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(58) Field of search
B6F

(54) Paper feeder for printers

(57) A paper feeder for a printer includes a pair of slide blocks (30a, 30b) variable in an interval therebetween dependent on the width and type of recording paper to be used. Each of the slide blocks (30a, 30b) supports a track rotating body (31) having a plurality of pins (31a) mounted on a peripheral surface thereof and spaced at prescribed intervals to drive a perforated edge paper, a paper holder member (35) confronting the track rotating body (31), and a drive roller (33) for driving plain paper. A drive shaft (27) is disposed in each of the slide blocks (30a, 30b) for driving the track rotating body (31) and the drive roller (33). A roller shaft (36) supports thereon a pair of pinch rollers (37a, 37b) for contacting the drive rollers (33), respectively, and is movable away from the slide blocks (30a, 30b), the pinch rollers (37a, 37b) being held by the paper holder members (35) for slidable movement along the roller shaft (36) in response to movement of the slide blocks (30a, 30b).

Fig.1

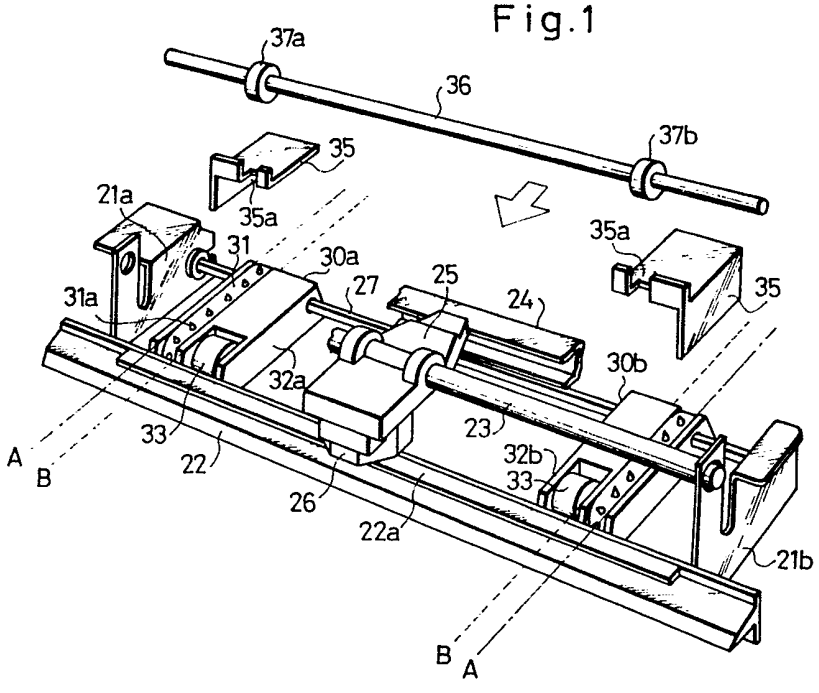

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Fig.1

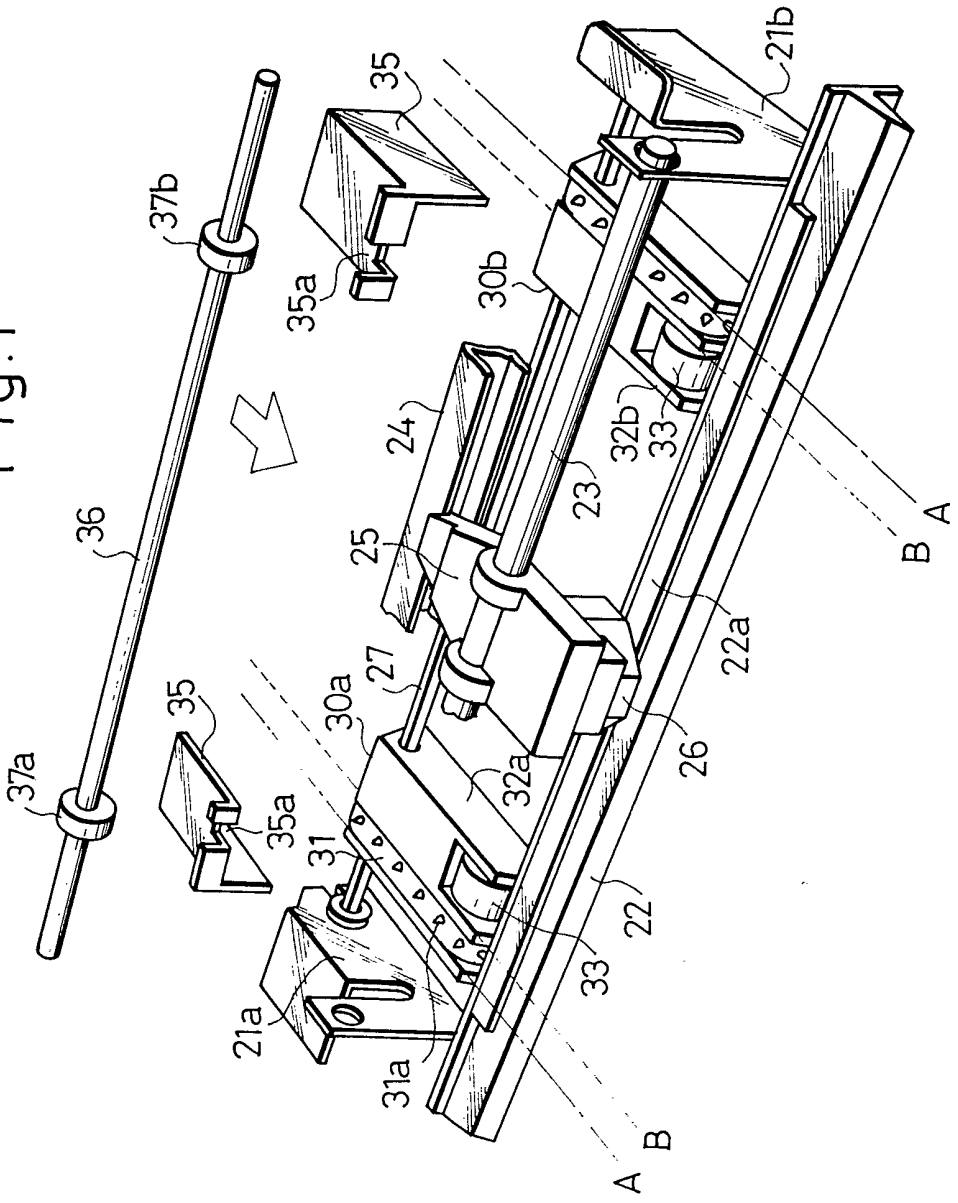

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Fig.2

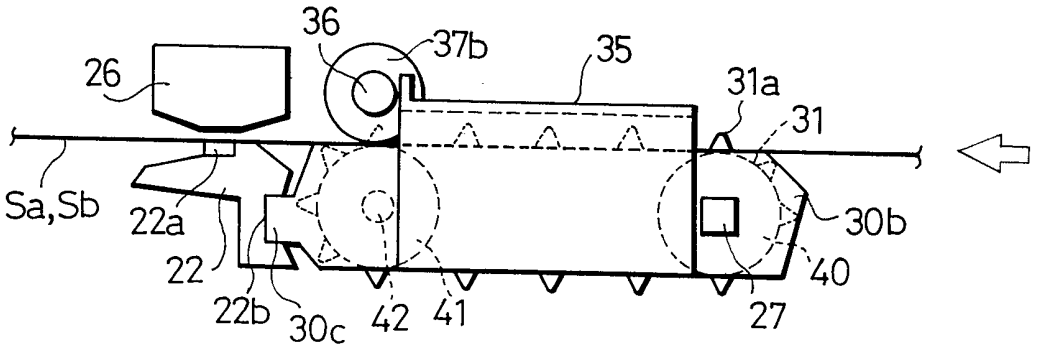

Fig.3

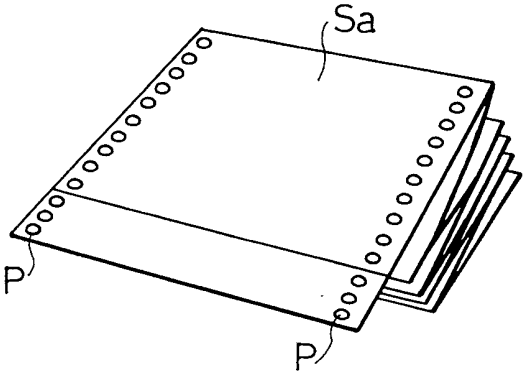

Fig.4

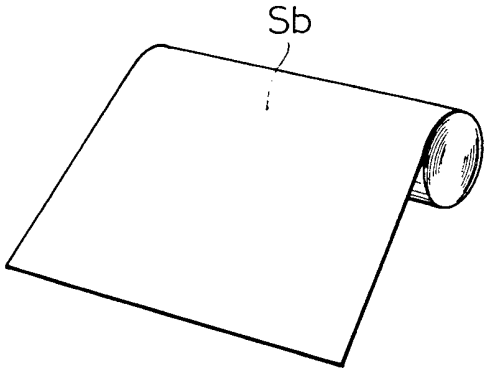

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Fig.5

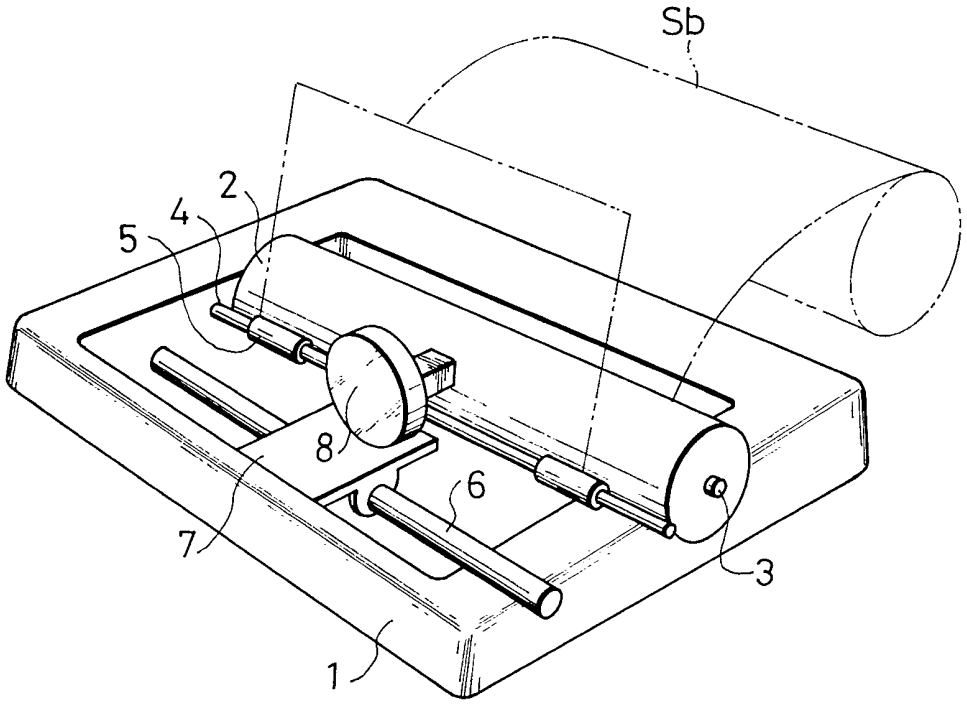

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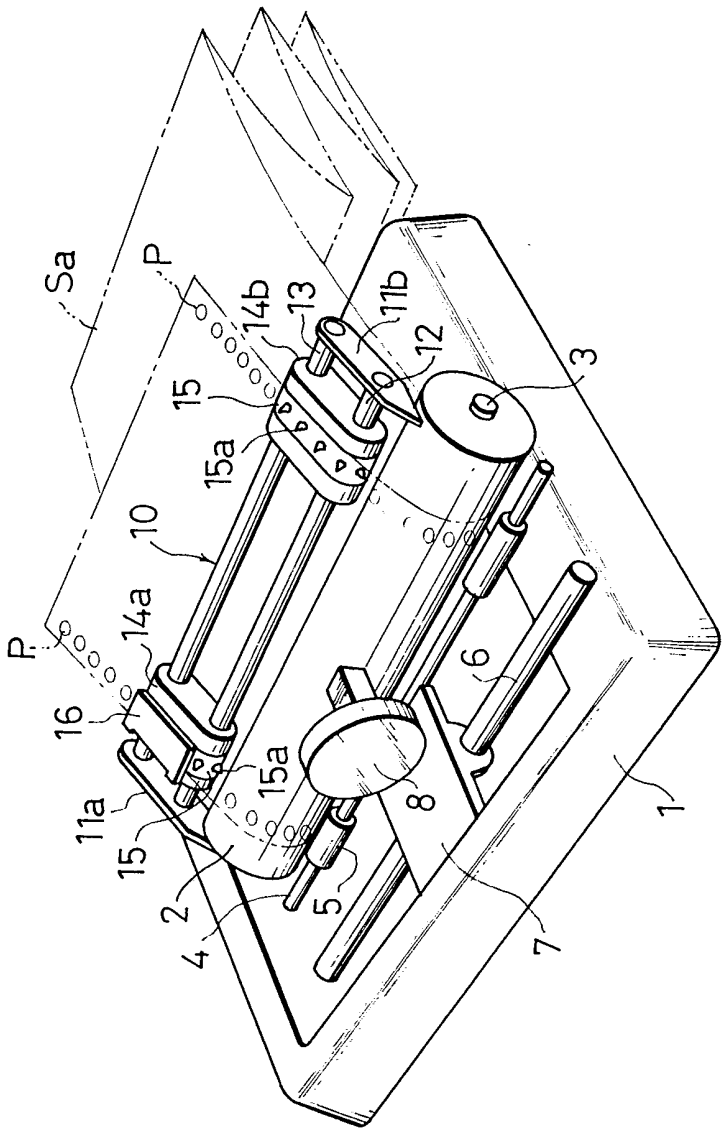
Fig.6



SPECIFICATION

Paper feeder for printers

The present invention relates to a paper feeder for a printer, and more particularly to a paper feeder capable of feeding many types of recording paper.

Various types of recording paper are used on printers such as wire dot-matrix printers.

