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(54) Serial printer frame.

(57) Serial printer frame constituted by a basement (1C) and by two side plates (1A,1B) identical each other.

The side plates are provided with dihedral shaped housings (7A,7B,8A,8B) for the ends of the platen (3) and at least a carriage guiding bar and provide for their precise positioning and parallelism.

The platen and guiding bar ends are restrained in the dihedrals by means of clamping riders (11A,11B,21A,21B) which perform on them a force directed towards the dihedral apex.

The riders are fixed to the side plates by means of tapered head screws (13A,14A,13B,14B,24A,24B) perpendicular to the side plates.

The screws perform a trasversal pull on the riders owing to the tapered head action on a corresponding tapered housing of the riders suitably arranged.

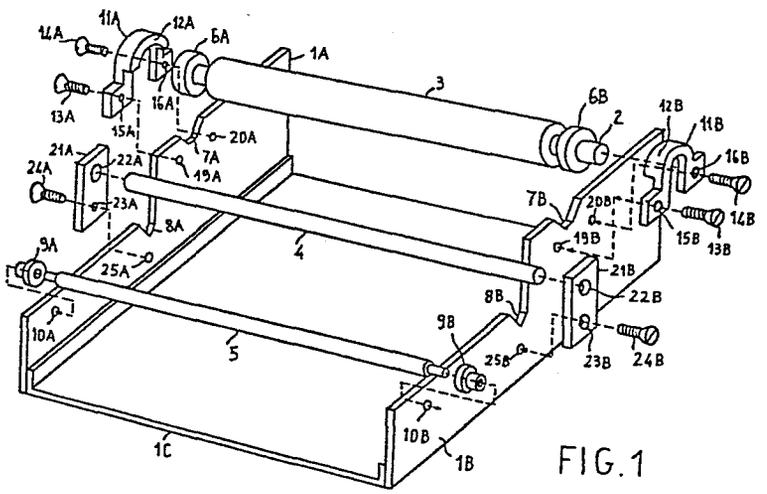

FIG.1

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Serial printer frame

The present invention relates to a serial printer frame and, more precisely, to the means securing the platen and the printing carriage guiding bars to such frame.

The frame of a serial printer is generally constituted by a basement and by two side plates provided with suitable housings where the ends of the platen and of the carriage guiding bars are inserted and steadily restrained.

The printing carriage, where a printing head is mounted, slides along the guiding bars to subsequently take different printing positions along a printing line.

An example of such printers is disclosed in US Patents N. 4,044,882, N. 3,970,193 and N. 4,229,114.

The carriage is moved by a motor, preferably a step motor, through a flexible transmission, generally and preferably a toothed belt.

The paper feeding for the printing of several lines is performed by suitable feeding elements, such as tractors or pin wheels, or by a cylindric shaped platen rotatable around its axis and which cooperates with suitable pressure rollers pressing the paper against the platen.

A perfect parallelism between the printing platen and the printing carriage guiding bars is required in the serial printers and, particularly, in those printers which must perform high quality printing.

In this way a constant distance between printing head and printing platen is assured along the whole printing line, so that a constant impact energy is obtained and the printed alphanumerical characters are per-

fectly matched as to an imaginary median line of the printing line.

The lack of parallelism is generally due both to the defective positioning of the housings intended to receive the ends of the platen and of the guiding bars on the frame side plates, and to the possible slacks between the side plate housings and the ends of the platen or the guiding bars.

In the prior art the parallelism between platen and carriage guiding bars was obtained by strictly restraining the guiding bars to the frame by means able to eliminate the possible slacks and by supplying the platen with adjusting means able to recover both the position tolerances of the housing on the side plates and the possible slacks between housings and printing platen ends, during a setup phase subsequent to an assembling phase.

These adjusting means consist of fixing and gauging screws which act in radial directions contained in the side plate plane or in a plane parallely thereto.

However such kind of solution is complicated and therefore intrinsically expensive as it requires a manual setup phase during which the use of suitable tools able to detect the reached parallelism degree is unavoidable.

This manual setting phase further increases the product cost.

These disadvantages are overcome by the present invention which provides a simple and unexpensive serial printer frame which enables to obtain the desired parallelism during the assembling phase without requiring a subsequent setup operation.

According to the invention these advantages are obtained by restraining the platen and the carriage guiding bars into suitable housings arranged on the side plates which are plane and identical each other.

The housings in each side plate are obtained by a simple blanking operation and consist of V shaped housings providing a well definite refe

rence and support dihedral.

