

PINCH ROLLER ASSEMBLY

The present invention relates to a pinch roller assembly, for tape recorders, which includes a pinch-roller support member resiliently deformable or yieldable axially of a shaft of a pinch roller so that opposite ends of the shaft can be received in a pair of retaining holes formed in the support member.

Heretofore, pinch roller assemblies or units are known which generally comprise a pinch roller having a shaft projecting from opposite ends of the roller, and a support member made of resilient synthetic resin and having a pair of opposed sidewalls having a pair of retaining holes receptive of the respective ends of the shaft of the pinch roller. The sidewalls are resiliently deformable or yieldable so as to allow the opposite ends of the roller shaft to be received in the respective retaining holes. This prior art is exemplified by Japanese Utility Model Laid-Open Publication No. 27606/1979.

A common problem with this prior arrangement is that since the sidewalls are deformed radially of the shaft of the roller as peripheral surfaces of the roller shaft frictionally engage the peripheral edges of the retaining holes until the opposite ends

of the roller shaft are received in the respective retaining holes, the peripheral surfaces of the roller shaft were often scratched or scored especially if the roller shaft is made of synthetic resin. If the gap between the sidewalls of the support member is increased, it could minimize the amount of deformation of the sidewalls. With such hypothetical construction, however, the roller shaft tends to be removed off the retaining holes, and therefore it is difficult to determine the amount of deformation of the sidewalls to the optimum.

Yet if the roller shaft is made of metal in an attempt to provide an increased amount of deformation, it is difficult to manufacture the pinch roller assembly at a competitive cost.

With the foregoing problems of the prior art in view, it is an object of the present invention to provide an inexpensive pinch roller assembly in which opposite ends of a pinch roller shaft of synthetic resin can be brought into the respective retaining holes in the sidewalls of a support member without any scratch or score on the peripheral surfaces of the roller shaft.

According to the present invention, there is provided a pinch roller assembly suitable for use in a tape recorder comprising:

a pinch roller having a synthetic resin shaft projecting from opposite ends of said pinch roller; and

a support member made of resilient synthetic resin and having a pair of opposed sidewalls having a pair of retaining through-holes for rotatably receiving said shaft of said pinch roller, said support member being resiliently yieldable so as to allow the opposite ends of said shaft of said pinch roller to be received in said retaining through-holes, respectively, said support member having in an inner surface of one of said sidewalls an introduction groove extending between an edge of said one sidewall and one of said retaining through-holes, said introduction groove having a bottom surface rising at a slope from the edge of said one sidewall toward said one retaining through-hole.

Many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying drawings in which two preferred structural embodiments incorporating the principles of the present invention are shown by way of illustrative example.

In the drawings:

Fig. 1 is a perspective view of a pinch roller assembly embodying the present invention;

Fig 2 is an enlarged vertical cross-sectional view taken along line II-II of Fig 1;

Fig 3 is a detail view, partly broken away, as viewed along line III-III of Fig 2;

5 Fig 4 is a view similar to Fig 1, but showing a modified pinch roller assembly according to a second embodiment; and

Fig 5 is an enlarged vertical cross-sectional view taken along line V-V of Fig 4.

10 The principles of the present invention are particularly useful when embodied in a pinch roller assembly for a tape recorder.

As shown in Figs 1 and 2, the pinch roller assembly comprises a pinch roller 1, and a support member 4 for rotatably supporting the pinch roller 1. The pinch roller 1 is composed a roller body 2 of an elastomeric material such as rubber, and a synthetic resin shaft 3 projecting from opposite ends of the roller body 2.

20 The support member 4 is made of resilient synthetic resin and has a generally C-shaped cross section, having a pair of horizontal sidewalls 6, 7 and a vertical intermediate wall 5 extending between the sidewalls 6, 7 integrally therewith. The side-
25 walls 6, 7 have a pair of projections 8, 9

horizontally extending from the respective midportions of the sidewalls 6, 7 in a common direction. A distal edge 8a, 9a of each of the projections 8, 9 has a thickness larger than the remaining portion. The
5 two projections 8, 9 have in their respective small-thickness portions a pair of retaining holes 10, 11 in which the opposite ends of the shaft 3 of the pinch roller 1 are to be rotatably received.