Fig. 3 of the accompanying drawings illustrates a continuous paper Sa known as a fan-fold stack. The continuous paper Sa has feed holes P called perforations defined in each edge thereof at prescribed intervals. Fig. 4 shows a roll of paper Sb which does not have the feed holes P.

Fig. 5 shows a conventional printer which uses the unperforated roll of paper Sb. In this printer, the roll-paper Sb is inserted from behind a base 1 and rolled around a cylindrical platen 2 from below the same. The paper Sb is held against the platen 2 by means of rollers 5 mounted on a paper holder shaft 4. The platen 2 has a shaft 3 rotated by a stepping motor (not shown) for vertically feeding the paper Sb sandwiched between the platen 2 and the rollers 5 in response to rotation of the platen 2. A carriage 7 is slidably mounted on a carriage guide shaft 6 extending parallel to the platen 2, and supports thereon a printing member 8 such as a wire dot-matrix head or a thermal head. The printing member 8 is disposed in confronting relation to the roll paper Sb rolled around the platen 2. Power from the stepping motor (not shown) is transmitted to the carriage 7 through a wire or the like to move the carriage 7 and the printing member 8 on the guide shaft 6 in a direction along the platen 2 for effecting desired printing operation.

The printer shown in Fig. 5 is disadvantageous however because the paper feed operation lacks reliability when the paper is fed along under the pressure which it is subjected to is sandwiched between the platen 2 and the pinch rollers 5. More specifically, paper feed pitches may be subjected to slight variations due to any error in the diameter of the platen 2 and slippage between the paper and the platen 2. Where the paper is ruled and characters are to be printed along the ruled lines, the line feed pitches tend to be out of alignment with the intervals of the ruled lines as the platen 2 rotates.

