

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number:

0 197 340
A2

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: **86103215.9**(51) Int. Cl.4: **B41J 13/00 , B41J 15/06**(22) Date of filing: **11.03.86**

The title of the invention has been amended
(Guidelines for Examination in the EPO, A-III,
7.3).

(30) Priority: **12.04.85 JP 76872/85**(43) Date of publication of application:
15.10.86 Bulletin 86/42(84) Designated Contracting States:
DE FR GB IT

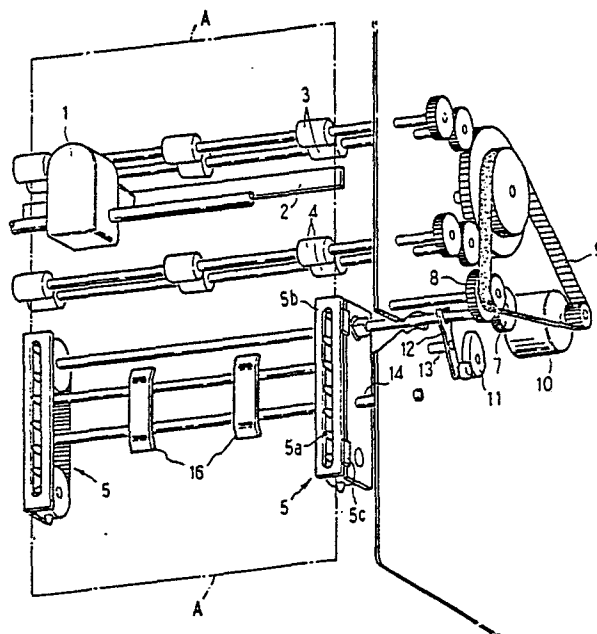
(71) Applicant: **International Business Machines Corporation**
Old Orchard Road
Armonk, N.Y. 10504(US)

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

(74) Representative: **Teufel, Fritz, Dipl.-Phys. et al**
IBM Deutschland GmbH. Europäische
Patentdienste Postfach 265
D-8000 München 22(DE)

(54) **Paper feed for a printer.**

(57) In a printer, a pin-feed tractor (5) for continuous forms and feed rollers (3) for cut forms are arranged along a linear form feeding path; to print cut forms, the end of the tractor near the platen (2) is removed from the feeding path by actuating means (11-14/).



EP 0 197 340 A2

PRINTER

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.

Known planar platens do not provide combined feeding means for continuous and cut forms; therefore 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 claim.

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, characterized in that

the pin feed tractor (5) and the feed rollers (3) are arranged along a linear form feeding path (A-A) passing through the platen (2), and

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).

