(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 030 271**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **80106663.0**

(22) Date of filing: **30.10.80**

(51) Int. Cl.³: **B 41 J 29/10**

(30) Priority: **06.11.79 IT 2705079**

(43) Date of publication of application: **17.06.81**
Bulletin 81/24

(84) Designated Contracting States: **CH DE FR GB LI**

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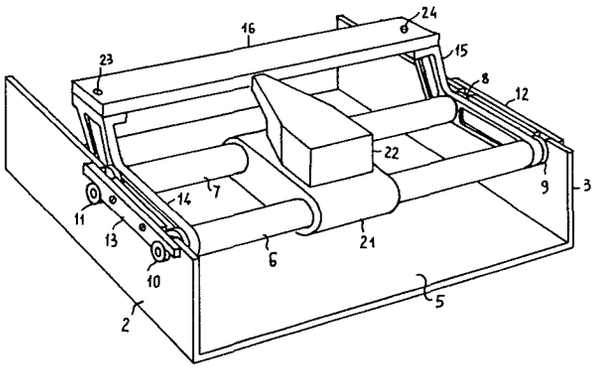
(54) Antinoise structure.

(57) Mechanical structure of a serial printer capable of greatly reducing the noise produced during the printing, characterized by a rigid resilient coupling (14, 15) between the mechanical members (6, 7, 16) which produce vibrations during printing (as the platen (16), and the bearing and guiding bars (6, 7) of the printing head carriage) and the metallic frame (2, 3, 5) in order to avoid the vibration transfer to the frame.

The platen and the two bearing and guiding bars of the carriage are restrined each other by plastic elements (14, 15) and form a unic relatively rigid member which is fixed in an elastic way the metallic frame through rubber bushes (8, 9, 10, 11).

Thus the transfer to the frame of the vibrations produced by the printing head impression elements on the platen and by the printing head carriage on the bearing and guiding bars is greatly attenuated.



EP 0 030 271 A2

Antinoise structure

The present invention relates to the 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 inconvenients of the 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) intrinsecally 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.

The device object of the present invention allows to limit the noise by acting on the generating causes instead of reducing the consequences.

As it is known an impact serial printer generally includes a rigid fra

me equiped with parallel guides, arranged in the direction of the printing line, and a platen on which a printing support is leaned.
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, equiped 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 to the vibration diffusion, the mechanical elements, which contitute 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.
According to the invention such decoupling is obtained through elastic intermediate elements and through rigid resilient elements.
The resilient elements are used to restraint one another the platen and the carriage guides in a reciprocally determined position, the elastic 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 particular 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 provided with 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 si

de 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 5 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 screews 23, 24.

The two arms 14 and 15 are made with plastic material; their function is to bear platen 16 allowing to maintain the 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 toleranoes 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 such way the vibrations produced on platen 16 by the printing head needles, thank 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, a pair of guiding bars at least, a carriage moving along said guiding bars and a printing head mounted on said carriage characterized by that said platen (16) is restrained to said guiding bars (6, 7) through relatively stiff resilient means (14, 15) and said guiding bars are fixed to said frame through interposition of resilient means (8, 9, 10, 11).

2. Mechanical structure as claimed in claim 1 wherein said relatively stiff resilient means consists of two arms (14, 15) in plastic material engaged on the ends of said pair of guiding bars.

3. Mechanical structure as claimed in claim 1 wherein said resilient 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.

