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EP 0 030 271 B1

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Antinoise structure

The present invention relates to impact serial printers used in data processing systems, and more particularly to the mechanical structure of such printers with reference to the noise produced during the printing.

It is known that one of the main inconveniences of impact printers is the considerable noise produced during the working.

This is one of the reasons which have induced the manufacturers to invest in the research and development of non impact printers (ink-jet, electrostatic and so on) intrinsically noiseless.

However the need to have several printing copies existing in several activities makes still essential the use of impact printers; besides the printing speed of impact printers of matrix type satisfies, at present, the need of a large range of users.

In the prior art the solutions adopted to reduce the noise of such printers were to equip them with covers and frames lined with deadening material and enclosing, in the best way possible, the noise source.

So, the purpose was to reduce the effects not to remedy the causes, as the noise causes were considered impossible to be eliminated or reduced.

In FR - A - 2 280 511 it has been disclosed a way of reducing noise by providing a printer with a hollow cylindrical platen, the platen cavity being filled with noise deadening material such as small lead or steel balls. The platen shaft is further mounted to the printer frame through the interposition of rubber bushing.

Similarly to the above French publication the device object of the present invention allows a limitation of noise by acting on the generating causes instead of reducing the consequences. As it is known an impact serial printer generally includes a rigid frame equipped with parallel guides, arranged in the direction of the printing line, and a platen on which a printing support is held. Guides and platen are strictly fixed to the frame and are part of the same.

In case the platen is capable of rotation.

A printing carriage, equipped with a printing head (of needle type for mosaic printing or of bearing-type element kind) slides on the guides. It has been experimentally noted that the main noise source is given by the impact on the platen caused by the printing head, and by the head and carriage vibrations during the carriage sliding on the guides. However the produced vibrations induce vibrations all over the frame through the mechanical restraints, which frame acts therefore as sound source.

According to the invention a noise reduction is therefore obtained by decoupling, as regards vibration diffusion, the mechanical elements, which constitute the main noise source, the one

from the other and from the secondary element that is the frame.

Carrying out such decoupling it is necessary that the required links among elements are maintained as they are essential for the relative and invariant positioning of the elements forming the printer. Such decoupling can be obtained through elastic intermediate rubber elements and through rigid arm elements. The resilient elements are used to restrain one another, the platen and the carriage guides in a reciprocally determined position, the elastic rubber elements are used to restrain the carriage guides to the frame. These and other features of the invention will appear more clearly from the description of a preferred form of embodiment of the invention and from the attached drawings where:

figure 1 is a perspective simplified view of the mechanical structure of a printer designed according to the invention;

figure 2 is the perspective view of some detail of the elements which form the mechanical structure of the printer according to the invention.

With reference to the figures the mechanical structure of a printer, according to the invention, includes a metallic frame formed by a bottom 5 and at least two sides 2, 3.

Both bottom 5 and sides 2, 3 are made with suitable thickness metal plate in order to give to the equipment an high stoutness. In the alternative cast structures can be used. On both sides 2, 3, 2 grooves are made where a front metallic bar 6 and a rear metallic bar 7 are to be engaged.

Figure 2 shows, for better clearness, the detail of such grooves on side 2, indicated with reference numerals 24, 25. It is clear that side 3 is specular to side 2. Bars 6 and 7 have a bearing and guiding function for a carriage which supports the printing head.

Carriage and printing head are shown in figure 1 where they are respectively indicated by reference numerals 21, 22.

The carriage is mounted on guides by means of bushes or axial bearings. Bars 6 and 7 are preferably cylindrical and are provided with two end cylindrical tapers.

In figure 2 the tapers are indicated by reference numerals 26, 27, 1, 4.

Four rubber bushes 8, 9, 10, 11 each provided with a shoulder, are respectively engaged on the two tapers of bars 6 and 7.

In turn the rubber bushes are inserted into the grooves of the printer side plates.

With reference to figure 1, front bar 6 is therefore engaged in the two grooves of side plate 3 and of side plate 2 respectively, through bushes 9, 10 and rear bar 7 is engaged in the other two grooves of side plate 3 and of side plate 2 respectively, through bushes 12 and 11.

Both couples of bushes 10, 11 and 8, 9 are then clamped to side plates 2 and 3 respectively through clamping plates 13, 12.

