

ROTARY STRUCTURAL MEMBERBACKGROUND OF THE INVENTION1) Field of the Invention

This invention relates to a rotary structural member of the press fitted shaft type wherein a rotary shaft made of a synthetic resin material is press fitted in a rotary body made of the same or a different synthetic resin material in order to mechanically couple the former to the latter.

2) Description of the Prior Art

Conventionally, most of rotary structural members for which a very high mechanical strength is not required include a rotary shaft and a rotary body made of one or different synthetic resin materials and press fitted one in the other in order to couple them.

Representative of such rotary structural members wherein two bodies are made of one or different synthetic resin materials and are press fitted one in the other is a reel shaft of a tape recorder of the cassette type. Such a reel shaft normally includes a drive shaft made of a synthetic resin material, and a reel driving member made of the same or a different synthetic resin material and coupled to the drive shaft. In such a conventional

reel shaft structure, the driving shaft is press fitted in a fitting hole formed in the drive shaft and having a smaller diameter than the drive shaft.

However, such a conventional rotary structural member of the press fitted shaft type as described above has following drawbacks. In particular, where two different parts made of one or different synthetic resin materials are coupled to each other by press fitting, creep deformation readily appears and a holding force between the two parts is lost in a relatively short time comparing with two different parts made of one or different metal materials and coupled to each other by press fitting. Therefore, a press fitting force is normally set to a rather high level. However, such a rather high press fitting force naturally deteriorates the operability in such press fitting. Besides, if the press fitting force is too high, it may raise a problem that a crack appears in a tubular section in which a fitting hole is formed or that the creep deformation after press fitting is accelerated on the contrary, resulting in deterioration in the holding force between the two parts in a short time.

In this manner, a conventional rotary structural member wherein two parts are made of one or different synthetic resin materials and are coupled to each other

by press fitting presents problems that it is low in reliability in the press fitting coupling where the press fitting force is low and that on the contrary where the press fitting force is raised to improve the reliability of the coupling, the operability in press fitting is deteriorated or else the creep deformation of the member is accelerated, resulting in deterioration in the reliability of the coupling. Any way, such a conventional rotary structural member is defective in that it is generally low in reliability in the coupling between the two parts.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a rotary structural member of the press fitted shaft type which can attain a press fitting coupling of a high reliability between two parts thereof eliminating such problems as described above which arise from the fact that the two parts are made of one or different synthetic resin materials.

According to the invention, there is provided a rotary structural member which comprises a rotary shaft made of a synthetic resin material, and a rotary body made of the same or a different synthetic resin material having a fitting hole formed therein in which said

rotary shaft is press fitted, at least one projection being provided either on an inner periphery of said fitting hole of said rotary body or on an outer periphery of said rotary shaft, wherein said projection is a
5 circumferentially elongated rib having opposite ends circumferentially spaced from each other.

After the rotary shaft has been press fitted into the fitting hole formed in the rotary body, stress which is caused by the pressure for press fitting concentrates
10 on the projection on the rotary shaft or the rotary body. Consequently, creep deformation will first appear at a portion of the counterpart with which the projection contacts and will cause the projection to bite into the counterpart. Accordingly, the rotary body and the rotary
15 shaft are coupled in a mutually biting condition due to the presence of the projection.

A specific embodiment of the present invention will now be described in detail by way of example with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal sectional view of a reel shaft to which the present invention is applied;

25 FIG. 2 is a perspective view, in a rather reduced scale, of a drive shaft of the reel shaft of FIG. 1; and

FIG. 3 is a plan view of the drive shaft of FIG. 2.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Referring first to FIG. 1, there is shown a reel shaft of a tape recorder of the cassette type to which the present invention is applied. The reel shaft shown includes a drive shaft 1 made of a synthetic resin material, and a reel driving member 2 made of the same or a different synthetic resin material and coupled to the drive shaft 1 by press fitting. The drive shaft 1 includes a shaft section 11 and a gear section 12.

10 Meanwhile, the reel driving member 2 includes a tubular section 13 and a blade section 14. The tubular section 13 has a bore or fitting hole 21 formed therein. The shaft section 11 is press fitted in the fitting hole 21 of the tubular section 13 to couple the drive shaft 1 and the reel driving member 2 to each other.

