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Venker

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[54] **PRINT DEVICE FOR A PRINTER**

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[52] **U.S. Cl.** ..... **335/268,** 101/93 C

[51] **Int. Cl.** **H01f 7/18**

[58] **Field of Search** ..... 335/266, 267, 268, 335/274, 279; 101/93 C

[56] **References Cited**

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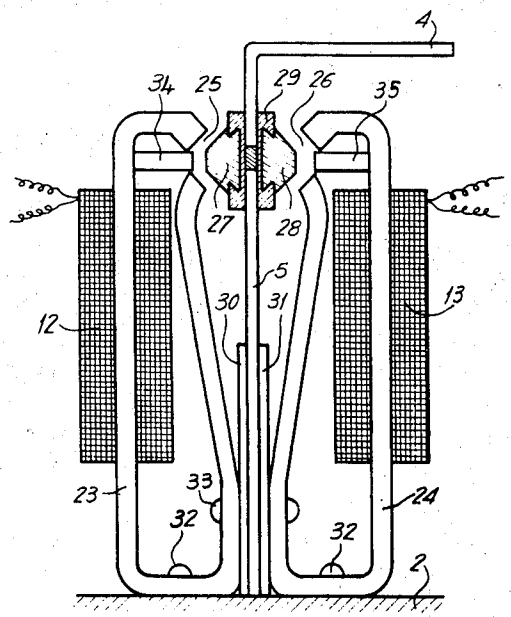
[57] **ABSTRACT**

A striking device is provided for a printer in which the print hammer is integral with the free end of a flexible plate, the other end being stationary. The device includes two independent magnetic circuits with mobile armatures which are attached to said flexible plate and are capable of bending this plate in either of two opposite directions.

