

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. 2 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. 2, 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 (N-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(a) is a side view showing an embodiment of the present invention, and

Fig. 1(b) is a sectional view looking toward frame 1 from the inner side, opposite to the side shown in Fig. 1(a), and

Fig. 2 illustrates a conventional paper holding roller switching mechanism.

Fig. 1 shows an embodiment of the present invention. In this embodiment, the rotating force of the paper feeding motor (not shown) for driving a platen 3 is used to achieve the contacting/separating operation of a paper holding roller 104 located under the platen 3.

The paper holding roller 104 is located below the platen 3 upstream of a print head H. Paper P to be printed is pressed against the platen 3 by the paper holding roller 104 and is fed in accordance with the rotation of the platen 3.

In Fig. 1(a) reference numeral 1 designates a frame on one side of the printer. A release lever 102 is rotatably supported by a shaft 102a on the frame 1 and has an edge portion 102b engagable with a cam portion 103a of a supplemental release lever 103. The supplemental release lever 103 is fixed on a paper holding roller shaft 106. Also fixed on the paper holding roller shaft 106 is a roller holder 105 rotatably supporting the paper holding roller 104. The paper holding roller 104 is normally pressed against the platen 3 by means of a spring (not shown). The release lever 102 is provided with a toothed portion 102c to be engaged with one of two epicyclic gears 109. The epicyclic gears 109 are rotatably supported on an epicyclic lever 108 which is pivotally supported on the frame 1 by a shaft 108a. The two epicyclic gears 109 can attain three different conditions relative to the toothed portion 102c of the release lever 102 in accordance with the motion of epicyclic lever 108, that is one condition where both gears 109 are not engaged with the toothed portion 102c and two other conditions where either of the two gears 109 is engaged with the toothed portion 102c of the release lever 102. A release transmission gear 110 forming the sun gear which is engaged with the two epicyclic gears 109 is provided on the same shaft as the epicyclic lever 108 and is rotatably supported on the same shaft as the platen 3 to be driven by the rotational power of the platen by intermediate gears (not shown).

A trigger plate 111 is pivotally supported on a shaft 120 fixed on the frame 1. The trigger plate 111 has a groove portion 111a to receive a projection 108b of the epicyclic lever 108 as shown in Fig. 1(a). The trigger plate 111 also has an armature portion 111b to be attracted by a solenoid 112. By a return spring 113, the trigger plate 111 is biased counterclockwise (in Fig. 1(a)) into a position, where the projection 108b can enter the groove portion 111a. When the solenoid 112 is energized to attract the armature portion 111b, the projection 108b is released from the groove portion 111a. The epicyclic lever 108 then rotates in the same direction as the release transmission gear 110 until one of the epicyclic gears 109 is engaged with the toothed portion 102c of the release lever 102. When the solenoid 112 is deenergized, the trigger plate 111 returns to its original position due to the effect of the trigger plate return spring 113. At the same time, the epicyclic lever 108 returns to its intermediate position.

The operation of the embodiment of Fig. 1 will be explained below.

First the operation to switch the paper holding roller 104 to the release condition will be described. If the solenoid 112 is energized to attract the trigger plate 111. The engagement between the groove portion 111a and the projection 108b is released. After that, when a stepping motor is energized to rotate the platen 3, the release transmission gear 110 is rotated counterclockwise and the epicyclic lever 108 is also rotated counterclockwise until the epicyclic gear 109 engages the toothed portion 102c of the release lever 102. Then the rotation of the release transmission gear 110 is transmitted via the epicyclic gear 109 to the toothed portion 102c, thus rotating the release lever 102 counterclockwise. During this rotation, the edge portion 102b of the release lever 102 enters into a notch of the cam portion 103a of the supplemental release lever 103, locking the release lever 102 in this position. At this time the solenoid 112 is deenergized and the trigger plate 111 returned to its original position by means of the return spring 113. At the same time the projection 108b of the epicyclic lever 108 is again engaged with the groove portion 111a of the trigger plate, thereby separating the epicyclic gear 109 from the release lever 102.

By the above operation, the roller holder 105 has been rotated clockwise (in Fig. 1(b)) thereby moving the paper holding roller 104 into a release condition. In this condition continuous or cutsheet paper can be inserted.

Next the operation for resetting the paper holding roller 104 into the working condition will be explained.

The operation as to the engagement of the epicyclic gear 109 with the toothed portion 102c of the release lever 102 is the same as that for bringing the release lever 102 into the release condition. In this case, however, the paper feeding motor rotates in the reverse direction relative to the above case. When the release transmission gear 110 rotates clockwise, the release lever is also rotated into the clockwise direction to be returned to its original position so that the paper holding roller 104 is pressed against the platen 3. After that, the operation for separating the epicyclic gear 109 from the release lever 102 is the same as in the case of bringing the release lever 102 into the release condition.

When the projection 108b is engaged with the groove portion 111a, the gear 109 is disengaged from the release lever 102. Therefore, the release lever 102 can be manually operated and the paper holding roller 104 can be contacted/separated with/from the platen 3.