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Three projections 15 are formed in a circumferentially equidistantly spaced and discontinued relationship on an outer periphery of the shaft section 11 of the drive shaft 1 at an intermediate height, that is, at an intermediate position in a direction of an axis of the shaft section 11, and extend or are elongated in a circumferential direction of the shaft section 11 as shown in FIGS. 2 and 3 so that they are each formed as a circumferentially extending rib having

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opposite ends circumferentially spaced from each other. Accordingly, the shaft section 11 of the drive shaft 1 is press fitted in the tubular section 13 of the reel driving member 2 with the projections 15 of the former contacted with the inner periphery of the fitting hole 21 of the latter. It should be noted that the projections 15 are shown in a rather exaggerated form in FIGS. 1 to 3: their actual height is generally on the order of about 0.1 mm.

10 With the construction described above, the projections 15 will be acted upon by a higher force than any other portion of the shaft section 11 of the drive shaft 1 after the shaft section 11 is pressed fitted. The force will in turn act as a reactive force upon
15 portions of the inner periphery of the fitting hole 21 of the tubular section 13 of the reel driving member 2 with which the projections 15 contact. Consequently, creep deformation is promoted at the contact portions of the inner periphery of the tubular section 13 with the
20 projections 15 so that such a condition will be reached wherein the projections 15 bite in the tubular section 13. Accordingly, the shaft section 11 and the tubular section 13 are coupled to each other in a mutually biting condition.

25 In this manner, provision of the projections 15

causes creep deformation to appear to different degrees at different portions of the tubular section 13 of the reel driving member 2, and consequently the shaft section 11 of the drive shaft 1 and the tubular section 13 of the reel driving member 2 can be coupled in a mutually biting condition. Accordingly, possible deterioration of the holding force between the two elements 1, 2 by creep deformation after press fitting can be prevented effectively. Besides, since reduction of the holding force can be restrained, the force required for press fitting need not be so high as in the prior art. Consequently, the operability in press fitting can be improved, and the possibility of appearance of a crack at the tubular section 13 of the reel driving member 2 can be reduced. Further, since the press fitting force can be restrained low, the change of the holding force in time can be extremely slowed down. In addition, where a plurality of projections are formed in a circumferentially spaced relationship on a shaft section of a drive shaft as in the embodiment shown, the torsional strength between the drive shaft and a reel driving member is increased, and accordingly a coupling of a higher reliability can be realized between the two parts.

It is to be noted that the present invention is

not limited to the specific embodiment described above. For example, while in the embodiment the projections are provided on the shaft section of the drive shaft, they may otherwise be provided on the inner periphery of the fitting hole of the tubular section of the reel driving member. Further, while in the embodiment the three circumferentially elongated projections are provided on a same circumferential line, a single circumferentially elongated projection may otherwise be provided.

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On the other hand, the present invention can be applied not only to such a reel shaft of a tape recorder but also to any apparatus which includes a rotary structural member wherein a rotary body and a rotary shaft are made of one or different synthetic resin materials and are coupled to each other by press fitting.

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As apparent from the foregoing description, according to the present invention, reduction of the holding force and the torsional strength between two parts due to creep deformation after press fitting of the two parts can be prevented due to the provision of projections on a fitting face of one of the two parts.

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Accordingly, the reliability in the coupling between the

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two parts can be improved, and the operability in press fitting can be improved with a low press fitting force.



CLAIMS:

1. A rotary structural member comprising a rotary shaft made of a synthetic resin material, and a rotary body made of the same or a different synthetic resin material having a fitting hole formed therein in which said rotary shaft is press fitted, at least one projection being provided either on an inner periphery of said fitting hole of said rotary body or on an outer periphery of said rotary shaft, wherein said projection is a circumferentially elongated rib having opposite ends circumferentially spaced from each other.

2. A rotary structural member as set forth in claim 1, wherein there are a plurality of projections provided in an equidistantly spaced and discontinued relationship in a circumferential direction from each other.

3. A rotary structural member substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.
