

[54] **AUTOMATIC PRINT HEAD SHIFTING DEVICE**

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[57] **ABSTRACT**

Automatic shifting mechanism is provided to shift a pin matrix type head normally positioned closely spaced from a printing plane during printing to a retracted position away from the printing plane during carriage return movement of a carriage supporting the printing head. Movement of the printing head from printing and retracted positions is controlled by carriage limit position.

4 Claims, 2 Drawing Figures

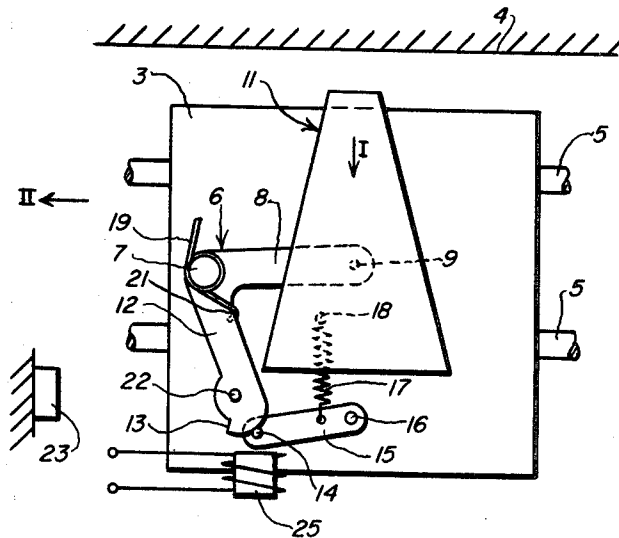


Fig. 1

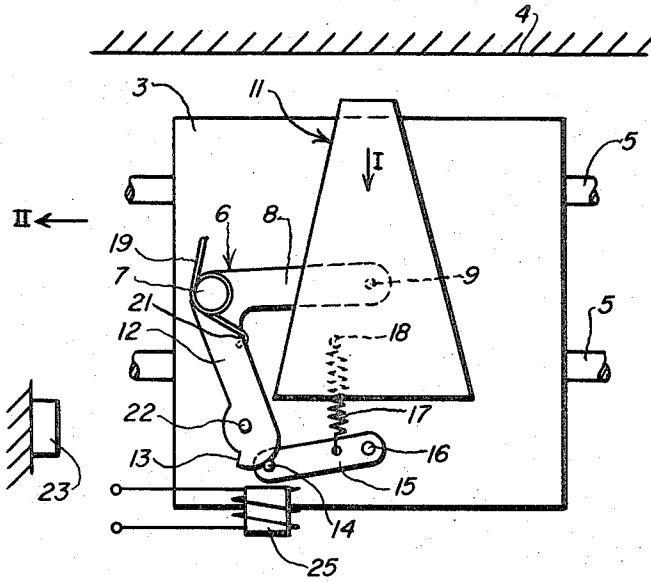
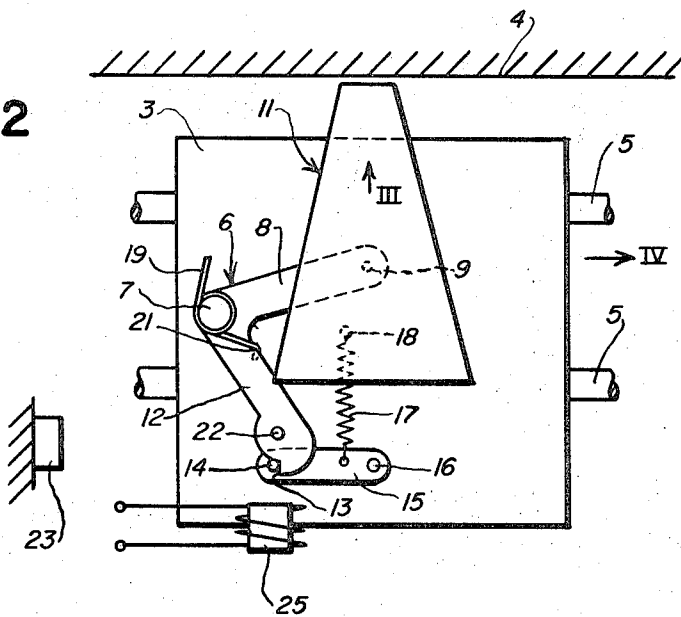


