

Description

The present invention relates to a mechanism for switching a paper holding roller in a printer between a release position where it is kept off the platen of the printer and a working position where it is pressed against the platen.

In the field of printers used as output device of personal computers and word processors, normally a paper feeding mechanism is switched over by a manual operation of a release lever between different operating conditions in accordance with the kind of paper used for the printer. Alternatively, a strong solenoid in connection with a return spring is used to rotate a lever supporting the paper holding roller. Fig. 7 shows such an arrangement, where a solenoid 202 is connected to a lever 206 supporting the paper holding roller 204. By means of a return spring 205 the lever 206 is biased into a position where the paper holding roller 204 is pressed against a platen 203 of the printer. When the solenoid 202 is energized, the lever 206 is turned clockwise against the force of the return spring 205 into a position where the paper holding roller 204 is removed from the platen 203.

In the case of a manual operation, such operation is required each time paper is supplied or removed or changed from continuous type paper to cutsheet paper. When, in accordance with Fig. 7, a solenoid is used to make the operation automatic, a large solenoid is needed since the lever has to be moved against the biasing force of spring 205.

The document Patent Abstracts of Japan, Vol.6, No. 220 (M-169) [1098], 05/11/82, corresponding to JP-A-57123079 discloses a mechanism for switching a paper holding roller of a printer according to the prior art portion of the claim. In this prior art, a cam is provided as the power transmission means and coupled to the driving source for driving the platen via a spring clutch that can be engaged and disengaged by means of a solenoid. The holding means rotatably supporting the paper holding roller are coupled to the cam by two levers pivotally connected to each other. If the clutch is engaged, a rotation of the cam is transmitted to the holding means to change its position.

It is an object of the present invention to remedy the above drawbacks of the prior art and to provide such a switching mechanism which can be automatically operated without needing any special driving source or a large solenoid but which can also be operated manually.

This object is achieved with a mechanism as claimed.

The driving power for driving the platen of a printer is used to switch the paper holding roller between a working position where it is pressed against the platen and a release position. The pow-

er to switch the paper holding roller is transmitted via gear means that also allow the paper feeding roller to be contacted/separated with/from the platen manually.

An embodiment of the present invention will be explained in detail below with reference to the drawings, wherein:

- Fig. 1 is a diagrammatic plan view showing one embodiment of the invention,
- Fig. 2(a) is a side view of the embodiment shown in Fig. 1,
- Fig. 2(b) is a partial sectional view along line S-S in Fig. 2(a),
- Fig. 3 shows the frame 17 of Fig. 2(a) from the backside,
- Figs 4 and 5 are side views similar to Fig. 2(a) for illustrating the operation of the embodiment of Fig. 2,
- Fig. 6 is a side view showing another embodiment of the present invention, and
- Fig. 7 illustrates a conventional paper holding roller switching mechanism.

Referring to Figs. 1, 2 and 3 the constructional features of a first embodiment of the present invention will be explained below.

Holding levers 6 and 7 which are pivotally supported by shafts 4 and 5 on frames 1 and 2, located on both sides of a printer, support the two ends of a paper bail 8 on which a plurality of paper holding rollers 8a are rotatably provided. Levers 6 and 7 are turnable between a first position shown in solid lines in Fig. 2(a) and a second position shown in broken lines in Fig. 2(a). In both, the first and the second position holding levers 6 and 7 are held stably by springs 9 and 10. In the first position of holding levers 6 and 7 rollers 8a are in contact with a platen 3, whereas in the second position rollers 8a are kept away from the platen 3. When holding levers 6, 7 are turned from their first to their second position, a portion 6a of holding lever 6 comes into contact with a protrusion or peg 1b of or fixed to the frame 1, to limit the movement of holding lever 6 and defining the said second position (a similar stopping means may be provided for holding lever 7 on frame 2). The springs 9 and 10 are spanned between projections 6b and 7b of holding levers 6 and 7 and hooks 1a and 2a of the frames 1 and 2. The driving power of a paper feeding motor (not shown) is transmitted by a gear train (not shown) to a gear 3a fixed on the platen 3 in order to rotate platen 3 and to transport the paper on platen 3 to be printed by the printer.