The continuous perforated paper Sa shown in Fig. 3 is more suitable for printing on the ruled lines. In case the continuous paper Sa is used, it is necessary to employ a special dedicated arrangement in which paper feed pins are mounted on the platen 2 or an arrangement shown in Fig. 6 in which a tractor feed mechanism is added to the arrangement of Fig. 5.

The tractor mechanism at 10 in Fig. 6, is attached upwardly and slightly rearwardly of the platen 2. The tractor mechanism 10 has side frames 11a, 11b and s pair of shafts 12, 13 extending parallel to each other between the side frames 11a, 11b. One of the shafts 13 is rotatably driven by a stepping motor (not shown). Blocks 14a, 14b are mounted respectively on opposite ends of the shafts 12, 13 and spaced a given distance from each other, with a belt 15 wound around each of the blocks 14a, 14b. The belt 15 is formed of a resilient material such as rubber or silicone and has a plurality of pins 15a disposed on a peripheral surface thereof at regular pitches equal to those of the feed holes P in the continuous paper Sa. Rotation of the shaft 13 belt 15 to rotate the same at a prescribed speed around each of the blocks 14a, 14b.

The continuous paper Sa is fed from behind the base 1 into a position below the platen 2 and then rolled around the platen 2. The feed holes P in the continuous paper Sa are fitted over the pins 15a on the belts 15. Paper holder plates 16 (one shown) are mounted respectively on the blocks 14a, 14b for preventing the continuous paper Sa from being detached from the blocks 14a, 14b. The paper holder shaft 4 is pulled toward the front of the base 1 for separating the rollers 5 of f the platen 2. During printing operation, the carriage 7 is moved laterally and the printing member 8 is operated to record desired characters on the continuous paper Sa. For line feeding operation, the shaft 13 is driven by the stepping motor to rotate the belts 15. The continuous paper Sa is now fed along accurately by the pins 15a on the belts 15.

The conventional printer shown in Fig. 5 allows only the roll paper Sb or separate sheets to be used thereon, but does not permit the continuous perforated paper Sa as shown in Fig. 3 to be employed. If it is desired to use the continuous paper Sa on the printer of Fig. 5, then it is necessary to add the tractor mechanism as illustrated in Fig. 6. The resultant construction of the combined device is complex. Furthermore, it involves an expenditure of time and labour to attach and detach the tractor mechanism. On the other hand, a printer originally equipped with the tractor mechanism cannot use the roll paper Sb or plain separate sheets thereon.

The paper feeder to be described is simple in construction, capable of using all types of paper such as roll paper, separate sheets and continuous perforated paper, capable of freely varying the width of the paper feed mechanism to adapt to the width and type of paper used, and has a simple construction.

According to the present invention, there is provided a paper feeder for a printer having a platen and a printing member disposed in confronting relation to the platen, comprising a pair of slide blocks variable in an interval therebetween, each of the slide blocks supporting

a track rotating body having a plurality of pins which are mounted on a peripheral surface thereof and spaced at prescribed intervals, a paper holder member confronting the track rotating body, and a drive roller; a drive shaft disposed in each of the slide blocks for driving the tractor rotating body and the drive roller; and a roller shaft supporting thereon a pair of pinch rollers for contacting the drive rollers, respectively, and movable away from the slide blocks, the pinch rollers being held by the paper holder members for slidable movement along the roller shaft in response to movement of the slide blocks.

A paper feeder embodying the invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, in which:

Fig. 1 is a perspective view of a principal portion of a printer according to the present invention;

Fig. 2 is a side elevational view of a paper feeder in the printer;

Fig. 3 is a perspective view of a continuous paper;

Fig. 4 is a perspective view of roll paper; and

Figs. 5 and 6 are perspective views of principal portions of conventional printers.

The present invention will be described with reference to Figs. 1 and 2.

