

"SHAFT SUPPORTING STRUCTURE"

This invention relates to a shaft supporting structure.

Printers and the like are known having a guide shaft for guiding a print head of the printer. The guide shaft has been supported by support plates, the guide shaft having been passed axially through bearing holes in the support plates, and the guide shaft being secured on the outside of the support plates by the use of screws or E-shaped retainers.

In such a construction, however, a screwdriver and screws are needed to effect assembly, there is considerable work in attaching the screws and E-shaped retainers, and assembly is therefore inefficient.

It is an object of the present invention to eliminate the need for a screwing operation using a screwdriver and for the step of attaching E-shaped retainers using a pair of pliers, so that the efficiency of assembly can be improved.

According to the present invention, there is therefore provided a shaft supporting structure comprising at least one shaft mounting member having an opening through which a shaft has been introduced in a direction radial of the shaft, and holding means which hold the shaft non-rotatably in the shaft mounting member after having been so introduced, the holding means comprising a resilient member which has been moved back by an end surface of the shaft, against the resilient force of the resilient member, during the said introduction of the shaft, subsequent rotation of the shaft having moved the end surface out of engagement with the resilient member and having moved into

engagement therewith a cut-away surface of the shaft, the engagement between the resilient member and the cut-away surface preventing further rotation of the shaft.

Preferably the shaft mounting member and the resilient member are integral portions of a support member.

Preferably, the said opening extends from at least one shaft positioning projection of the shaft mounting member, the shaft having been introduced into the shaft mounting member by moving the cut-away surface, or cut-away surfaces, through the opening and past the shaft positioning projection or projections, the said subsequent rotation of the shaft having moved a non-cut-away portion of the shaft into engagement with the or each shaft positioning projection to restrict radial movement of the shaft.

There may be bayonet-type connector means between the shaft and the shaft mounting member which prevent axial movement of the shaft. Thus the bayonet-type connector means may comprise an engagement projection on an inner surface of the shaft mounting member which has entered an engagement groove in the shaft as a result of the latter having been rotated after being introduced into the shaft mounting member.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:-

Figure 1 is a front view, partly in cross-section, of an embodiment of a shaft supporting structure according to the present invention; and

Figures 2(A) and (B) are enlarged left side views of the structure of Figure 1 illustrating the assembly into position of the shaft of the said structure

In Figure 1 there is shown an embodiment of a shaft supporting structure according to the present

invention. The structure comprises a shaft 1 which is constituted by a front guide shaft of a printer for guiding a carriage 2 on which a print head of the printer is mounted. The end portions of the shaft 1 are rotatably mounted in shaft mounting portions 5, 6 projecting from and integral with support members 3, 4 respectively. The end portions of the shaft 1 are respectively provided with recess portions 1e, 1f each of which is formed with a pair of oppositely disposed cut-away plane surfaces 1a, 1b or 1c, 1d. Each recess portion 1e, 1f has an engagement groove 1g, 1h respectively which is formed along the outer surface thereof.

Each of the shaft mounting portions 5, 6 of the support members 3, 4 has a pair of shaft positioning projections 5b, 6b respectively which face each other across a respective opening 5a, 6a in the respective shaft mounting portion 5, 6, each pair of shaft positioning projections 5b, 6b allowing the respective recess portion 1e, 1f to pass therebetween only in a direction substantially parallel to the respective plane surfaces 1a, 1b, or 1c, 1d. After the recess portions 1e, 1f, have been passed radially through the openings 5a, 6a, both end portions of the shaft 1 are seated in the shaft mounting portions 5, 6, so that if the shaft 1 is rotated, the pairs of shaft positioning projections 5b, 6b, restrict the radial movement of the shaft 1 by engaging with the outer surfaces of the recess portions 1e, 1f and thus with non-cut-away portions of the shaft 1. Further, the inner surface of each shaft mounting portion 5, 6 has an engagement projection 5c, 6c respectively which serves as a bayonet-type engagement portion for restricting the axial movement of the shaft 1. In the embodiment of Figure 1, each engagement

projection 5c, 6c is adapted to engage in the corresponding engagement groove 1g, 1h.

The support member 3 is formed with an integral resilient pawl 7 whose resilient force is exerted towards the opening 5a. That is, when both end portions of the shaft 1 are introduced into shaft mounting portions 5, 6, the resilient pawl 7 is pushed back in opposition to its resilient force by an end surface 1i of the shaft 1, thereby allowing the shaft 1 to pass into the seated position. When the shaft 1 is rotated after being seated in the shaft mounting portion 5, the resilient pawl 7 comes into engagement with one plane surface 1a by virtue of its resilient force as soon as it comes out of engagement with the end surface 1i of the shaft 1, thereby restricting any further rotation of the shaft 1.

Because of the construction described above, when the shaft 1 is attached to the support members 3, 4, as shown in Figure 2(A) which illustrates one (the left hand) end portion, the recess portions 1e, 1f can only be inserted in a direction substantially parallel to the plane surfaces 1a, 1b and to the plane surfaces 1c, 1d and orthogonal to the axis of the shaft 1 so that they are passed through the openings 5a, 6a and supported by the shaft mounting portions 5, 6. Then, the shaft 1 can be rotated inside the shaft mounting portions 5, 6. As a result, as shown in Figure 2(B), the resilient pawl 7 comes into engagement with the plane surface 1a, so that the shaft 1 can no longer be rotated. At the same time, the radial movement of the shaft is restricted by the shaft positioning projections 5b, 6b and since the engagement projections 5c, 6c come into engagement with the engagement grooves 1g, 1h, the axial movement of the shaft is also restricted, whereby the shaft 1 is stably

retained.

Although the embodiment of Figure 1 has a pair of opposite plane surfaces 1a, 1b or 1c, 1d in each recess portion 1e, 1f, each recess portion 1e, 1f may have only one plane surface. Moreover, although each support member 3, 4 has the pair of shaft positioning projections 5b, 6b, only one shaft positioning projection need be provided on each support member. In this way, various modifications may be made in design.

CLAIMS

1. A shaft supporting structure comprising at least one shaft mounting member having an opening through which a shaft has been introduced in a direction radial of the shaft, and holding means which hold the shaft non-rotatably in the shaft mounting member after having been so introduced, the holding means comprising a resilient member which has been moved back by an end surface of the shaft, against the resilient force of the resilient member, during the said introduction of the shaft, subsequent rotation of the shaft having moved the end surface out of engagement with the resilient member and having moved into engagement therewith a cut-away surface of the shaft, the engagement between the resilient member and the cut-away surface preventing further rotation of the shaft.
2. A shaft supporting structure as claimed in claim 1 in which the shaft mounting member and the resilient member are integral portions of a support member.
3. A shaft supporting structure as claimed in claim 1 or 2 in which the said opening extends from at least one shaft positioning projection of the shaft mounting member, the shaft having been introduced into the shaft mounting member by moving the cut-away surface, or cut-away surfaces, through the opening and past the shaft positioning projection or projections, the said subsequent rotation of the shaft having moved a non-cut-away portion of the shaft into engagement with the or each shaft positioning projection to restrict radial movement of the shaft.



4. A shaft supporting structure as claimed in any preceding claim comprising bayonet-type connector means between the shaft and the shaft mounting member which prevent axial movement of the shaft.

5. A shaft supporting structure as claimed in claim 4 in which the bayonet-type connector means comprises an engagement projection on an inner surface of the shaft mounting member which has entered an engagement groove in the shaft as a result of the latter having been rotated after being introduced into the shaft mounting member.

6. A shaft supporting structure substantially as hereinbefore described with reference to and as shown in the accompanying drawings.



* C L M S *