Claims

1. A mechanism for switching a paper holding roller (104) of a printer, comprising
 - a cylindrical platen (3),
 - a driving source for transmitting rotational force to said platen,
 - a holding means (105) rotatably supporting said paper holding roller (104) and switchable between a first position, where the paper holding roller (104) contacts the platen (3) and a second position where it is separated from the platen,
 - a power transmission means (102c, 109, 110) for transmitting the power of said driving source via rotatably supported lever means (102, 103) to said holding means to move said holding means into either of the two positions, and
 - electro-magnetic trigger means (111, 112) for bringing the power transmission means (102c, 109, 110) into a condition where the power is transmitted to said holding means (105) 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 (102, 103) and is stably held in its respective position,
 - characterized in that
 - the power transmission means includes a first gear (110) rotatable by said driving source, a pair of second gears (109) which are engaged with the first gear, respectively, a lever (108) on which the three gears (110, 109) are rotatably supported, the lever being

A trigger plate 111 is pivotally supported on a shaft 120 fixed on the frame 1. The trigger plate 111 has a groove portion 111a to receive a projection 108b of the epicyclic lever 108 as shown in Fig. 1(a). The trigger plate 111 also has an armature portion 111b to be attracted by a solenoid 112. By a return spring 113, the trigger plate 111 is biased counterclockwise (in Fig. 1(a)) into a position, where the projection 108b can enter the groove portion 111a. When the solenoid 112 is energized to attract the armature portion 111b, the projection 108b is released from the groove portion 111a. The epicyclic lever 108 then rotates in the same direction as the release transmission gear 110 until one of the epicyclic gears 109 is engaged with the toothed portion 102c of the release lever 102. When the solenoid 112 is deenergized, the trigger plate 111 returns to its original position due to the effect of the trigger plate return spring 113. At the same time, the epicyclic lever 108 returns to its intermediate position.

The operation of the embodiment of Fig. 1 will be explained below.

First the operation to switch the paper holding roller 104 to the release condition will be described. If the solenoid 112 is energized to attract the trigger plate 111. The engagement between the groove portion 111a and the projection 108b is released. After that, when a stepping motor is energized to rotate the platen 3, the release transmission gear 110 is rotated counterclockwise and the epicyclic lever 108 is also rotated counterclockwise until the epicyclic gear 109 engages the toothed portion 102c of the release lever 102. Then the rotation of the release transmission gear 110 is transmitted via the epicyclic gear 109 to the toothed portion 102c, thus rotating the release lever 102 counterclockwise. During this rotation, the edge portion 102b of the release lever 102 enters into a notch of the cam portion 103a of the supplemental release lever 103, locking the release lever 102 in this position. At this time the solenoid 112 is deenergized and the trigger plate 111 returned to its original position by means of the return spring 113. At the same time the projection 108b of the epicyclic lever 108 is again engaged with the groove portion 111a of the trigger plate, thereby separating the epicyclic gear 109 from the release lever 102.

By the above operation, the roller holder 105 has been rotated clockwise (in Fig. 1(b)) thereby moving the paper holding roller 104 into a release condition. In this condition continuous or cutsheet paper can be inserted.

Next the operation for resetting the paper holding roller 104 into the working condition will be explained.

The operation as to the engagement of the epicyclic gear 109 with the toothed portion 102c of the release lever 102 is the same as that for bringing the release lever 102 into the release condition. In this case, however, the paper feeding motor rotates in the reverse direction relative to the above case. When the release transmission gear 110 rotates clockwise, the release lever is also rotated into the clockwise direction to be returned to its original position so that the paper holding roller 104 is pressed against the platen 3. After that, the operation for separating the epicyclic gear 109 from the release lever 102 is the same as in the case of bringing the release lever 102 into the release condition.

When the projection 108b is engaged with the groove portion 111a, the gear 109 is disengaged from the release lever 102. Therefore, the release lever 102 can be manually operated and the paper holding roller 104 can be contacted/separated with/from the platen 3.

Claims

1. A mechanism for switching a paper holding roller (104) of a printer, comprising
 - a cylindrical platen (3),
 - a driving source for transmitting rotational force to said platen,
 - a holding means (105) rotatably supporting said paper holding roller (104) and switchable between a first position, where the paper holding roller (104) contacts the platen (3) and a second position where it is separated from the platen,
 - a power transmission means (102c, 109, 110) for transmitting the power of said driving source via rotatably supported lever means (102, 103) to said holding means to move said holding means into either of the two positions, and
 - electro-magnetic trigger means (111, 112) for bringing the power transmission means (102c, 109, 110) into a condition where the power is transmitted to said holding means (105) 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 (102, 103) and is stably held in its respective position,
 - characterized in that
 - the power transmission means includes a first gear (110) rotatable by said driving source, a pair of second gears (109) which are engaged with the first gear, respectively, a lever (108) on which the three gears (110, 109) are rotatably supported, the lever being



rotatably supported itself and provided with an engagement portion (108b) and a release lever (102) provided with a toothed portion (102c) engagable with one of said second gears (109) in accordance with the rotation of said lever (108), and the trigger means includes a trigger plate (111) normally urged into a locking engagement with said engagement portion (108b) of the lever (108) and attractable by electromagnetic means (112) into a release condition releasing the locking state of said lever (108) and allowing it to be turned.