A platen 22 formed of hard rubber for example extends between a pair of righthand and lefthand side plates 21a, 21b of a base. A sheet of flexible synthetic resin 22a is bonded to an upper surface of the platen 22 for bearing recording paper Sa or Sb thereon.

A carriage guide 23 and a guide frame 24 extend parallel to each other between the side plates 21a, 21b, and a carriage 25 is movably mounted on the carriage guide 23 and guided by the guide frame 24. The carriage 25 can be moved along the platen 22 by power transmitted thereto through a wire or the like from a stepping motor (not shown). The carriage 25 supports thereon a printing member 26 such as a wire dot-matrix head or a thermal head. The printing member 26 has a printing face directed downwardly in confronting relation to the sheet 22a on the platen 22.

A drive shaft 27 extends and is rotatably supported between the side plates 21a, 21b, and is rotatably drivable by a stepping motor (not shown). The drive shaft 27 supports thereon a pair of slide blocks 30a, 30b. As illustrated in Fig. 2, each of the slide blocks 30a, 30b has on a distal end thereof a projection 30c slidably fitted in a guide groove 22b defined in an inner side surface of the platen 22. The slide blocks 30a, 30b are slidable along the drive shaft 27 and guided by the guide groove 22b for changing an interval between the slide blocks 30a, 30b. There is a fixing mechanism (not shown) disposed between the slide blocks 30a, 30b and the drive shaft 27 for fixing the slide blocks 30a, 30b with respect to the drive shaft 27 when the desired interval between the slide blocks 30a, 30b is established.

As shown in Fig. 2, each of the slide blocks 30a, 30b accommodates therein a drive pulley 40 and a driven pulley 41. The drive pulley 40 is splined to the drive shaft 27 for being driven thereby. The driven pulley 41 is secured to a driven shaft 42 rotatably supported in its respective slide block 30a, 30b. A belt 31 of a resilient material is trained around the drive pulley 40 and the driven pulley 41 and is rotatable on the peripheral surface of the slide block in response to rotation of the drive shaft 27. The belt 31 has on an outer peripheral surface a plurality of pins 31a spaced at regular intervals or pitches, the belt 31 serving as a track rotating body. The pitches of the pins 31a are equal to those of the feed holes P in the continuous paper Sa shown in Fig. 3.

Plates 32a, 32b are integrally formed respectively with confronting surfaces of the slide blocks 30a, 30b. Drive rollers 33 are interposed between the blocks and the plates 32a, 32b. The drive rollers 33 are integral with the driven shafts 42, respectively, for synchronous rotation with the driven pulleys 41 on which the belts 31 are trained.

Paper holder members 35 are mounted respectively on the slide blocks 30a, 30b. The paper holder members 35 are of an L-shaped cross-section for being easily fixed to the slide blocks 30a, 30b. When the paper holder members 35 are fixed to the slide blocks 30a, 30b, the paper holder members 35 are disposed in confronting relation to the pins 31a with a slight clearance left therebetween.

A roller shaft 36 extends between the side plates 21a, 21b, and a pair of pinch rollers 37a 37b are axially slidably supported on the roller shaft 36 and rotatable about their own axes. The roller shaft 36 is normally urged by a spring to move in a direction toward the slide blocks 30a, 30b for pressing the pinch rollers 37a, 37b resiliently against the drive rollers 33. The roller shaft 36 has an integral lever (not shown) which can be manipulated to lock the pinch rollers 37a, 37b in a position away from the drive rollers 33. The pinch rollers 37a, 37b are fitted in slots 35a defined respectively in the paper holder members 35, so that the pinch rollers 37a, 37b and the slide blocks 30a, 30b can be moved together in a direction transversely across the recording paper.

Operation of the printer thus constructed will be described.

The recording paper is inserted into a gap between the slide blocks 30a, 30b and the paper holder members 35 in the direction of the arrow and is loaded on the platen 22.