Fig. 2



AUTOMATIC PRINT HEAD SHIFTING DEVICE

This invention relates to pin matrix printers; more particularly, it relates to an automatically operable shifting device for controlling the spacing between a pin matrix print head and a printing plane, and, specifically, it relates to a shifting device operable to retract the printing head mounted on a movable carriage to an inactive position spaced from the printing plane incident to carriage return movement and to restore the print head to a printing position closely adjacent the printing plane on return of the carriage to a beginning of line position.

Pin type print heads, because of the short stroke of the pins to effect printing, require that the spacing of the print head from the printing plane be kept uniform to assure even density of print from character to character. Previously, such print heads have been associated with devices for controlling the spacing of the print head from the printing plane according to the thickness of the information bearing record. This has been accomplished by sensing devices, for example, by heads resiliently spring biased toward the printing plane or associated rollers mounted on the printing head which ride against the record and cause the spring biased head to retract according to record thickness sensed by the roller. Sensing devices of this type which bear against the paper interposed between print head and printing plane are apt, at the high return speeds of the carriage supporting the print head, to damage the paper and/or an inked ribbon and otherwise render illegible printed information.

In accordance with this invention, the above problem is alleviated in the provision of a print head shifting device operable to increase the spacing between print head and printing plane during return movement of a carriage supporting the print head to avoid frictional contact between print head and record. In one embodiment, the print head is associated with a spring biased lever acting normally to retract the print head from a normal print position closely adjacent the printing plane. Means are provided to automatically urge said lever against its spring bias and to latch it when a carriage supporting the print head reaches a beginning of line position thereby to hold the print head in print position. Further, means are provided to release the latch incident to a carriage return command issuing when the carriage has moved to a particular print location or on receipt of a prearranged signal following printing of selected information in a line.

Accordingly, an object of the invention is to provide an automatic system for varying the spacing between a pin matrix head and a print plane according to the direction of movement of a carriage supporting said print head.

Another object of the invention is in the provision of a system for normally releasably holding a print head in printing position closely adjacent a printing plane during movement of a carriage supporting the print head in a printing direction and for releasing said print head for movement away from said printing plane incident to and over the interval of a carriage return movement to a beginning of line position.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection

with the accompanying drawing in which like reference numerals designate like or corresponding parts throughout the figures thereof and wherein;

FIG. 1 is an elevational view showing a carriage supported pin matrix print head in a retracted position with the carriage moving in carriage return direction; and

FIG. 2 is an elevational view similar to FIG. 1 showing the print head in printing position closely adjacent a printing plane after movement of the carriage to a beginning of line position.

Referring now to the drawing wherein like reference numerals designate like or corresponding parts throughout the several views, there is shown in FIG. 1 a carriage 3 which is supported for movement relative to a printing plane 4 on a pair of parallel guide rails 5 parallel to the printing plane 4. The carriage 3 pivotally supports a lever generally designated by reference numeral 6 as at 7 which has a rightwardly extending arm 8 the end of which is coupled as by a pin 9 to the housing of a pin matrix print head generally designated by reference numeral 11. The lever 6 also has a downwardly extending arm 12 whose end is formed with a latching recess 13 adapted to cooperate with a latching pin 14 on the end of a horizontal latch member or bar 15. The other end of the latch member 15 is pivotally mounted on the carriage as at 16 and a spring 17 connected to an anchor 18 on the print head and to latch member 15 intermediate its ends normally tends to bias the latch member 15 upwardly into engagement with the end of lever arm 12. The lever 6 is normally urged clockwise by a torsion spring 19 wrapped about pivot 7 and having an end coupled to lever arm 12 as at 21. Thus, as shown in FIG. 1, the lever 6, since its recess 13 is to the left of the latching pin, is not latched by the latch member 15, and, through its arm 8, retracts the print head 11 away from the printing plane in the direction of arrow I a sufficient distance to allow free carriage return movement of the carriage and head by suitable conventional means without the print head contacting a record positioned between the end of the print head and the printing plane to receive printing.