The possible position inaccuracy in the blanking of the side plates does not affect at all the relative position of the housings therein. Also the possible wear of the blanking fixture (die and punch) equally affects the relative distances of the housings on both side plates.

The platen and guiding bar ends are firmly pressed in the related dihedrals by retaining riders which eliminate the slacks among the elements by performing a suitable pressure on said ends towards the dihedral apex.

According to a further aspect of the invention the clamping riders are fixed to the panels by tapered head screws which get through the riders and are screwed to the side plates perpendicularly to the plate plane. The riders pressure on the platen and guiding bars ends is obtained by interaction of the tapered screw heads with corresponding tapered housings.

To this purpose the distance between the contact point of the riders, positioned for the assembling, with the platen or the bar ends and the axis of the screw housings in the side plates is greater than the distance between the contact point of the riders with the platen or the bar ends and the axis of the tapered housings in the riders.

The riders are preferably embodied with plastic material in order to assure a suitable elastic extension.

These and other features will appear more clearly from the following description of a preferred embodiment of the present invention and from the enclosed drawings where:

- Figure 1 shows in sketch form an exploded perspective view of a serial printer frame according to the present invention.
- Figure 2 partially shows the contour of one of the two side plates in the frame of Fig. 1.
- Figures 3, 4 respectively show in front and section view a fixing ele

ment or rider used in the frame of Fig. 1.

Figure 1 shows the elements of a serial printer frame essential for understanding the present invention.

The frame of Fig. 1 comprises 2 side plates 1A, 1B firmly restrained to a basement 1C.

Both basement 1C and side plates 1A, 1B are in metal sheet of suitable thickness in order to provide a high strength to the equipment.

The two side plates 1A, 1B are plane and identical each other.

They are obtained by blanking from a single blanking die.

By this, possible tolerances in the blanking die shape as well as possible wears of its contour equally affect the side plates.

Side plates 1A, 1B of Fig. 1 support guiding bars 4, 5 and a shaft 2 on which a cylindrical platen 3 is mounted.

A printing carriage, not shown, axially slides along the guiding bars.

It is mounted on guiding bar 4 by means of axial bushings or bearings.

Guiding bar 5 generally acts as guiding rail to avoid the carriage rotation around bar 4.

The platen may be a fixed or a rotating platen.

Fig. 1 shows the rotating platen case.

The ends of shaft 2 are engaged in two bearings 6A, 6B which are housed in two housings 7A, 7B of side plates 1A, 1B respectively.

Such ends may protrude externally from side plates 1A, 1B for coupling with motor means, not shown.

The ends of guiding bar 4 are directly housed into two housings 8A, 8B of side plates 1A, 1B respectively.

Such ends protrude externally from side plates 1A, 1B.

The ends of guiding bars 5 are engaged in two holes 10A, 10B of side plates 1A, 1B through two housings 9A, 9B.

Fig. 2 partially shows the contour of one of the side plates.

In Fig. 2 as well as in Fig. 3, 4 the same reference numbers already

used in Fig. 1 are used for the same elements with the difference, as to Fig. 1 that the accompanying letters A or B which indicate the elements of side plates 1A or 1B respectively, are omitted.

V shaped housing 7 constitutes a supporting dihedral where bearing 6 lays in a stable position by contacting the housing in two generating lines 30, 31.

Likewise housing 8, V shaped too, constitutes a supporting dihedral where the end of bar 4 lays in a stable position by contacting the housing in two generating lines 33, 34.

Within the limit of working tolerances the distance between bearing 6 axis and bar 4 axis is equal on both the side plates and such distance is not affected by positioning slacks.

Considering Fig. 1 again, bearings 6A, 6B are steady pressed in housings 7A, 7B by two riders 11A, 11B respectively.

Such riders, preferably embodied in plastic material, are constituted by a semitoroidal body 12A, 12B inside which bearings 6A, 6B are respectively housed.

The body externally protrudes with two fixing ears each one provided with a hole 15A, 15B and 16A, 16B respectively.

The riders are fixed to side plates 1A, 1B respectively by means of tapered head screws 13A, 14A, 13B, 14B respectively.

Such screws gets through holes 15A, 15B and 16A, 16B and are screwed into corresponding threaded housings formed on the side plates and respectively indicated by reference numbers 19A, 20A, 19B, 20B.

Likewise, the ends of guiding bar 4 are steady pressed in housings 8A 8B by two riders 21A, 21B respectively.

