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(54) Paper feeding mechanism for printer.

(57) Paper feeding mechanism for printer, of the kind used in data processing systems, comprising a pair of feeding elements (7, 8) pivoted on a driving bar (13) and axially slideable on it, a pair of guiding and positioning elements (9, 10) coupled to such feeding elements to lock them in a predetermined position along such driving bar and a pair of pads (11, 12) hinged at the guiding elements and upsettable over the feeding elements.

The feeding elements have an annular zone provided with pins 8A and an annular zone 8B provided with rubber rings.

The pads are supplied with groove preventing interference among pads and pins and are further supplied with pressure rollers cooperating with the rubber rings.

Such paper feeding mechanism allows the use of printing forms with or without side perforations, the forms having any desired width within an upper and a lower limit.

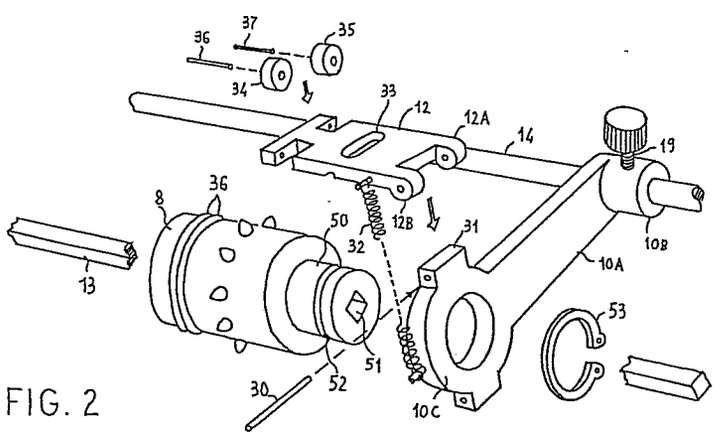

FIG. 2

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Paper feeding mechanism for printer.

The present invention relates to a paper feeding mechanism for printers such as those used in data processing systems where a printing form with perforations on the sides or a printing support without side perforations can be used as a printing support.

It is known that most users of printers for data processing system require that such printers be able to operate both with perforated printing supports and with continuous printing forms without lateral perforations.

The printer manufacturers have tried to satisfy such need by the offering of paper feeding mechanisms having the required operative flexibility.

Practically, means able to assure the friction feeding of the continuous printing form without lateral perforations have been associated to the known pin wheels suitable for the feeding of the side perforated forms.

An embodiment of such solution is given, for instance, by printers model 730 - 737 manufactured by CENTRONICS firm.

Such printers are provided with one plastic feeding element fixed on driving bar rotated by a solenoid or by a step motor.

Such feeding element comprises a cylindrical central portion having several grooves where rubber rings are housed and by two lateral pin wheels cooperating with pads which keep the printing form perforations engaged with the pins.

The cylindrical central part provides for the feeding of continuous printing form without lateral perforation; to this purpose pressure rolls are also provided which press the printing form against the rubber rings during operation in order to assure the friction required to the paper feeding.

On the contrary the pin wheels, together with the pads, assure the feeding of the continuous side perforated printing form.

The described example of paper feeding mechanism can operate with non perforated printing forms having different width (the maximum width is however determined by the distance between the pin wheels) but it has the disadvantage of being unable to handle side perforated printing forms having different sizes, as the distance between the pin wheels cannot be changed.

To avoid such disadvantages other solutions, which can be found on printers of several manufacturers, as for instance DATAPRODUCTS, involve the use of two separated paper feeding mechanisms. A first mechanism is supplied to assure the friction feeding of non perforated continuous printing forms (which may have different width). It consists in a feeding roll fixed to a first tractor bar and cooperating with pressure rollers. A second mechanism assures the feeding of the continuous side perforated printing form. It consists in two pin wheels cooperating with pads and mounted on a second tractor bar. The pin wheels may be axially moved along the second bar and locked in a determined position, thus allowing to operate with printing forms having different width.