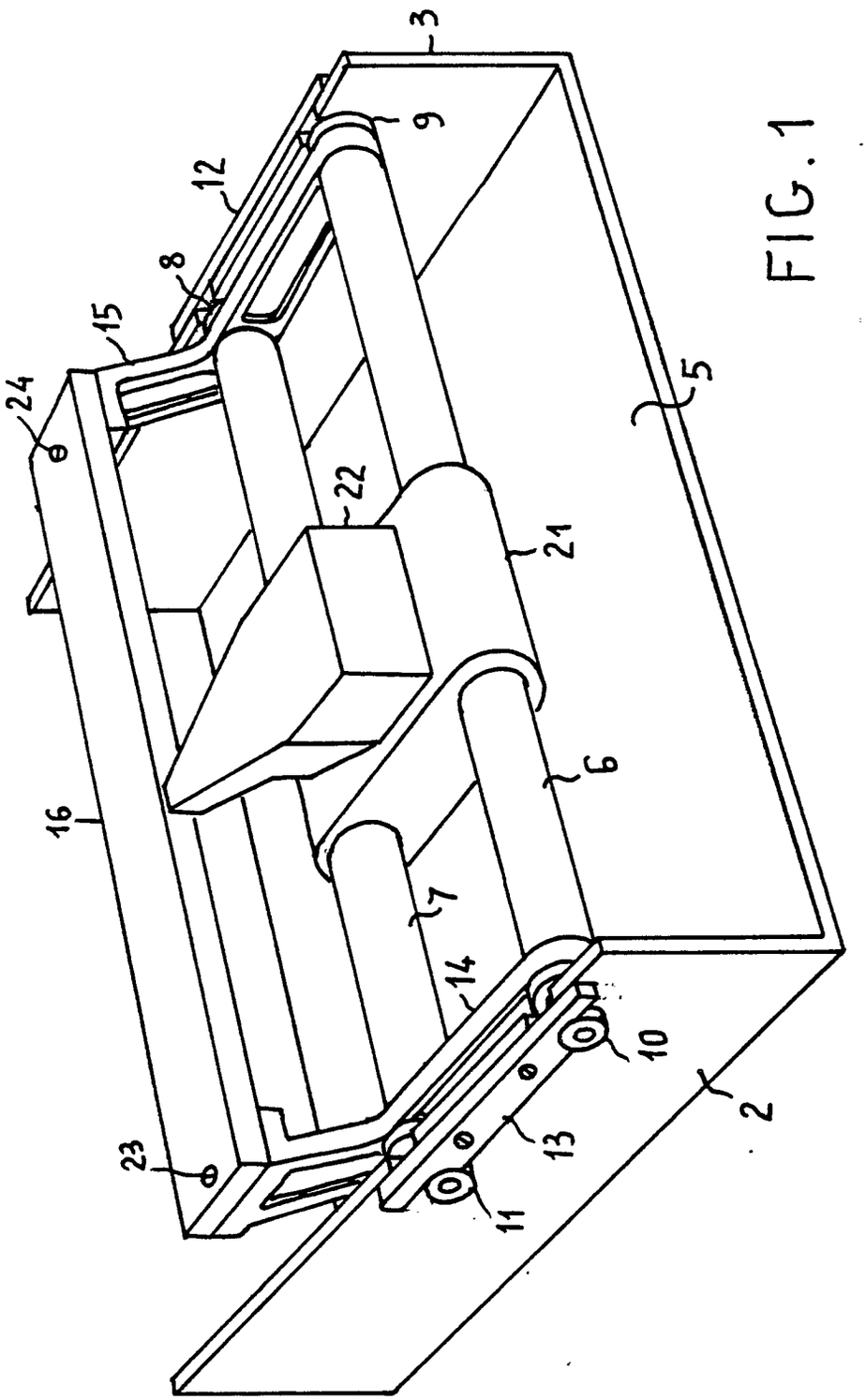


FIG. 1

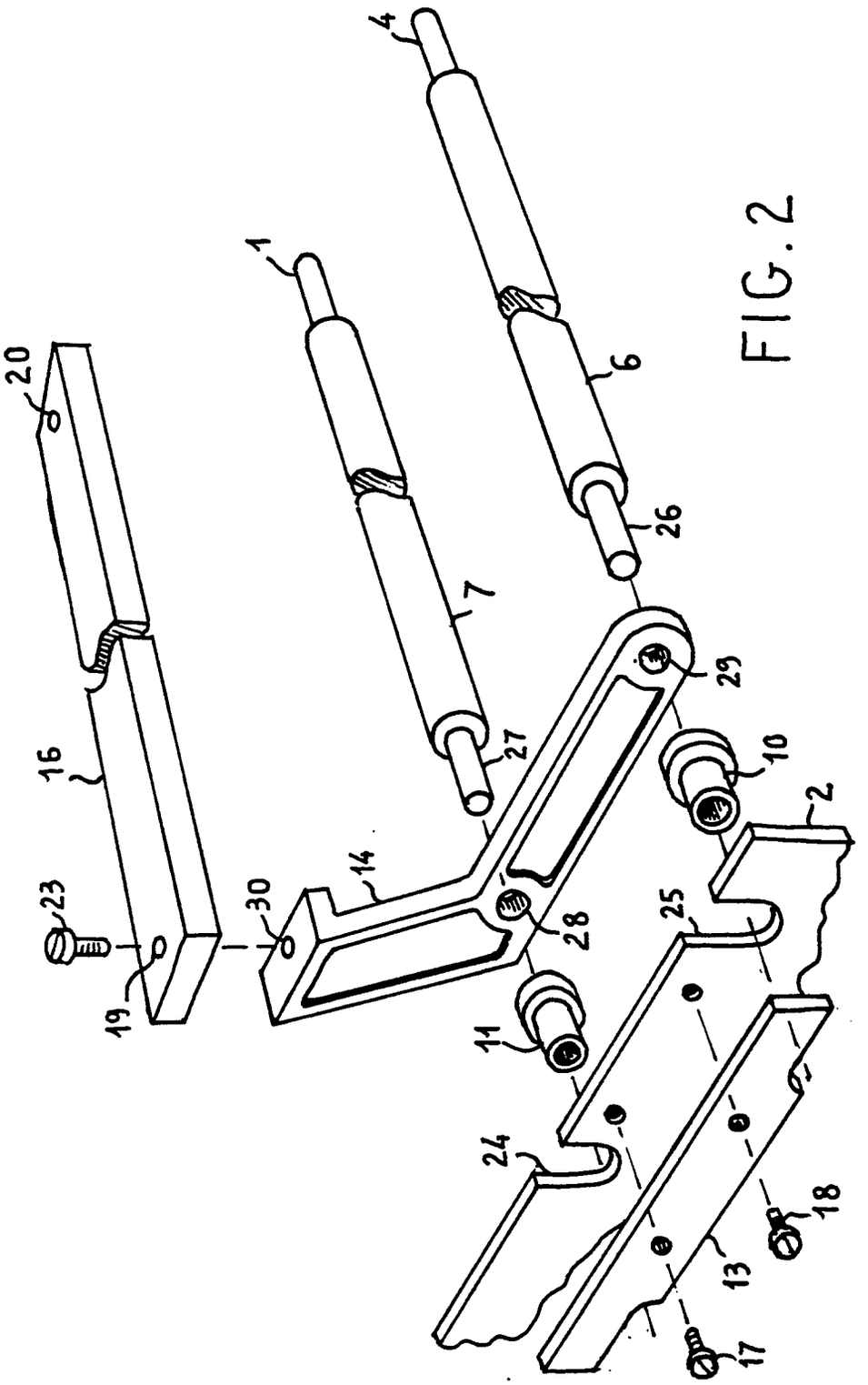


FIG. 2