Riders 21A, 21B are fixed to the side plates, each one by a tapered head screw 24A, 24B respectively, which is engaged in a second hole 23A, 23B respectively of the riders and is screwed in a corresponding threaded housing, 25A, 25B respectively, formed in the side plates.

Screws 13, 14, 24 (A, B respectively) act with a screwing axis perpendicular to the side plates plane (and therefore parallel to the axis of the platen and of the guiding bars) and, once clamped they steady press riders 11A, 11B, 21A, 21B against the side plates.

It will be now explained how, by the screw clamping, the riders are positioned to exert a force, on the bearings and on the guiding bar ends, which steady presses the bearings and the ends of guiding bar 4 in the corresponding housings of the side plates.

Considering Fig. 2 again, which shows a portion of side plate, it is to be noted that threaded housing 25 is arranged in order that its axis has a distance H1 from generating line 38 of bar 4 more far away when this last is engaged into dihedral 8.

Fig. 3 and 4 respectively show in front view and in section view according to plane A - A, rider 21.

The rider has an upper tapered opening 22 and a lower opening 23.

Upper opening 22 is intended to receive the guiding bar end and has a diameter slightly larger than the bar to ease its insertion.

Lower opening 23 is intended to receive a fixing screw and comprises a cylindrical portion 35 and a tapered housing 36.

The axis of tapered housing 36, parallel to the axis of opening 22, is at a distance H from generating line 37 more far away of opening 22.

H is suitably smaller than H1.

If D is the external diameter of screw 24, to be housed in seat 35 and to be screwed in side plate opening 25, diameter D1 of seat 35 must be equal to $D + (H1 - H) \cdot 2$.

In these conditions the assembling of guiding bar 4 end to side plate 1 occurs in the following way:

the end of bar 4 is laid down in the corresponding dihedral 8.

The bar end which protrude from the panel is inserted into housing 22 of rider 21 and the rider is leant against the side plate so that ope

ning 23 is axially aligned with threaded housing 25.

Such alignment may be established even if H is lesser than H1 owing to the opening diameter D1 which is wider than the screw and the threaded housing 25 diameter.

Screw 24 is inserted into opening 23 and it is screwed into housing 25.

Screw 24, when screwed into housing 25, has an eccentric position as to the opening 23 that is its axis is in opposition to generating line 37 as regards the axis of tapered housing 36.

Therefore, by screwing, the tapered head begins to interfere with the lower surface of tapered housing 36 and pull downwords rider 21 in order to make tapered housing 36 coaxial to the screw.

This shift is opposed by the contact between the bar and the rider in corrispondence of generating line 37, but it can take place thanks to an elastic elongation of the rider which exerts a pull down force on the bar end.

Such force (referenced by F in Fig. 2) steady positions the bar end in the housing dihedral 8.

The function carried out by riders 11A, 11B is the same even if, in this case, the clamping occurs by means of two screws, instead of one and the rider body acts on bearings 6A, 6B by elongating out of the external surface of the side plates towards the inside.

By using such clamping devices side plates 1A and 1B may consists in plane metallic elements obtained by blanking and bending operations are not required for obtaining support or fixing wings for rider of conventional type, where clamping screws acts in the same direction of the force they have to perform.

The inconvenient of deformations caused by bending operations performed after the blanking is therefore avoided.

These deformations, which are difficult to control, could modify in a

different way the relative distance on the side plates between the housings of the platen and of the guiding bars to the detriment of the required parallelism.

It is to be noted that the described printed frame is only a preferred embodiment of the invention and that several variants can be brought. Riders such as the disclosed ones can for instance be used only for positioning the platen bearings; while the guiding bar ends may be positioned into the corrisponding housings by different devices.

Likewise, considering the rider structure, the cylindric shaped housings 35 can have a form different from the one described which has circular section of diameter D1 suitably wider than the one of the screws they have to receive.

For instance they may consist of a groove with semicircular ends, having a widness equal to the diameter of the screw to be housed.

Such grooves may be eccentrically elongated as to the tapered portion in order to allow at first the easy insertion, without interference, of the screw in eccentric position as to the tapered housing, and then the relative shift of the screw within the groove, without interference, up to the coaxial alignment of the screw and of the tapered housing.