The tractor bars are actuated by the same motor by means of a belt pulley or gear transmission system.

The embodiment involving the use of two separate feeding mechanisms solves the problem to operate with several sizes both of the side perforated printing form both of the unperforated printing form

but makes the printer structure complicate, expensive as well as cumbersome.

The present invention overcomes such disadvantages and provides a simple and unexpensive paper feeding mechanism which allows to operate with different sizes of both side perforated printing forms and unperforated printing forms.

According to a first aspect of the invention, the paper feeding mechanism comprises a pair of feeding elements each one coupled to a pad. Each feeding element and the corresponding pad form a couple which is able to operate with both non perforated printing forms as well as side perforated printing forms. According to another aspect of the invention each couple feeding element-pad may be axially moved along a tractor bar and locked in any desired position: thus it is possible to operate with printing forms of different width, up to a maximum width imposed by the printer structure.

These and other features will appear more clearly from the following description of a preferred embodiment of the invention which has exemplifying and non restrictive purposes, and from the attached drawings where:

- fig. 1 is a perspective view of the paper feeding mechanism of the present invention.
- fig. 2 shows, in exploded perspective view, some elements of the paper feeding mechanism of fig. 1.

Fig. 1 is a perspective view of a printer having a paper feeding mechanism according to the invention.

Only the parts required for the understanding of the invention are shown.

The printer comprises a frame, a printing mechanism and a paper feeding mechanism.

The frame is formed, for instance, by two sides plates 1, 2 and a

base 3.

The printing mechanism, not shown, may be formed, for instance, by two guiding rods mounted between the sides, on which a printing carriage slideably moves.

A printing head, for instance of the needle type, is mounted on the printing carriage and allows to obtain the printing of several types by a dot composition, obtained through the energization of several needles and the combined transversal movement of the head and carriage. The printing is performed against a platen 4 on which the printing support moves.

Platent 4 is fixed to sides 1, 2.

The feeding mechanism object of the invention comprises a prismatic driving bar 13, a positioning and guiding rod 14, two cylindrical feeding elements 7, 8, two positioning and guiding arms 9, 10 and two pads 11, 12 coupled to the feeding elements.

The driving bar 13 is pivoted on sides 1, 2 by means of bushings and it is rotated by a step motor or by a low inertia motor 15.

Positioning and guiding rod 14 is fixed to sides 1, 2 of the frame.

Two feeding elements 7, 8 are mounted on tractor bar 13 and may move along its axis.

Each of such feeding elements, for instance feeding element 8, is a cylinder, preferably in plastic material, which is provided along a first circumference with pins 8A and along a second circumference with a groove 8B where one or more rubber rings (preferably 2 rings) are housed.

Circunferential portions of the feeding elements which are provided with rings are located internally relative to the circunferential portions provided with pins and considering as reference the direction of bar 13.

Fig. 2 shows in detail the exploded perspective view of a positioning

and guiding arm 10 and its relation with feeding element 8 and the corresponding pad 12.

The guiding arm is substantially constituted by a body shaped in form of connecting rod and provided with an arm 10A, a small end 10B,a big end 10C.

The circular opening in the big end receives a hub 50 integral and coaxial to the cylindrical feeding element 8.

Hub 50, as well as the cylindrical feeding element, has a prismatic axial opening 51 where guiding bar 13 is inserted.

Hub 50 is further provided with a cylindrical groove 52, intended to house an elastic retaining ring 53 (Benzing, Seeger ring or alike).

Once hub 50 is engaged with end 10C and locked there by the elastic ring, feeding element 8 and guiding arm 10 are mutually pivoted so that the relative rotation of the two element according to the ro - tation axis of the tractor bar is permitted,but any relative axial movement is prevented.

The small end 10B of the guiding arm is engaged with guiding rod 14 and is free to axially move along this one.

A locking screw 19, provided with a locking knob, and inserted in a threaded opening of the small end body, allows to lock the guiding arm to the guiding rod in any desired axial position.