Fig. 2(b) is a sectional view along line S-S in Fig. 2(a). Guide grooves 17a are formed in a frame 17. A gear 14 is supported slidably in a horizontal

direction in Figs. 2(a) and (b) by the guide grooves 17a. Gears 15 and 16 engaging one another are also rotatably supported by frame 17. A forked trigger plate 18 composed of metal is rotatably supported on frame 17 by a shaft 19 and embraces a portion of frame 17 such as to support the shaft of gear 14 on both sides by means of groove portions 18a. Trigger plate 18 is urged by a spring 21 (in a clockwise direction in Fig. 2(a)) in accordance with guide grooves 17a of frame 17 to a position where gear 14 is out of engagement with platen gear 3a. When a solenoid 20 fixed on the backside of frame 17 (Fig. 3) is energized, it attracts trigger plate 18. Gear 14 is then engaged with platen gear 3a and gear 15, thereby transmitting the driving force of the paper feeding motor.

A lever 11 is rotatably supported on frame 1 and provided with an opening, the inner side walls of which forming guide surfaces 11a and 11b, respectively. A pin 12 fixed on the side of holding lever 6 facing lever 11 extends into the opening to be contacted by either guide surface 11a or guide surface 11b as will be explained later. Lever 11 is further provided with gear portions 11c and 11d. The center of the pitch circle of gear portions 11c and 11d coincides with the center axis of the pivot of lever 11, formed by a screw 13 by which the lever 11 is rotatably supported on frame 1. The gear portions 11c and 11d of the lever 11 are engagable with gear portions 15a and 16a, provided on the gears 15 and 16, respectively.

To explain the operation of the first embodiment of the invention in detail, reference is now made to Figs. 4 and 5.

Normally, the paper holding rollers 8a are stably pressed against the platen 3 by the springs 9 and 10. With the solenoid 20 deenergized, the gear 14 is not engaged with the gear 15 due to the spring 21. Therefore, in this situation, a rotation of gear 3a is not transmitted to the lever 11. However, when the solenoid 20 is energized (Fig. 4), the trigger plate 18 is attracted against the biasing force of spring 21 to move the gear 14 along the guide grooves 18a into engagement with gear 15. In this condition, the driving force of the paper feeding motor is transmitted via the platen gear 3a and gear 14 to the gears 15 and 16. With gear portions 15a and 16a positioned as shown in Fig. 4, when platen gear 3a is rotated clockwise, the gear portion 15a engages the gear portion 11c, whereas the gear portion 16a does not engage the gear portion 11d of lever 11. Due to the engagement between the gear portion 15a and the gear portion 11c of lever 11, the lever 11 is rotated counterclockwise in the direction of arrow A. As a result of this movement, the guide surface 11a comes into contact with the pin 12, thereby rotating the holding lever 6 in the direction of arrow A until the

lower portion 6a of the holding lever 6 abuts against the peg 1b of the frame 1. At this point, the gear portion 15a disengages from the gear portion 11c of the lever 11 and the solenoid 20 is deenergized. Accordingly, the paper bail 8 is stably held in this condition.

As shown in Fig. 5, if the solenoid 20 is energized again, it is now the gear portion 16a that engages gear portion 11d of the lever 11, whereas the gear portion 15a is out of engagement with the gear portion 11c of the lever 11. Therefore, a clockwise rotation of the platen gear 3a will now result in a clockwise movement of the lever 11 whose guiding surface 11b will contact the pin 12 and turn the holding lever 6 clockwise into a position where the springs 9, 10 press the paper holding rollers 8a against the platen 3. Now the individual parts have reattained their positions as shown in Fig. 4 and the solenoid 20 is deenergized.