Claims

1. Serial printer frame comprising two side plates (1A, 1B), a basement (1C), a platen (3), a guiding bar (4), supporting a printing carriage, said platen and said guiding bar being mounted in parallel relationship by means of cylindrical shaped ends secured to said side plates, characterized by that:

said side plates are plane metal sheets identical each other and have dihedral shaped housings (7A, 7B, 8A, 8B) for the positioning of each of said ends by contact in a generating line of each side of the corresponding one of said dihedrals,

and further by that it comprises:

fixing means (11A, 11B, 21A, 21B, 13A, 14A, 13B, 14B, 24A, 24B) of each of said ends into a corresponding one of said housings of a side plate able to perform on said ends a force directed towards the apex of the corresponding dihedral.

2. Mechanical structure as per claim 1, characterized by that said fixing means comprise for each side plate at least a rider (11A, 11B, 21A, 21B) and at least a tapered head screw (13A, 14A, 13B, 14B, 24A, 24B) for fixing said rider to the side plate in corrispondence of one of said dihedrals, said rider being provided with a first opening for receiving one of said ends and with a tapered housing for said screw and related tapered head, each side plate being provided with a second opening intended to receive said screw with axis perpendicular to said side plate,

said second opening in the side plate and said housing in the rider being positioned one as to the corresponding dihedral, the other as to said first opening in the rider, in order that with the clamping of said screw on said side plate said screw head, interacting with said rider in said tapered housing, causes on the end engaged in said first opening of the rider a force directed towards the apex

of said corresponding dihedral.

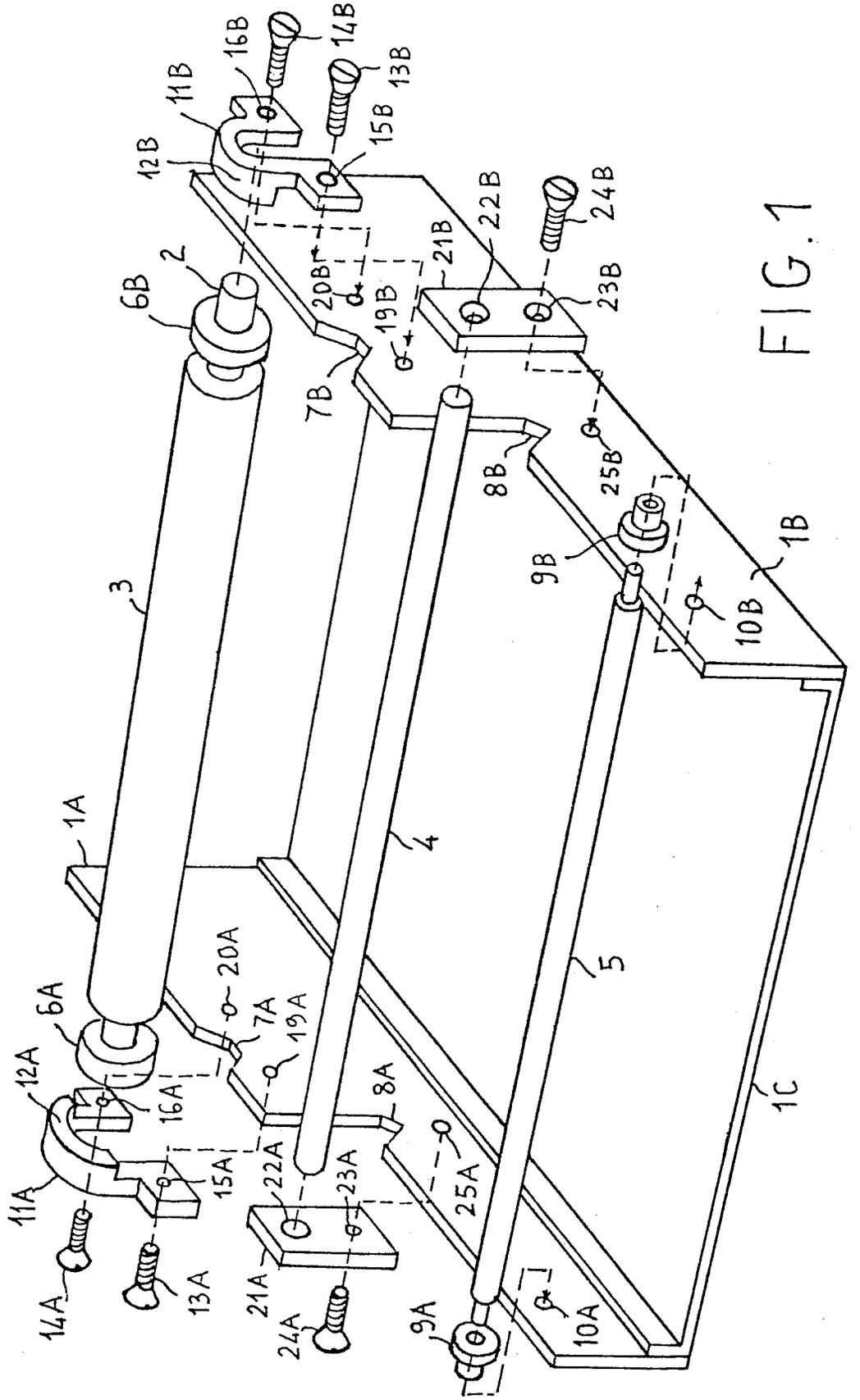
16B
14B
13B
11B
15B
12B
24B
22B
2
21B
6B
20B
23B
19B
7B
8B
25B
9B
1B
10B
3
4
5
1C
1A
20A
6A
7A
19A
12A
16A
8A
11A
15A
22A
23A
25A
14A
13A
21A
24A
9A
10A