In this way bars 6 and 7 are restrained to the frame through interposition of the rubber bushes and the mutual position of the bars to assure a proper sliding of the carriage is determined within acceptable tolerances.

Clamping plates 12, 13 in turn are restrained to side plates 3, 2 by a pair of screws.

In figure 2 clamping plate 13 and two clamping screws 17, 18 are shown.

Platen 16 is formed by a prismatic elongated rigid element provided with two fixing holes 19, 20 at the ends and, instead of being fixed to the frame it is fixed to bars 6 and 7 by means of two arms 14, 15. One of such arms is more clearly shown in figure 2; each arm has two holes 28, 29 designed to receive the tapered ends of bars 6 and 7 and a third hole 30 designed to receive a screw or fixing element of the platen and corresponding to one of the two holes 19, 20 present in platen 16 ends.

As shown in figure 1, arms 14 and 15 are engaged on the tapered ends of bar 6 and 7 and are interposed between the untapered end portions of the bars and the shoulder of the rubber bush pairs 8, 9 and 10, 11. Platen 16 is restrained to the two arms 14 and 15 ends through clamping screws 23, 24.

The two arms 14 and 15 are made with plastic material; their function is to bear platen 16 allowing parallelism between platen and bars 6 and 7 within acceptable tolerances also during printing. It is to be noted that the parallelism between the axis of bars 6 and 7 within acceptable tolerances is determined by the side plates 2 and 3.

The parallelism between bars 6 and 7 is essential for a proper advancement of the printing head carriage; the parallelism between platen 16 and bar 7 is essential for uniform printing.

It is to be noted that platen 16 ends are not restrained to side plates 2 and 3 of the metallic frame (solution adopted in the prior art) but platen 16 together with bars 6 and 7, thanks to arms 14 and 15 form a unitary member connected to the metallic frame only through bushes 8, 9, 10, 11.

In this way the vibrations produced on platen 16 by the printing head needles, thanks to arms 14 and 15 of plastic material, propagate in a very attenuated way to bars 6 and 7 and with further attenuation to the metallic frame owing to the damping effect of the rubber bushes. It is clear that other arrangements can be used to form two separate members, one related to bars and platen and the other related to the metallic frame of a printer, coupled together in order to form a vibration damping structure without departing from the scope of the invention.

Claims

1. Antinoise mechanical structure for impact

printer of the kind including a frame, a platen, at least one pair of guiding bars, a carriage movable along said guiding bars and a printing head mounted on said carriage characterized in that said platen (16) is mounted in said frame by restraining said platen to said guiding bars (6, 7) by two arms (14, 15) engaged on the ends of said pair of guiding bars and said ends of said guiding bars are further fixed to said frame with interposition of rubber means (8, 9, 10, 11).

2. Mechanical structure as claimed in claim 1 wherein said two arms (14, 15) are in plastic material.

3. Mechanical structure as claimed in claim 1 wherein said rubber means consist in rubber bushes (8, 9, 10, 11) engaged on the ends of said guiding bars and inserted in housings made in said frame.

Patentansprüche

1. Schalldämpfende mechanische Struktur für Anschlagdrucker mit einem Rahmen, einer Anschlagplatte, wenigstens zwei Führungsschienen, einem längs der Führungsschienen verschiebbaren Träger sowie einem auf dem Träger gehaltenen Druckkopf, dadurch gekennzeichnet, daß die Anschlagplatte (16) zur Befestigung im Rahmen durch zwei an den Enden der beiden Führungsschienen (6, 7) gehaltene Arme (14, 15) getragen ist und die Enden der Führungsschienen unter Zwischenlage von Gummielementen (8, 9, 10, 11) am Rahmen befestigt sind.

2. Mechanische Struktur nach Anspruch 1, bei der die beiden Arme (14, 15) aus Kunststoff bestehen.

3. Mechanische Struktur nach Anspruch 1, bei der die Gummielemente durch auf den Enden der Führungsschienen sitzende Gummihülsen (8, 9, 10, 11) gebildet und in Lagerstellen des Rahmens eingesetzt sind.