Patentansprüche

1. Mechanismus zum Umschalten einer Papierhalterrolle (104) eines Druckers, umfassend
 - eine zylindrische Schreibwalze (3),
 - eine Antriebsquelle zur Übertragung einer Drehkraft auf die Schreibwalze,
 - eine Halteeinrichtung (105) zur drehbaren Lagerung der Papierhalterrolle (104), welche zwischen einer ersten Position, wo die Papierhalterrolle (104) die Schreibwalze (3) berührt, und einer zweiten Position, wo sie von der Schreibwalze getrennt ist, umschaltbar ist,
 - eine Kraftübertragungseinrichtung (102c, 109, 110) zur Übertragung der Kraft von der Antriebsquelle über eine drehbar gelagerte Hebelanordnung (102, 103) auf die Halteeinrichtung zur Bewegung der Halteeinrichtung in eine der beiden Positionen, und
 - eine elektromagnetische Auslöseeinrichtung (111, 112), um die Kraftübertragungseinrichtung (102c, 109, 110) in einen Zustand zu bringen, wo die Kraft auf die Halteeinrichtung (105) übertragen wird, oder einen Zustand, wo die Kraft nicht auf die Halteeinrichtung übertragen wird,
 - wobei die Halteeinrichtung von der Hebelanordnung (102, 103) zwischen ihren beiden Positionen umschaltbar ist und in der jeweiligen Position stabil gehalten wird,
 - dadurch gekennzeichnet, daß
 - die Kraftübertragungseinrichtung ein erstes Zahnrad (110) enthält, das mittels der Antriebsquelle drehbar ist, ein Paar von zweiten Zahnrädern (109) die mit jeweils dem ersten Zahnrad in Eingriff stehen, einen Hebel (108), an dem die drei Zahnräder (110, 109) drehbar gelagert sind, wobei der Hebel selbst drehbar gelagert ist und mit einem Eingriffsabschnitt (108b) versehen ist, und einen Freigabehebel (102), der mit einem Verzahnungsabschnitt (102c) versehen ist, besitzt, um mit einem der zweiten Zahnräder (109) nach Maßgabe der Drehung des Hebels (108) in Eingriff zu kommen, und die Auslöseeinrichtung eine Auslö-

seplatte (111) enthält, die normalerweise in einen Rasteingriff mit dem Eingriffsabschnitt (108b) des Hebels (108) gedrängt wird und von der elektromagnetischen Einrichtung (112) in eine Freigabestellung bringbar ist, in der der Rasteingriff des Hebels (108) gelöst ist und er sich drehen kann.

Revendications

1. Mécanisme de commutation d'un cylindre (104) de maintien du papier d'une imprimante, comprenant:
 - un cylindre d'impression (3) de forme cylindrique,
 - une source d'entraînement pour transmettre une force de rotation au cylindre d'impression,
 - un moyen (105) de support soutenant de façon rotative le cylindre (104) de maintien du papier et pouvant commuter entre une première position, dans laquelle le cylindre (104) de maintien du papier est en contact avec le cylindre d'impression (3) et une seconde position dans laquelle il est séparé du cylindre d'impression,
 - un moyen (102c, 109, 110) de transmission de puissance pour transmettre la puissance de la source d'entraînement par l'intermédiaire de moyens (102, 103) à leviers supportés de façon rotative, au moyen de support afin d'entraîner le moyen de support vers l'une ou l'autre des deux positions, et
 - des moyens (111, 112) de déclenchement électromagnétiques pour faire passer le moyen (102c, 109, 110) de transmission de puissance dans un état dans lequel la puissance est transmise au moyen de support (105) ou dans un état dans lequel la puissance n'est pas transmise au moyen de support,
 - dans lequel le moyen de support peut être commuté entre ces deux positions par les moyens (102, 103) à leviers et est maintenu stable dans sa position correspondante,
 - caractérisé en ce que
 - le moyen de transmission de puissance comporte un premier engrenage (110) pouvant être mis en rotation par la source d'entraînement, une paire de seconds engrenages (109) qui engrènent respectivement avec le premier engrenage, un levier (108) sur lequel sont montés les trois engrenages (110, 109) de façon rotative, le levier étant lui-même supporté de façon rotative et étant muni d'une partie (108b) d'accouplement et d'un levier (102) de dégagement muni d'une partie (102c) dentée pouvant être engrenée avec l'un des seconds engrenages (109) selon la rotation du levier



(108), et le moyen de déclenchement comporte une plaque (111) de déclenchement normalement sollicitée pour être accouplée de façon verrouillée avec la partie (108b) d'accouplement du levier (108) et pouvant être attirée par un moyen (112) électromagnétique pour passer dans un état de dégagement permettant d'interrompre l'état de verrouillage du levier (108) et lui permettant d'être tourné.

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