As the carriage moves in the direction of arrow II or to the left as viewed in FIG. 1, an abutment or pin 22, secured to the lever arm 12 and extending upwardly from the plane of the drawing, will encounter a frame abutment 23 in its path defining a beginning of line or left margin position with the result that the lever 6 will be moved counterclockwise, cam the latch member counterclockwise, and be held by cooperative engagement of the latching pin 14 of the latch member and the latching recess on the end of lever arm 12, as shown in FIG. 2. This movement of the lever 6 against the bias of its spring 19 will move the print head 11 in the direction of arrow III (FIG. 2) to print position closely adjacent the printing plane as illustrated in FIG. 2. Printing of a line of characters by pins in the print head may be accomplished with the carriage moving in the direction of arrow IV under control of suitable motive or escapement mechanism. On some selected point in the line of print a carriage return command will occur and function to release lever 6 from latch member 15 as by rocking the latch member counterclockwise about its pivot with the result that the parts will reassume their FIG. 1 position until again the carriage returns to beginning of line position. In one embodiment, the carriage return command may be a signal pulse that may

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be applied to momentarily energize an electromagnet 25 located to attract the latch member directly or through an armature (not shown) and rotate it to release lever 6.

The objects of the present invention to regulate the distance between the printing head and the printing counterbearing are achieved by means of simple, readily produced components enabling the distance between the printing head and the printing plane to be increased for the return motion of the carriage so that damage to the information carrier by the print head cannot occur even when the return motion of the carriage takes place at a high rate of speed.

The present invention is not limited to the embodiment described and shown in the drawing, modifications being possible within the scope of the idea behind the invention. For example, instead of the detent pin of the latch member 15, the latch member 15 may be provided with a recess into which the lever arm 12 snaps. It is also possible to design the lever 6 itself so as to perform the function of the pin 22 at the end of lever arm 12. Finally, the disengagement of the lever 6 from the latch member 15 may also be triggered by purely mechanical means rather than by the magnet, for instance, in response to the carriage encountering the right margin setter usually present in such printing systems together with an appropriate design of the latch member 15.

The invention claimed is:

1. In a pin matrix printer having a printing plane, a pin matrix housing and a carriage supporting said housing mounted for movement relative to said printing

plane in writing and carriage return directions, means on said carriage for releasably holding said housing in printing position close to said printing plane to permit pins supported therein to print against a record located in front of said printing plane, said means being operative on release to retract said housing away from said printing plane, other means responsive to a carriage return signal for releasing said holding means, and further means cooperating with said means on said carriage for restoring said matrix housing to said printing position on return of said carriage to an initial beginning of line position.

2. In a pin matrix printer as recited in claim 1, said means on said carriage for releasably holding said matrix housing comprising lever means pivoted on said carriage and connected to said housing, spring means biasing said lever in a direction to retract said housing, and latch means for holding said lever against movement by said spring means.

3. In a pin matrix printer as recited in claim 2, said other means comprising a latch member, a spring biasing said latch member to latching position, and means responsive to movement of said carriage to an end of line position to operate said latch member against its spring bias to release said lever means.

4. In a printer as recited in claim 3, said further means including an abutment on said lever means, and a frame stop positioned to engage said abutment when said carriage is returned to force said lever means to latched position.

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