Important, the sidewalls 8, 9 have in their
10 inner confronting surfaces a pair of introduction grooves 12, 12 each extending between the distal edge portion 8a, 9a and the retaining hole 10, 11. The introduction grooves 12, 12 serve to guide the opposite ends of the roller shaft 3 to the respective
15 retaining holes 10, 11. Each of the introduction grooves 12 has a bottom surface 13 rising at a slope from the edge portion 8a, 9a toward the retaining hole 10, 11. When mounting the pinch roller 1 on the support member 4, the end surfaces 3a, 3b of
20 the roller shaft 3 frictionally engage the bottom surfaces 13, 13 of the introduction grooves 12, 12 so as to cause the projections 8, 9 of the opposite sidewalls 6, 7 of the support member 4 to be resiliently deformed or yielded axially of the roller
25 shaft 3.

Designated by the numeral 14 in Fig 1 is a mounting hole through which an attachment bolt is to be inserted for pivotally attaching the support member 4 to a frame (not shown) mounted in the tape recorder.

As the pinch roller 1 is pushed from a solid-line position in the direction of an arrow in Fig 2 into the support member 4, the opposite ends of the roller shaft 3 are moved along the introduction grooves 12, 12 with the end surfaces 3a, 3b frictionally engaging the bottom surfaces 13, 13 of the introduction grooves 12, 12. This movement of the roller shaft 3 causes the projections 8, 9 of the opposite sidewalls 6, 7 to be deformed or yielded away from each other against their own resilience axially of the roller shaft 3. When the end surfaces 3a, 3b of the roller shaft 3 is moved past the introduction grooves 12, 12 and then arrive at the respective retaining holes, 10, 11, the projections 8, 9 of the sidewalls 6, 7 recover their original free shape under their own resilience. As a result, the opposite ends of the roller shaft 3 are received in the respective retaining holes 12, 12 of the sidewalls 10, 11 as illustrated in dash-and two-dot lines in Fig 2. Thus the pinch roller 1 has been rotatably

mounted on the support member 4. During this mounting of the pinch roller 1, only the end surfaces 3a, 3b of the roller shaft 3 are in contact with the introduction grooves 12, 12, while the peripheral surfaces of the roller shaft 3 are out of contact with the introduction grooves 12, 12. Therefore, the peripheral surfaces of the roller shaft 3 can be kept free from any scratch or score.

In the first embodiment, both the opposite sidewalls 6, 7 of the support member 4 are provided with the introduction grooves 12, 12. In an alternative form, however, only one of the opposite sidewalls (lower sidewall) 7 may be provided with an introduction groove 12, as shown in Figs 4 and 5. In this alternative embodiment, it is preferable that the projection 8 of the other sidewall (upper sidewall) 6 is reduced in thickness at a portion spanning between a substantially central portion of the retaining hole 10 and the distal edge 8a. In the embodiment of Figs 4 and 5, since the other construction is similar to the embodiment of Figs 1 through 3, like reference numerals designate similar parts in the drawings, while its description is omitted here in the specification for clarity.

Alternatively, only the other sidewall (upper sidewall) 6 may be provided with the introduction groove 12.

As mentioned above, an advantageous feature of the present pinch roller assembly is that the roller support member has in the inner surface of at least one of opposite sidewalls an introduction groove extending between an edge of the sidewall and the retaining hole and having a bottom surface rising at a slope from the sidewall edge toward the retaining hole.

With this arrangement, when placing the opposite ends of the roller shaft of synthetic resin in the respective retaining holes, it is possible not only to prevent the peripheral surface of the roller shaft from any scratch or score, but also to reduce the cost of production.

According to another feature that both the opposite sidewalls of the roller support member have a pair of introduction grooves, the opposite ends of the roller shaft can be placed in the retaining holes of the support member with improved reliableness.

CLAIMS:

1. A pinch roller assembly suitable for use in a tape recorder, comprising:

a) A pinch roller having a synthetic resin shaft projecting from opposite ends of said pinch roller; and

b) A support member made of resilient synthetic resin and having a pair of opposed sidewalls having a pair of retaining through-holes for rotatably receiving said shaft of said pinch roller, said support member being resiliently yieldable so as to allow the opposite ends of said shaft of said pinch roller to be received in said retaining through-holes, respectively, said support member having in an inner surface of one of said sidewalls an introduction groove extending between an edge of said one sidewall and one of said retaining through-holes, said introduction groove having a bottom surface rising at a slope from the edge of said one sidewall toward said one retaining through-hole.

2. A pinch roller assembly according to claim 1, in which said support member further has in an inner surface of the other sidewall an introduction groove extending between an edge of said other sidewall and the other retaining through-hole and having a bottom surface rising at a slope from the edge of said other sidewall toward said other retaining through-hole.