Pad 12 is provided with a pair of drilled tabs 12A, 12B hinged to a corresponding tab 31 of end 10C by means of a pin 30.

Pad 12 is firmly kept in a working position or in an opened position by a return spring 32, suitably fixed to an eye or pin of the pad, on one side, and to an eye or pin of end 10C, on the other one.

In working position, pad 12 lays on a peripheral portion of feeding element 8.

An elongated opening 33 or a groove is provided in the pad zone which,

when pad is in working position, gets in contact with the toothed zone of the feeding element, thus avoiding any interference between the pad and the pins.

The pressure rollers 34, 35 are hinged, by means of two pins 36, 37, on the pad side opposite to the side hinged to end 10C.

The rollers are housed in suitable pad seats and, when the pad is in working position, they lay on the rubber rings 36, housed into the groove of feeding element 8.

Their rotation axis is substantially parallel to the rotation axis of the guiding rod.

When a printing form is inserted in the feeding mechanism the form edges are interposed and pinched between the rubber rings and the pressure rollers.

The rotation of the feeding elements thus causes the movement of the form.

The use of two pressure rollers, which operate on different angular positions of the feeding element, determines a contact angle of the printing support with the rubber rings which is wide enough to assure the correct feeding of the printing support.

The set of feeding element 8, pad 12 and positioning and guiding arm 10, forms a traction group.

The traction group formed by feeding element 7, pad 11 and positioning and guiding arm 9 is mirror like identical to the first one.

Clearly, through suitable design, the two traction groups may be assembled from identical elements.

The operation of the feeding mechanism object of the invention is clear: in case a form with side perforations is to be used, the traction groups are axially positioned along the guiding rod and the driving bar in order that the side perforations engage with the pins of the two feeding elements.

The guiding pads prevent disengagement of the side perforations from the feeding pins.

The feeding action exerted by the pins is further aided by the feeding action exerted on the form side portions by the rubber rings and due to the pressure exerted by the pressure rollers.

In case a non perforated form is to be used, the two traction groups are axially positioned in order the form edges do not interfere with the feeding element pins while the feeding action is exerted by the rubber rings.

It is clear that the described feeding mechanism discloses only a preferred embodiment of the invention and that several changes can be made to the described embodiment without departing from the scope of the invention.

Particularly the invention may be applied to feeding mechanisms where toothed belts can be used instead of pin wheels.

Such mechanism are known as tractors and are for instance described in the Italian patent N. 1.037.391.

Claims

1. Paper feeding mechanism for printer comprising:

- a driving bar mounted on a frame,
- two feeding elements mounted on said driving bar, actuated by said bar and axially slideable along said bar, each of said feeding elements being provided with pins for the feeding of a side perforated form by engagement of said pins with side perforation of said form, and with friction means for the feeding of a non perforated form by frictional engagement of the non perforated form sides with said means,

two positioning and guiding elements, each one coupled to one of said feeding elements for locking said feeding elements in an axial determined position along said bar,

- two pressure pads, each one hinged to one of said guiding elements and upsettable over one of said feeding elements, said pressure pads guiding the engagement of a plurality of said pins with a corresponding plurality of side perforations of said side perforated form, each of said pressure pads being provided with at least a pair of idle pressure rollers, having axis parallel each other, and further parallel to said bar when said pressure pads are upset in operative position over said feeding element, the sides of a form inserted in said feeding element being pressed by said pressure rollers against the friction means of said feeding elements, when said pressure pads are upset in operative position.

2. Paper feeding mechanism as claimed in claim 1, comprising further a guiding and positioning rod parallel to said bar and fixed to said frame and wherein each of said positioning and guiding elements comprises an arm coupled to said rod and movable along said rod, and means for locking said arm to said rod.

3. Paper feeding mechanism as claimed in claim 1 wherein said friction means comprises at least a resilient ring mounted on the outer surface of the related feeding element.