Revendications

1. Structure mécanique antibruits pour imprimante à impact comprenant un châssis, une platine, au moins une paire de barres de guidage, un chariot pouvant se déplacer le long desdites barres de guidage et une tête d'impression montée sur ledit chariot, caractérisée en ce que ladite platine (16) est montée dans ledit châssis en la fixant auxdites barres de guidage (6, 7) par deux bras (14, 15) enfilés sur les extrémités de ladite paire de barres de guidage et en ce que lesdites extrémités desdites barres de guidage sont, en outre, fixées audit châssis avec interposition d'éléments de caoutchouc (8, 9, 10, 11).

2. Structure mécanique selon la revendication 1, caractérisée en ce que les deux bras (14, 15) sont en matière plastique.

3. Structure mécanique selon la revendication 1, caractérisée en ce que lesdits

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éléments de caoutchouc sont des coussinets de caoutchouc (8, 9, 10, 11) enfilés sur les extré-

mités desdites barres de guidage et insérés dans des logements prévus dans ledit châssis.

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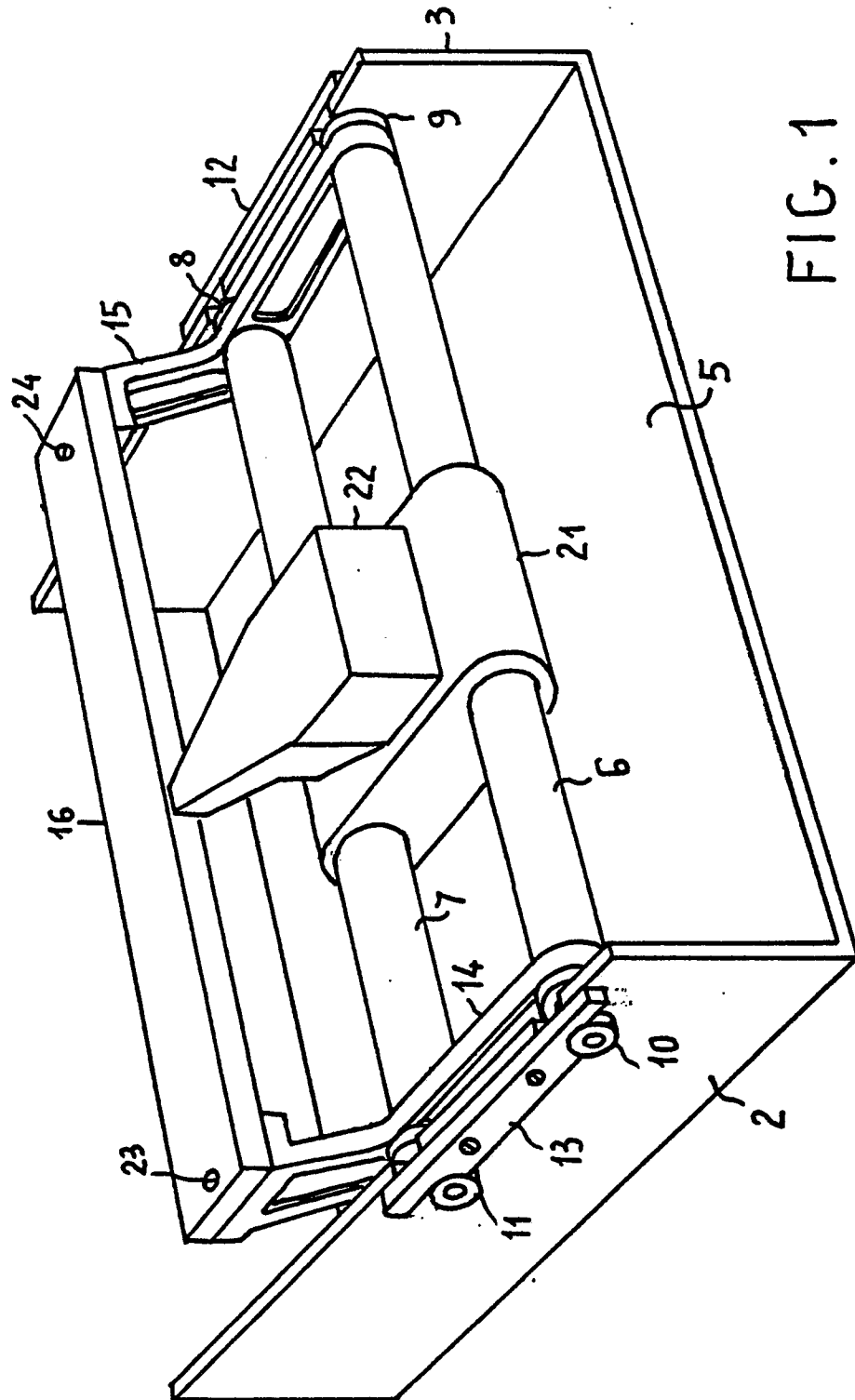