A modification of the first embodiment is shown in detail in Fig. 6. In addition to the above described first embodiment, a lever 30 is fixed on the gear 16. A weak coil spring 31 is stretched between the distal end of the lever 30 on the one hand and a fixed point of the frame 17 on the other hand. Due to this arrangement and the weak spring force, when no driving force is transmitted to the gears 15 and 16, the gear portion 15a or the gear portion 16a is engaged without any backlash with the gear portion 11c or the gear portion 11d, respectively, of the lever 11. Therefore, when the solenoid 20 is energized, the rotation of the lever 11 can start without timelag, thereby achieved the rotation of the lever 11 securely.

Claims

1. A mechanism for switching a paper holding roller (8a) of a printer, comprising
 - a cylindrical platen (3),
 - a driving source for transmitting rotational force to said platen,
 - a holding means (6, 7, 8) rotatably supporting said paper holding roller (8a) and switchable between a first position, where the paper holding roller (8a) contacts the platen (3) and a second position where it is separated from the platen,
 - a power transmission means (3a, 14, 15, 16, 11) for transmitting the power of said driving source via rotatably supported lever means (11) to said holding means to move said holding means into either of the two positions, and
 - electro-magnetic trigger means (18, 20, 21) for bringing the power transmission means (3a, 14, 15, 16, 11) into a condition where the power is transmitted to said holding means (6, 7, 8) or a condition where the power is not



direction in Figs. 2(a) and (b) by the guide grooves 17a. Gears 15 and 16 engaging one another are also rotatably supported by frame 17. A forked trigger plate 18 composed of metal is rotatably supported on frame 17 by a shaft 19 and embraces a portion of frame 17 such as to support the shaft of gear 14 on both sides by means of groove portions 18a. Trigger plate 18 is urged by a spring 21 (in a clockwise direction in Fig. 2(a)) in accordance with guide grooves 17a of frame 17 to a position where gear 14 is out of engagement with platen gear 3a. When a solenoid 20 fixed on the backside of frame 17 (Fig. 3) is energized, it attracts trigger plate 18. Gear 14 is then engaged with platen gear 3a and gear 15, thereby transmitting the driving force of the paper feeding motor.

A lever 11 is rotatably supported on frame 1 and provided with an opening, the inner side walls of which forming guide surfaces 11a and 11b, respectively. A pin 12 fixed on the side of holding lever 6 facing lever 11 extends into the opening to be contacted by either guide surface 11a or guide surface 11b as will be explained later. Lever 11 is further provided with gear portions 11c and 11d. The center of the pitch circle of gear portions 11c and 11d coincides with the center axis of the pivot of lever 11, formed by a screw 13 by which the lever 11 is rotatably supported on frame 1. The gear portions 11c and 11d of the lever 11 are engagable with gear portions 15a and 16a, provided on the gears 15 and 16, respectively.

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lower portion 6a of the holding lever 6 abuts against the peg 1b of the frame 1. At this point, the gear portion 15a disengages from the gear portion 11c of the lever 11 and the solenoid 20 is deenergized. Accordingly, the paper bail 8 is stably held in this condition.

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 - a power transmission means (3a, 14, 15, 16, 11) for transmitting the power of said driving source via rotatably supported lever means (11) to said holding means to move said holding means into either of the two positions, and
 - electro-magnetic trigger means (18, 20, 21) for bringing the power transmission means (3a, 14, 15, 16, 11) into a condition where the power is transmitted to said holding means (6, 7, 8) or a condition where the power is not



transmitted to said holding means,

wherein the holding means is switchable between its two positions by said lever means (11) and is stably held by spring means (9, 10) in its respective position,

characterized in that

the trigger means (14, 15, 16, 18, 20, 21) includes a gear (14, 15, 16) to be engaged with or disengaged from said driving source under the control of an electro-magnetic means (20), and

the power transmission means includes a pair of partial gears (15a, 16a) rotatable by said gear (14, 15, 16), said lever means (11) being provided with a toothed portion (11c, 11d) to be engaged with one of said partial gears (15a, 16a).