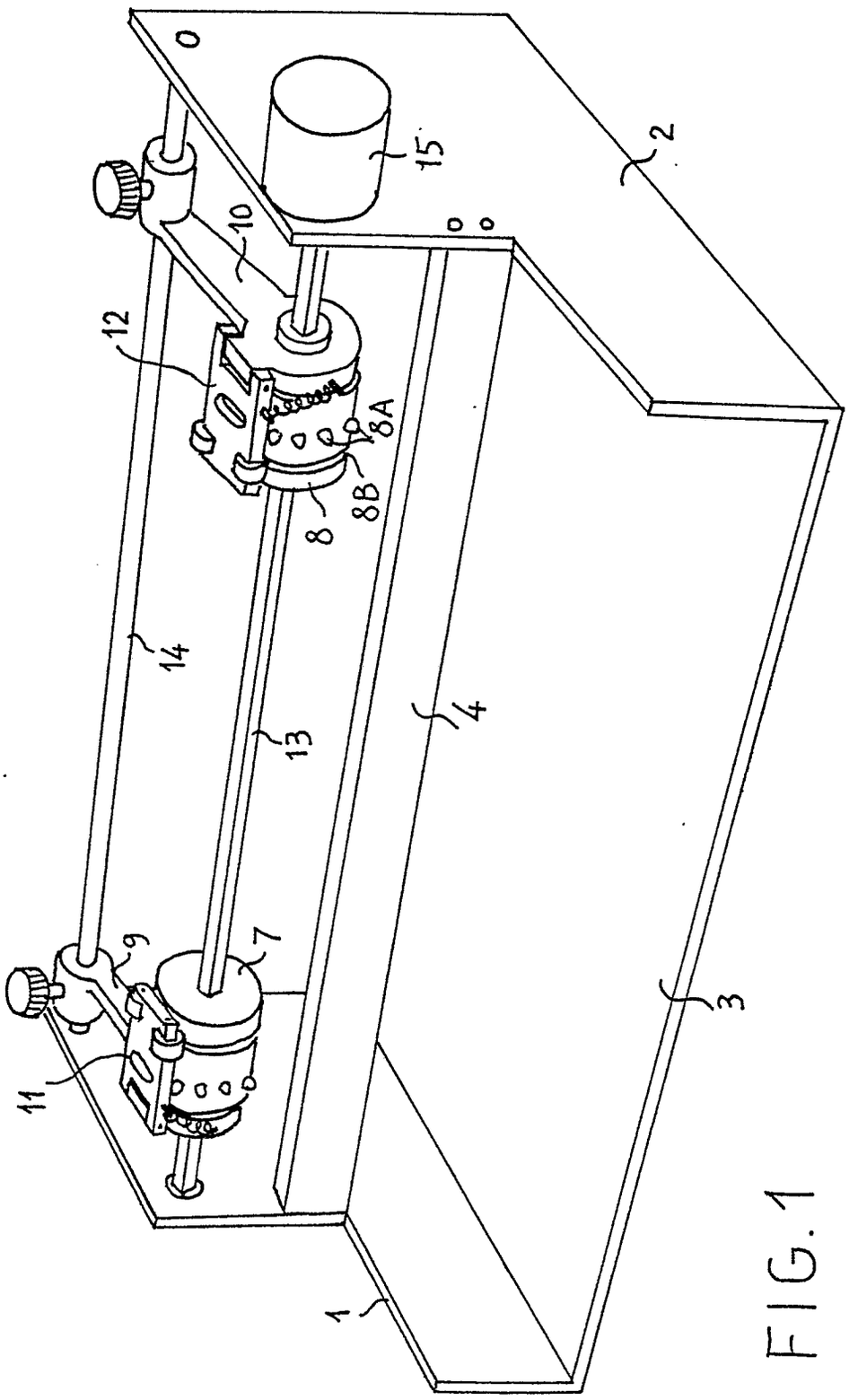
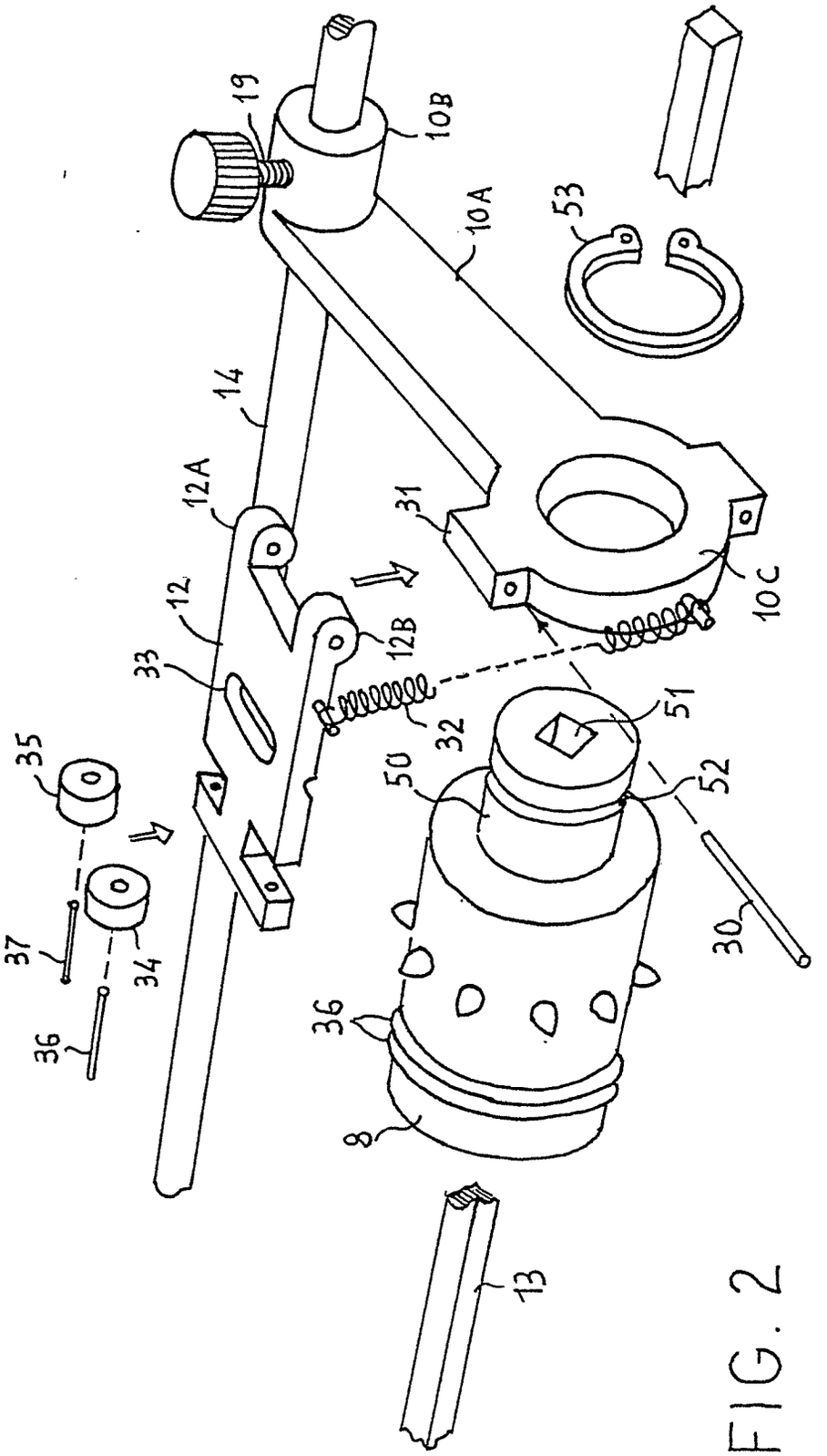


FIG.1


19
10B
10A
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14
12A
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12B
10C
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34
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36
8
13

FIG. 2