. Imprimante selon la revendication 1, dans laquelle la force d'entraînement appliquée au tracteur (5) d'entraînement à picots est supprimée lorsque le

tracteur d'entraînement à picots est écarté de la trajectoire d'entraînement de la feuille.

3. Imprimante selon la revendication 1 ou 2, dans laquelle la platine (2) possède une surface plane en vis-à-vis de la tête d'impression (1).

5

4. Imprimante selon l'une des revendications 1 à 3, dans laquelle les moyens servant à écarter le tracteur (5) d'entraînement à picots, du trajet d'entraînement de la feuille comprennent un axe de pivotement (14) monté de façon excentrée à l'intérieur du tracteur d'entraînement à picots, et un levier (12) en prise avec la tige d'actionnement du tracteur d'entraînement à picots pour faire pivoter le tracteur.

10

15

20

25

30

35

40

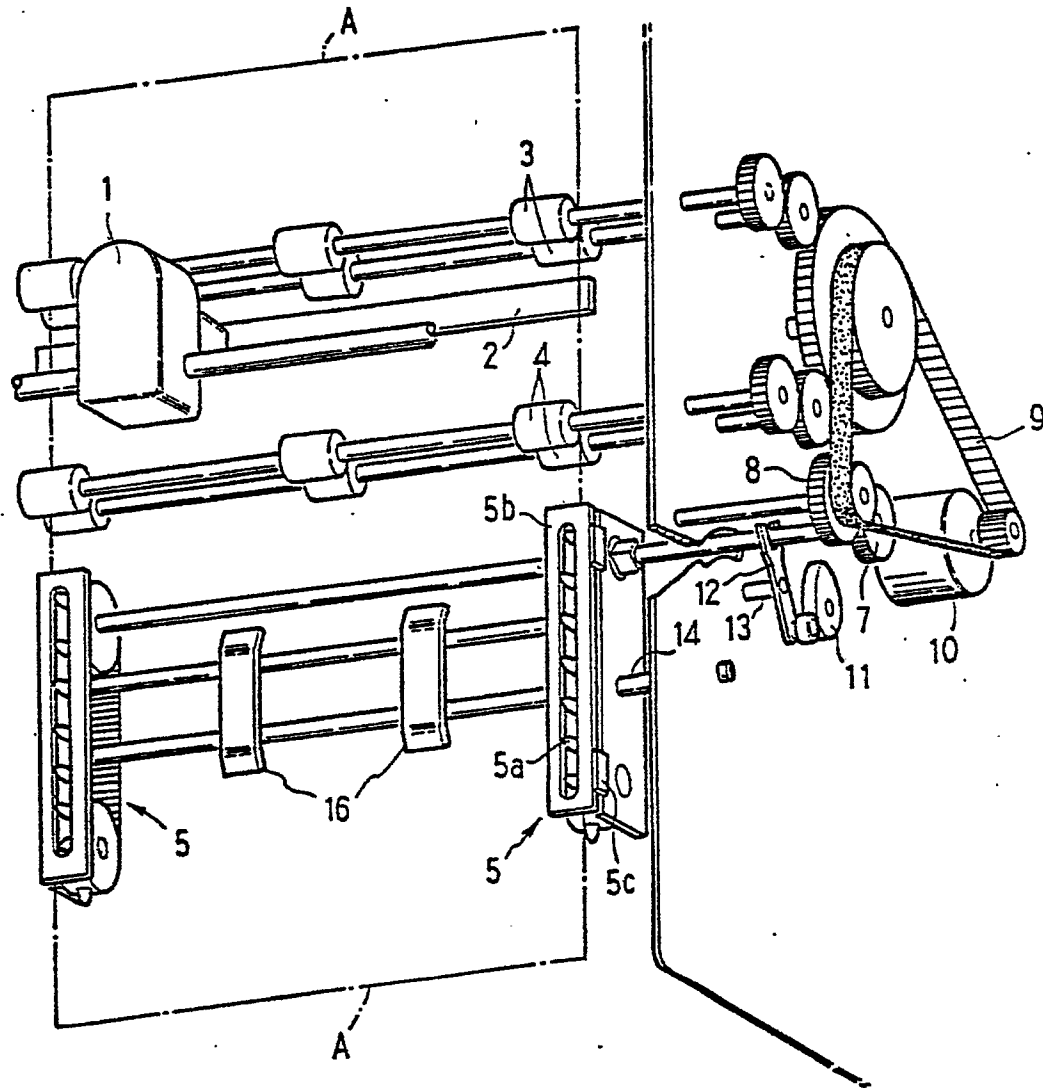
45

50

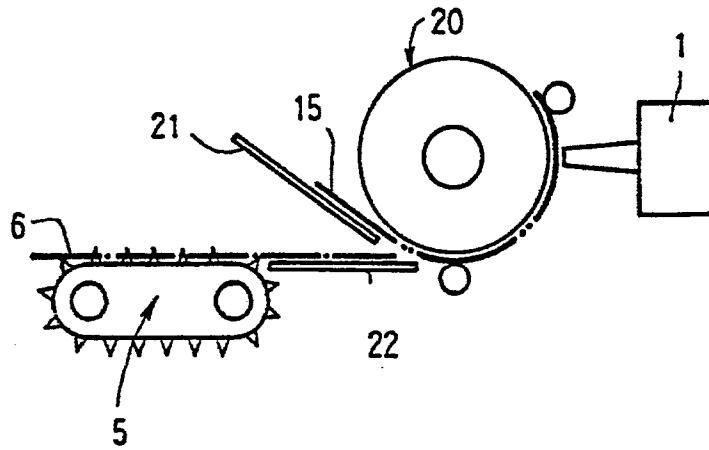
55

60

65



OVERALL VIEW
FIG. 1



PRIOR ART
FIG. 2

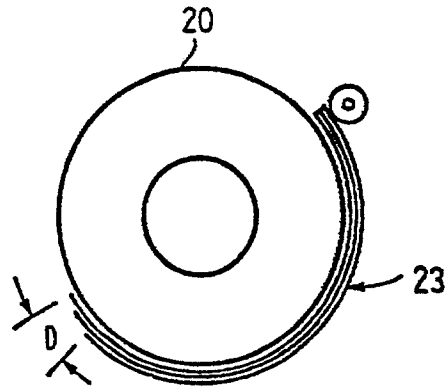


FIG. 3

FIG. 4
WHEN THE CONTINUOUS
FORM IS USED