Where the recording paper is the continuous paper (fan-fold stack) Sa having the feed holes (perforations) P as shown in Fig. 3, the side

edges of the paper are located at positions indicated by the dot-and-dash lines A in Fig. 1, and the pins 31a on the belts 31 are fitted in the feed holes P. If the interval between the slide blocks 30a, 30b is not equal to the width of the paper, then the slide blocks 30a, 30b can be moved along the drive shaft 27 and the guide groove 22b into an optimum position. At this time, the lever (not shown) is actuated to lock the roller shaft 36 away from the slide blocks 30a, 30b so that no pressure from the pinch rollers 37a, 37b will act on the continuous paper Sa.

For printing operation, the carriage 25 is driven by the stepping motor to move along the carriage guide shaft 23 and the guide frame 24. During such movement, the printing member 26 is actuated to record desired characters on the continuous paper Sa placed on the sheet 22a on the platen 22. After one line of characters has been printed, the drive shaft 27 is driven by the stepping motor to rotate the belts 31 to enable the pins 31a to feed the continuous paper Sa in a one-line increment.

Where the roll paper Sb as shown in Fig. 4 or separate sheets are used, the interval between the slide blocks 30a, 30b is selected such that the edges of the roll paper or the sheet will be located in positions indicated by the dotted lines B in Fig. 1 bearing on the drive rollers 33. With the roll paper or separate sheets, the roller shaft 36 is not locked, but the pinch rollers 37a, 37b are pressed against the drive rollers 33 under the spring force to cause the pinch rollers 37a, 37b and the drive rollers 33 to grip the opposite edges of the paper. For feeding the paper, the drive shaft 27 is rotated about its own axis to cause the drive pulleys 40, the belts 31, the driven pulleys 41, and the driven shafts 42 to drive the drive rollers 33 for thereby feeding the paper. Printing operation is the same as described above.

While in the illustrated embodiment the tractor rotating body comprises the belt 31 having the pins 31a, it may comprise a roller having pins on its circumference.

The present invention has the following advantages:

(1) Since the slide blocks are positioned on opposite sides of the recording paper and have a paper feed mechanism composed of the tractor mechanism and the ordinary drive rollers, the printer can use continuous paper having feed holes defined in opposite edges, roll paper with no such feed holes, and separate sheets. The printer can be used in wider application as many types of paaper can be fed along under the same condition during printing operation.

(2) Inasmuch as the distance between the slide blocks can be varied, the paper feeder can freely be adapted to the width of any continuous or roll paper used.

(3) Since the pinch rollers held by the paper holder members can be moved to align with the slide blocks, no complex mechanism is required for establishing the interval between the pinch rollers, and the overall mechanism can be similified.

(4) The pair of pinch rollers is supported on the common roller shaft, and the roller shaft can be moved away from the slide blocks for separating the pinch rollers simultaneously from the drive rollers. The printer can be operated with ease when using the continuous paper.

CLAIMS

1. A paper feeder capable of feeding both a paper having perforated edges by engaging with the perforations and a paper having unperforated edges, comprising: a pair of slide blocks variable in an interval therebetween; each of said slide blocks supporting a track rotating body having a plurality of pins mounted on a peripheral surface thereof and spaced at prescribed intervals to drivingly engage the perforations of a perforated paper, and a drive roller which can drivingly engage the edges of the unperforated paper; a drive shaft disposed through each of said slide blocks for driving the track rotating body and the drive roller; a roller shaft supporting thereon a pair of pinch rollers for contacting the paper against the drive rollers, respectively, and movable away from said slide blocks; and a paper holder member confronting said track rotating body and having pinch roller retaining projections so that said pinch rollers are held by said paper holder members for slidable movement along said roller shaft in response to movement of said slide blocks.

2. A paper feeder according to Claim 1, wherein each of said slide blocks accommodates therein a drive pulley fixedly mounted on said drive shaft, a driven shaft supporting said drive roller, and a driven pulley mounted on said driven shaft, said track rotating body comprising a belt trained around said drive and driven pulley.

3. A paper feeder according to Claim 1 or to Claim 2, wherein each of said paper holder members has an L-shaped cross-section that includes a slot holding one of said pinch rollers therein.

4. A paper feeder substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.

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