FIG. 1

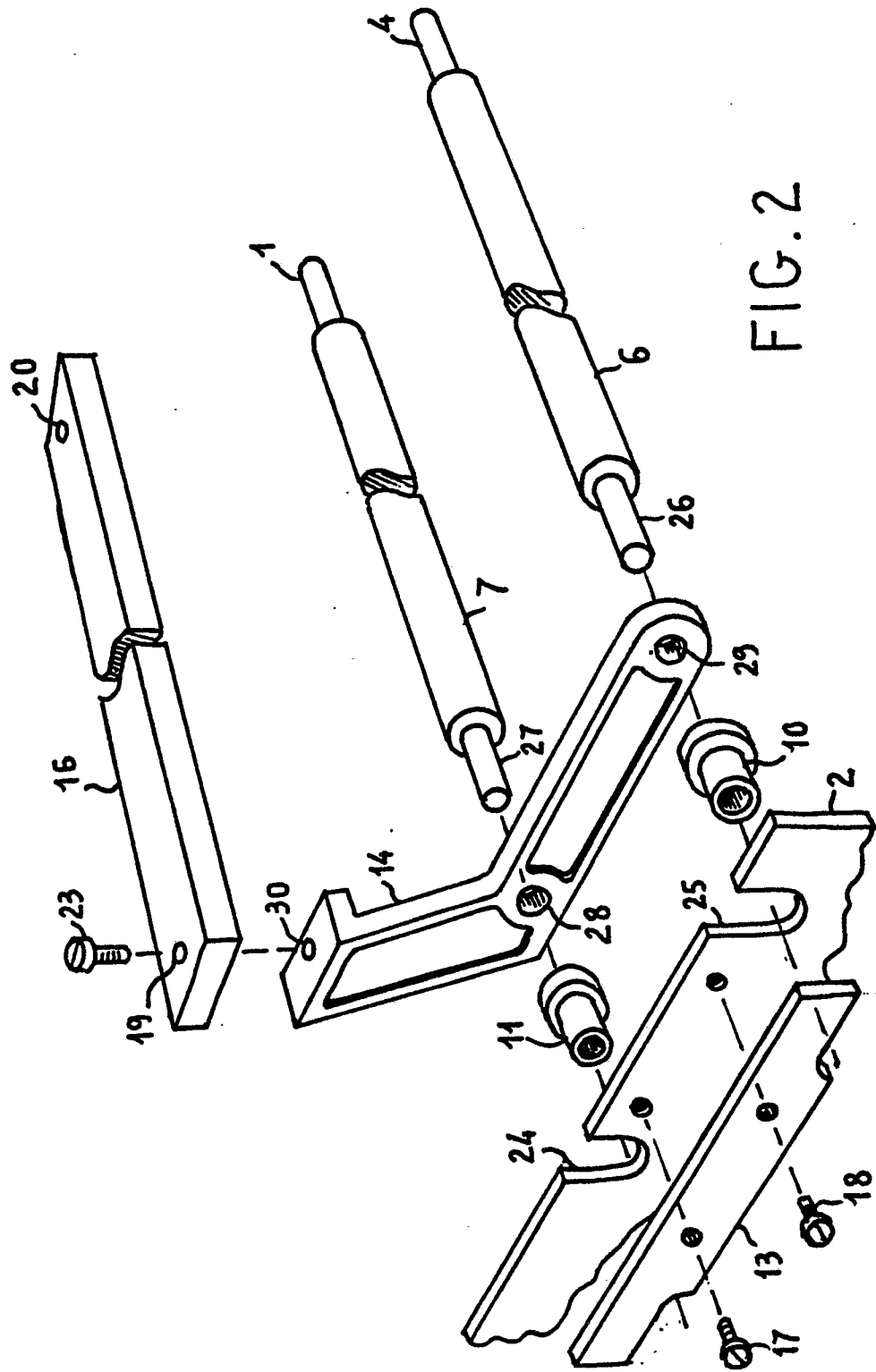


FIG. 2