6 Claims, 2 Drawing Figures



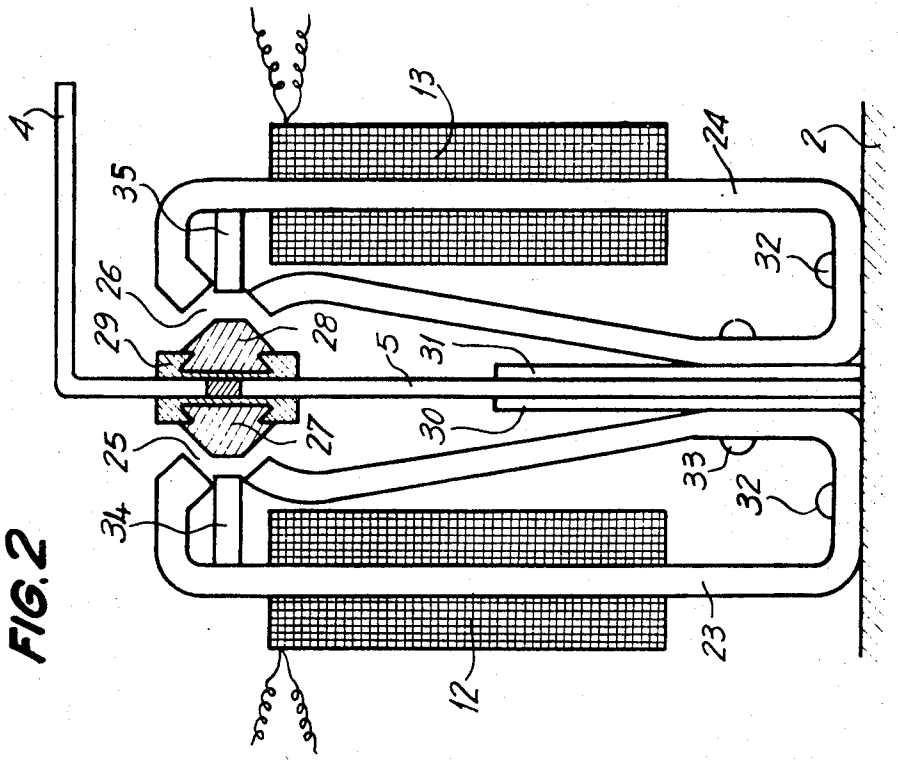

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FIG. 2

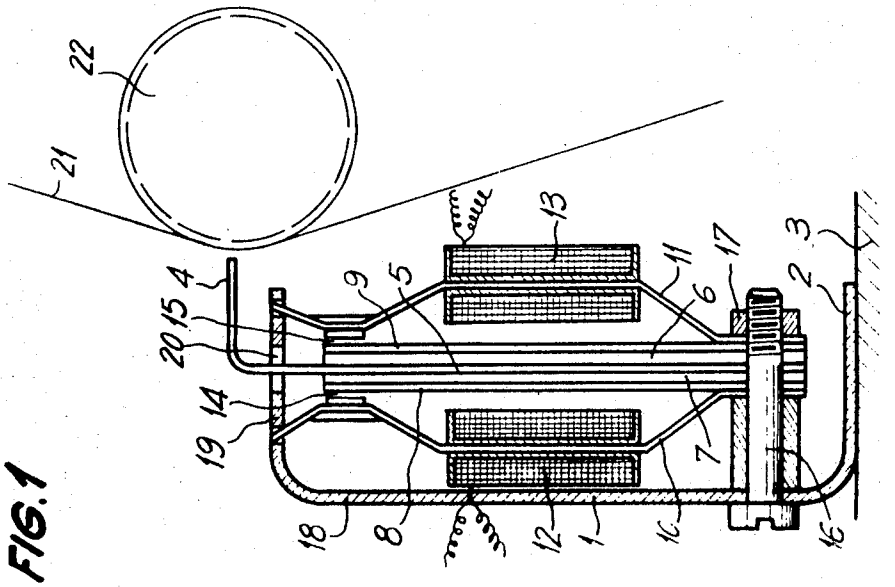
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FIG. 1

PRINT DEVICE FOR A PRINTER

BACKGROUND OF THE INVENTION

This invention relates to a striking device for a printer, and more particularly, although not exclusively, to striking devices for printers of the mosaic type; i.e., wherein each character is formed by a plurality of spots struck at different instances.

One type of such prior art striking device for a printer is provided with a striking hammer which is attached to the free-end of an elastic blade whose other end is fixed. A moveable armature is also attached to this elastic blade and is a part of a unique magnetic circuit on which are mounted to electromagnetic windings.

One of these windings, common to all of the striking devices of the printer, is energized continuously and acts on the various armatures so that the corresponding elastic blades are bent in a direction opposite to their direction of striking. The other winding, associated with these particular striking devices, is adapted to generate momentarily and selectively in the latter a field sufficiently strong to annul that of the first winding, thereby permitting the corresponding blade to be released and the hammer to accomplish a striking action. After the striking, the hammer rebounds in the direction of the striking device at the moment when the second winding is no longer energized. Consequently the blade resumes its bent position.

However, such striking devices of the prior art exhibit serious disadvantages.

In effect, the striking takes place solely under the action of the initiation of the elastic release of the bent blades, since the second winding only serves to suppress the action of the first. Consequently, the striking, which cannot be controlled, is relatively slow, which is particularly disadvantageous for a printer of the mosaic type where the hammers must make several strikings to form the characters.

Therefore, it is the object of the present invention to remedy these disadvantages of the prior art printers.

SUMMARY OF THE INVENTION

The printer striking device is provided with striking hammers attached to the free-end of respective elastic blades whose other ends are fixed. The elastic blade has attached thereon a first moveable armature which is part of a first magnetic circuit on which is mounted a first electromagnetic winding adapted to act on the first armature so that the elastic blade is bent in a direction opposite to its striking direction. The invention is further characterized by, and it comprises, a second magnetic circuit, independent from the first, on which is mounted a second electromagnetic winding adapted to act on a second moveable armature also carried by the elastic blade and associated with the second magnetic circuit, so that the elastic blade is attracted in the direction of the striking.