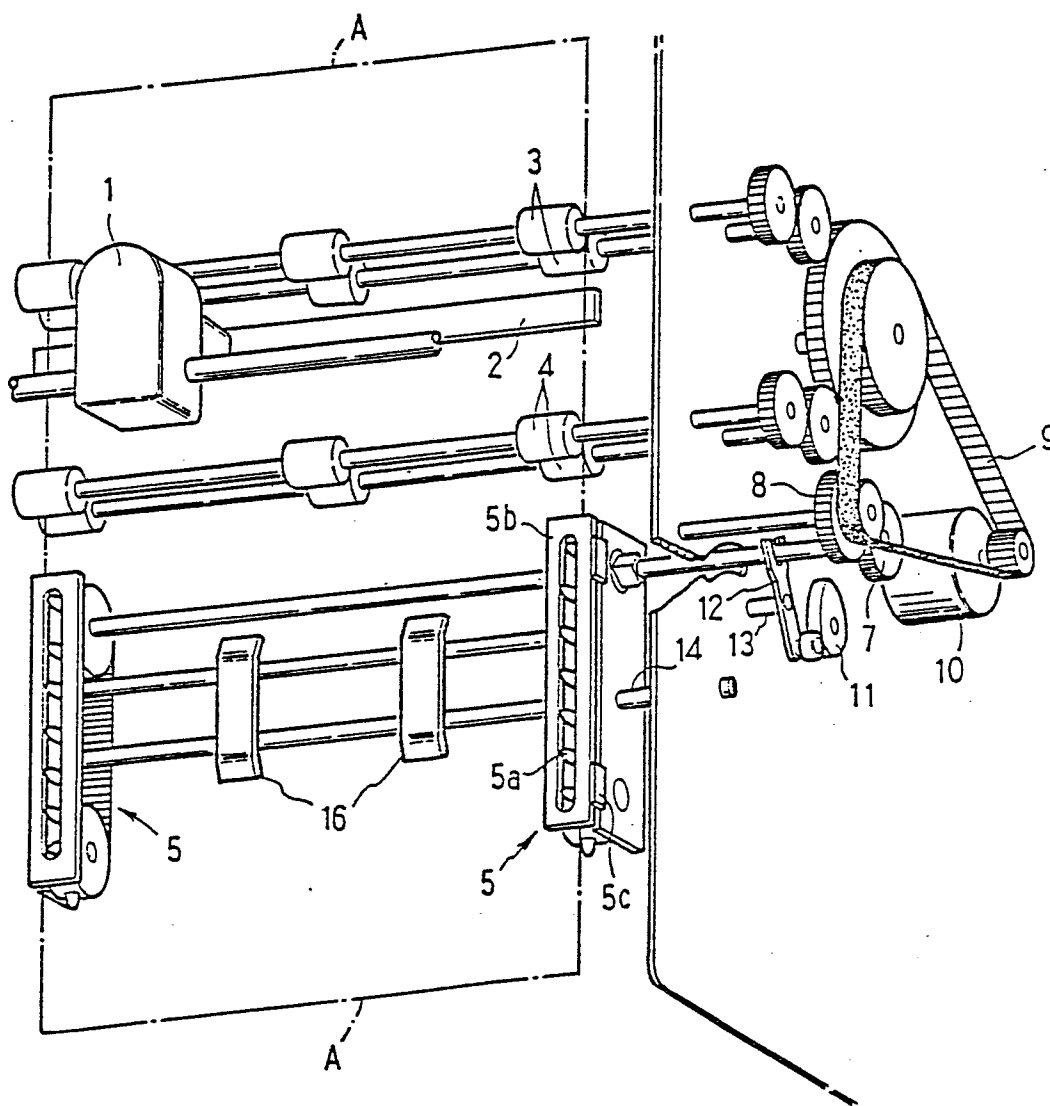
4. The printer of one of the claims 1 to 3, wherein the means for removing the pin feed tractor (5) from the form feeding path comprise a pivoting axis (14) arranged excentrically within the pin feed tractor and a lever (12) in engagement with the driving rod of the pin feed tractor for pivoting the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

40

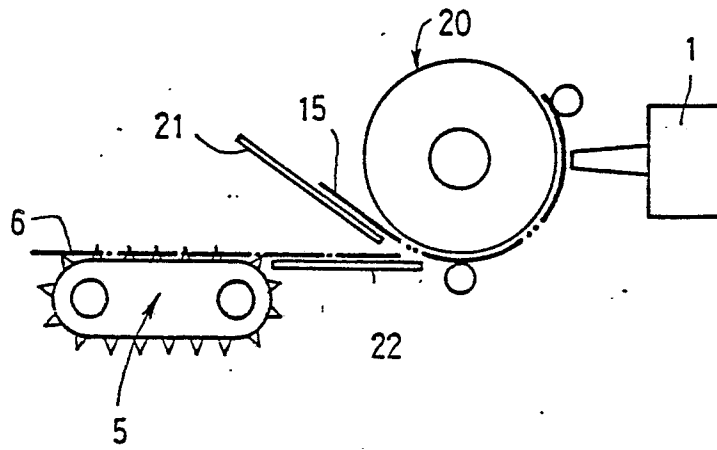
45

50

55



OVERALL VIEW
FIG. 1



PRIOR ART
FIG. 2

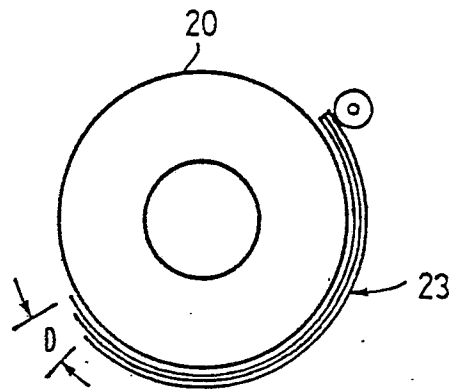


FIG. 3

FIG. 4
WHEN THE CONTINUOUS
FORM IS USED