FIG. 1

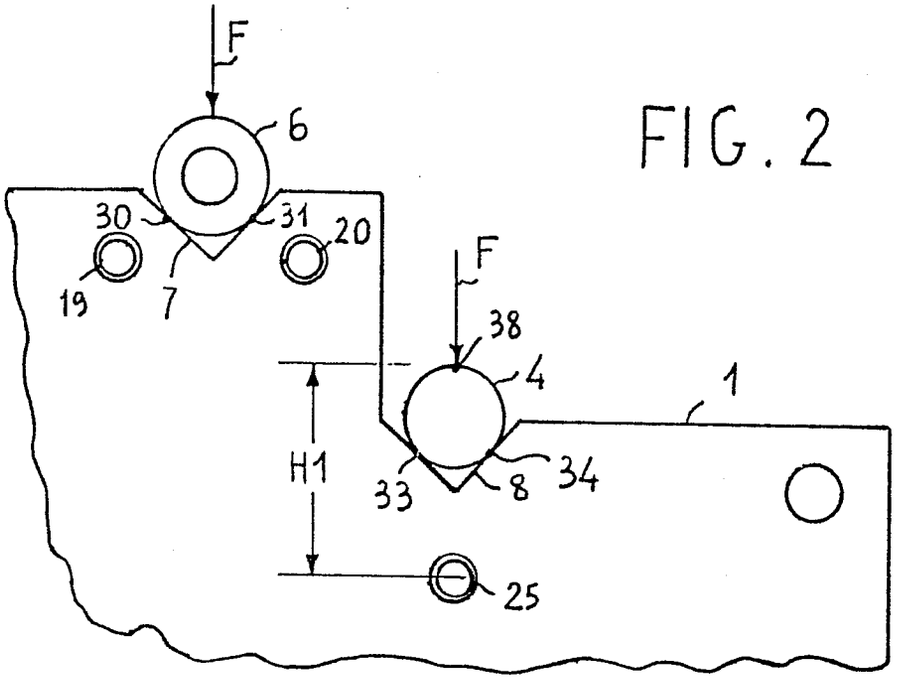

FIG. 2

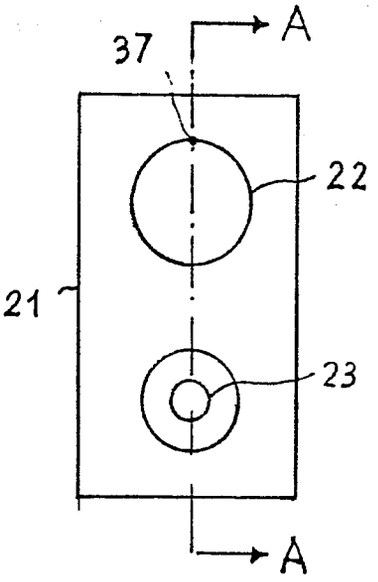

FIG. 3

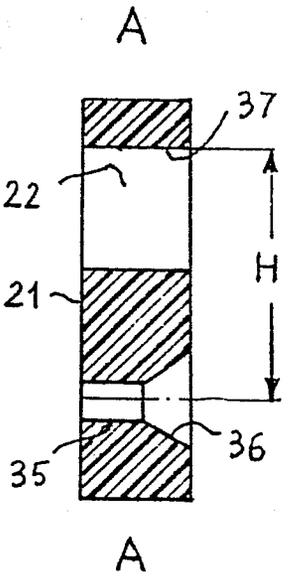

FIG. 4