Thus, when the first winding is energized, the elastic blade is bent in a direction opposite to the direction of striking. If how, the supply of current to the first winding is cut, while supplying the second winding, the elastic blade and the hammer which it bears are moved in the direction of striking under the combined actions of the elastic release of the blade and the attraction of the second winding. It is therefore possible, by regulating this attraction, to give to the striking hammer a velocity

greater than that which it receives in the prior art devices.

Similarly, if the current supply to the second winding is cut off while current is now supplied to the first, it is possible to return the elastic blade (and its hammer) very rapidly to its initial position under the joint actions of the first winding and the elastic release of the blade temporarily bent in the direction of the striking.

Preferably the two magnetic circuits and their armatures are identical and disposed symmetrically on both sides of the elastic blade.

According to a first embodiment, each magnetic circuit is formed by a curved branch on which is mounted the corresponding winding, whereas each armature is formed of a flexible magnetic blade, attached in magnetic insulating manner on the elastic blade of the striking hammer. Each such magnetic blade is magnetically coupled at one of its ends to the corresponding curved branch and is adapted to contact, by elastic deformation, the other end of the curved branch.

According to a variation of the embodiment of the invention, each magnetic circuit is formed of a loop, open by an air gap, on which is mounted the corresponding winding, whereas each armature is formed of a magnetic body, attached in magnetic insulating manner on the elastic blade of the striking hammer. Each of these armatures is capable of closing the corresponding air gap to join the opposing ends of the corresponding loop.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be described with reference to the accompanying drawing, wherein:

FIG. 1 illustrates schematically, and partially in cross section, a striking device according to the invention; and

FIG. 2 illustrates schematically and to greater scale, a variation of the embodiment of the device of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The striking device of FIG. 1 comprises a stirrup 1 of nonmagnetic material, generally in the form of the letter C. Stirrup 1 is attached by one of its wings 2 to a support 3, by any appropriate means. In this embodiment, the striking hammer 4 is attached to a screen blade 5 of hard steel, whose thickness, for example, is between 0.25 and 0.35mm. Hammer 4 may actually be formed by a bent end of the blade 5.

On both sides of elastic blade 5 are attached, in magnetic insulating manner, for example by means of layers of vulcanized rubber 6 and 7, magnetic lamalla 8 and 9. Lamalla 8 and 9 may be formed of transformer sheet-iron. The striking device comprises, further, two curved magnetic branches 10 and 11 disposed on each side of the assemblage of elements 5–9. Windings 12 and 13 are mounted on respective ones of magnetic branches 10 and 11.

At one of their ends, lamella 8 and 9 are in magnetic contact with respective ones of branches 10 and 11. On the other hand, at the other end, lamella 8 and 9 are respectively separated from branches 10 and 11 by respective air gaps 14 and 15.

The assemblage of elements 5–13 is attached to the base 18 of stirrup 1 by means of a bolt 16 and nut 17, which are fitted to the edge of lamella 8 and 9 where they are in contact with branches 10 and 11. Blade 5

and lamella 8 and 9 are disposed parallel to base 18 of stirrup 1. In addition, the ends of curved branches 10 and 11 opposite to bolt 16 are attached to the wing 19 of stirrup 1, opposite to wing 2, blade 5 traversing wing 19 through an opening 20 therein.

At rest, the striking device occupies the position shown in FIG. 1. In the position of preparation for striking, winding 12 is energized so as to attract lamella 8. Consequently, blade 5 is bent toward the left in FIG. 1. When hammer 4 must effect a striking, the excitation of winding 12 is interrupted and winding 13 receives an excitation pulse in order to attract lamella 9 toward the right in the figure. Consequently, hammer 4 is propelled toward the right in the figure and strikes the print receiving member 21 which moves by the print receiving position on a platen 22.

When the striking action is terminated, the current supplied to winding 13 is cut off, whereas winding 12 is energized anew.