Patentansprüche

1. Mechanismus zum Umschalten einer Papierhalterrolle (8a) eines Druckers, umfassend
 - eine zylindrische Schreibwalze (3),
 - eine Antriebsquelle zur Übertragung einer Drehkraft auf die Schreibwalze,
 - eine Halteeinrichtung (6, 7, 8) zur drehbaren Lagerung der Papierhalterrolle (8a), welche zwischen einer ersten Position, wo die Papierhalterrolle (8a) die Schreibwalze (3) berührt, und einer zweiten Position, wo sie von der Schreibwalze getrennt ist, umschaltbar ist,
 - eine Kraftübertragungseinrichtung (3a, 14, 15, 16, 11) zur Übertragung der Kraft von der Antriebsquelle über eine drehbar gelagerte Hebelanordnung (11) auf die Halteeinrichtung zur Bewegung der Halteeinrichtung in eine der beiden Positionen, und
 - eine elektromagnetische Triggereinrichtung (18, 20, 21), um die Kraftübertragungseinrichtung (3a, 14, 15, 16, 11) in einen Zustand zu bringen, wo die Kraft auf die Halteeinrichtung (6, 7, 8) übertragen wird, oder einen Zustand, wo die Kraft nicht auf die Halteeinrichtung übertragen wird,
 - wobei die Halteeinrichtung von der Hebelanordnung (11) zwischen ihren beiden Positionen umschaltbar ist und von einer Federanordnung (9, 10) in der jeweiligen Position stabil gehalten wird,
 - dadurch gekennzeichnet, daß
 - die Triggereinrichtung (14, 15, 16, 18, 20, 21) ein Zahnrad (14, 15, 16) enthält, das unter der Steuerung der elektromagnetischen Einrichtung (20) mit der Antriebsquelle in Eingriff bringbar bzw. von dieser trennbar ist, und
 - die Kraftübertragungseinrichtung ein Paar Teilzahnräder (15a, 16a) aufweist, die von dem Zahnrad (14, 15, 16) drehbar sind, wobei die

Hebelanordnung (11) mit einem Verzahnungsabschnitt (11c, 11d) für den Eingriff mit einem der Teilzahnräder (15a, 16a) versehen ist.

Revendications

1. Un mécanisme pour déplacer un rouleau de maintien de papier (8a) d'une imprimante, comprenant
 - un rouleau d'impression cylindrique (3),
 - une source motrice pour transmettre une force de rotation au rouleau d'impression,
 - des moyens de maintien (6, 7, 8) qui supportent de façon tournante le rouleau de maintien de papier (8a) et qui peuvent être déplacés entre une première position, dans laquelle le rouleau de maintien de papier (8a) vient en contact avec le rouleau d'impression (3), et une seconde position dans laquelle il est séparé du rouleau d'impression,
 - des moyens de transmission d'énergie (3a, 14, 15, 16, 11) qui sont destinés à transmettre l'énergie de la source motrice aux moyens de maintien, par l'intermédiaire d'un levier supporté de façon tournante (11), pour déplacer les moyens de maintien vers l'une ou l'autre des deux positions, et
 - des moyens de déclenchement électromagnétiques (18, 20, 21) qui sont destinés à amener les moyens de transmission d'énergie (3a, 14, 15, 16, 11) dans une condition dans laquelle l'énergie est transmise aux moyens de maintien (6, 7, 8), ou dans une condition dans laquelle l'énergie n'est pas transmise aux moyens de maintien,
 - dans lequel les moyens de maintien peuvent être déplacés entre leurs deux positions par le levier (11), et ils sont maintenus de façon stable dans leur position respective par des moyens à ressort (9, 10),
 - caractérisé en ce que
 - les moyens de déclenchement (14, 15, 16, 18, 20, 21) comprennent un engrenage (14, 15, 16) qui est conçu pour être accouplé à la source d'énergie ou pour être désaccouplé de cette dernière, sous la commande de moyens électromagnétiques (20), et
 - les moyens de transmission d'énergie comprennent une paire de roues partiellement dentées (15a, 16a) qui peuvent tourner sous l'action de l'engrenage précité (14, 15, 16), le levier (11) comportant une partie dentée (11c, 11d) avec laquelle l'une des roues partiellement dentées (15a, 16a) peut engrener.