The embodiment shown in FIG. 2 comprises two magnetic circuits formed respectively by a loop 23 opened by an air gap 25 and a loop 24 opened by an air gap 26. Loops 23 and 24 are formed of magnetic material and are disposed on each side of spring blade 5, which bears hammer 4. Loops 23 and 24 serve as the frame of the striking device and bear, in addition, windings 12 and 13.

Blade 5 bears two magnetic members 27 and 28, magnetically insulated from one another and from blade 5 by an insulator 29. Member 27 is adapted to be inserted into the air gap 25 in order to close loop 23 when spring blade 5 is bent toward the left in FIG. 2. Similarly, magnetic member 28 is adapted to be inserted into air gap 26 in order to close loop 24 when blade 5 is bent toward the right in FIG. 2. Flexible magnetic insulating lamella 30 and 31 may be disposed between blade 5 and loops 23 and 24. Lamella 30 and 31 are attached to support 3 by screws 32. In addition, screws 33 provide for assembling between them the interposed blade 5 and lamella 30 and 31.

The operation of the device of FIG. 2 is similar to that of FIG. 1. However, the inertia of the flexible assemblage of blade 5 and lamella 30 and 31 is less than that of the assemblage of elements 5–9 in FIG. 1.

In order to prevent members 27 and 28 from seizing in the openings in air gaps 25 and 26, stops 34 and 35 are provided at the base of such openings.

Much that has been described in the foregoing and that is represented on the drawing is characteristic of the invention. It is evident that one skilled in the art is able to adduce all modifications of form and of detail using his judgment, without departing from the scope of this invention.

What is claimed is:

1. A striking device for a printer, wherein the striking hammer thereof is attached to the free end of an elastic blade whose other end is fixed, wherein a first movable armature is fixed on said elastic blade and is a part of a first magnetic circuit on which is mounted a first electromagnetic winding adapted to act on said first armature whereby said elastic blade is bent in a direction opposite to its direction of striking, characterized in that said device comprises a second magnetic circuit, independent of said first magnetic circuit and on which is mounted a second electromagnetic winding adapted to act on a second movable armature said second movable armature also being borne by said elastic blade and associated with said second magnetic circuit, whereby said elastic blade is attracted in the direction of the striking.

2. The device of claim 1, wherein the two magnetic circuits thereof and their armatures are identical and disposed symmetrically on each side of said elastic blade.

3. The device of claim 2, wherein each of said magnetic circuits is formed by a curved branch on which is mounted the corresponding winding, wherein each armature is formed of a flexible magnetic blade attached in magnetic unsulating manner on the elastic blade bearing such striking hammer, each such magnetic blade being magnetically coupled to a respective one of the ends of the corresponding curved branch and adapted to contact, by elastic deformation, the other end of said curved branch.

4. The device of claim 2, wherein each of said magnetic circuits is formed of a loop, opened by an air gap, on which is mounted a corresponding winding, wherein each of said armatures is formed of a magnetic body, attached in a magnetic insulating manner to the elastic blade bearing the striking hammer and capable of reaching the corresponding air gap to join the opposing ends of the corresponding loop.

5. A striking device for a printer comprising; an elastic blade having a striking hammer attached to one end thereof and the opposite end substantially fixed, a first magnetic circuit including a first movable armature attached to said elastic blade and a first electromagnetic winding disposed in spaced relation with said first armature for moving said elastic blade in a direction opposite to its striking direction when said first circuit is energized, a second magnetic circuit independent of said first magnetic circuit and including a second movable armature attached to said elastic blade and a second electromagnetic winding disposed in spaced relation with said second movable armature for moving said elastic blade in the direction of striking when said second circuit is energized.

6. The device of claim 5 wherein each of said magnetic circuits is formed by a curved branch having one of said respective windings mounted therein and wherein each of said armatures is formed of a flexible magnetic blade attached to said elastic blade and magnetically insulated therefrom, each of said magnetic blades being magnetically coupled with a respective one of the ends of said corresponding curved branch and adapted to contact the other end of said curved branch when said elastic blade is moved by energization of one of said first or second circuits.

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