

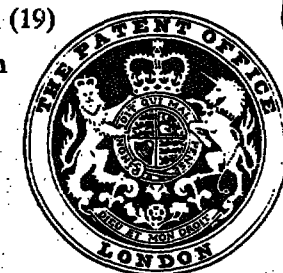
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(54) A SPINDLE ASSEMBLY FOR A TAPE RECORDER/PLAYER

(71) We, AUTOVOX S.p.A. an Italian company of 981 Via Salaria - 0199 Rome, Italy, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

The present invention relates to a spindle assembly for tape recorder/players.

Tape recorder/players are known in which the pulley wheel with the drive belt running in a peripheral groove is carried at the end of the spindle so that the pulley wheel can be located within the housing of the recorder/player. With this arrangement the spindle must be supported by a thrust bearing and this makes it necessary to dismantle the whole unit to obtain access to the pulley wheel and drive belt. Moreover the axial alignment of a small diameter spindle with a pulley wheel mounted on one end cannot be maintained by grooved spring rings.

An object of the present invention is to provide a spindle assembly comprising a shaft, pulley wheel and bearings which overcomes the disadvantages inherent in prior assemblies and which may be installed directly as a single unit ready for operation on the chassis or housing of the tape recorder/player. It also provides free access for the installation or replacement of the drive belt on the pulley wheel.

Accordingly the invention provides a spindle assembly for a tape recorder/player comprising a pulley wheel, a shaft and a bearing wherein said pulley wheel is fixedly mounted on one end of said shaft and is surmounted by said bearing arranged about said shaft, said pulley wheel being provided with a smooth surface adjacent said bearing and wherein a slip washer is interposed between said smooth surface and said bearing.

An embodiment of the invention is illustrated in the drawing which shows an

assembly according to the invention, in section.

In the drawing a shaft 11, which forms the spindle of the tape recorder/player is supported by a bearing 14 in a manner to be described hereinafter. A pulley wheel 12 is secured to the shaft 11 in any suitable manner, e.g. by radial clamping or bonding. A smoothed surface 15 is provided on the portion of pulley 12 adjacent to the bearing 14 and a slip washer 16 is interposed between surface 15 and bearing 14.

The bearing 14 is provided with an external body 13 which has on its upper part remote from the pulley wheel a threaded portion 17 adapted to receive a nut 18.

The lower part of the external body 13 is of larger diameter than the upper threaded part and has an upstanding annular rim 22 which abuts the recorder chassis or housing 19. Optionally the rim 22 may be provided with a key element to prevent rotation of body 13 on the chassis 19. When the nut 18 is screwed onto the part 17 the spindle assembly comprising shaft 11, pulley wheel 12 and bearing 14 is fixed in position on the chassis or housing 19.

Beyond the bearing element 13-14, a collar or sleeve 21 may be secured to the shaft 11 in any suitable manner so that during operation the collar 21 cooperates with the upper surface of the bearing 14 to form a thrust bearing. A slip washer 20 is interposed between the collar or sleeve 21 and the bearing 14.

When the spindle assembly is to be used in a tape recorder/player for music cassettes the collar or sleeve 21 may be tapered away from the bearing permitting the partial insertion of the spindle into the opening of the music cassette. The external diameter of the collar or sleeve should of course be such as to avoid scraping against the inner surface of the cassette in use. Also the height of the sleeve or collar must be such as to avoid

interference with the tape and/or the tape driving roller.

It is an important feature of the assembly according to the present embodiment that the internal diameter of the nut 18 should be larger than the external diameter of the shaft 11, sleeve 21 and washer 20 so that the nut 18 can hold the external body portion 13 of the bearing against the chassis or housing 19.

Thus the installation of the spindle assembly is very simple and the pulley wheel is readily accessible from the other side of the chassis or housing for the positioning of the driving belt.

If, as is preferred, the collar or sleeve 21 is bonded to the shaft 11, it is only necessary in case of breakdown to remove the nut 18 and the whole assembly of shaft 11, bearing 14 and the pulley wheel 12 can be removed and replaced. Thus repairs can be carried out with great rapidity and both production assembly and servicing are extremely simple.

The collar or sleeve 21 can be secured to the shaft 11 by means other than bonding. For example the collar may be a split conical shape which is suitably deformed prior to fitting and is held in position on the shaft either by friction or by the clamping action resulting from elastic restoration to the original shape.

Alternatively the collar 21 may be secured to the shaft 11 by forcing the inner surface of the collar to engage in and be retained by circumferential scoring previously provided on the shaft 11. A further possibility is to form the collar 21 and shaft 11 in one piece.

Thus with the embodiment described a spindle, pulley wheel, plain bearing and thrust bearing assembled as a prefabricated unit can be installed ready for use in tape recorder/players, including those for music cassettes, simply by tightening a nut.

The advantages of the present invention include the simplification of assembly line production and also of repair and replacement with a consequent reduction of production and maintenance costs.

WHAT WE CLAIM IS:-

1. A spindle assembly for a tape recorder/player comprising a pulley wheel, a shaft and a bearing wherein said pulley wheel is fixedly mounted on one end of said shaft and is surmounted by said bearing arranged about said shaft, said pulley wheel, being provided with a smooth surface adjacent to said bearing and wherein a slip washer is interposed between said smooth surface and said bearing.

2. A spindle assembly according to claim 1, wherein said bearing has an external body comprising a portion of greater diameter forming an abutment adapted to

engage the chassis or housing of the said tape recorder/player and an externally threaded portion of lesser diameter and a locking nut received on said threaded portion.

3. A spindle assembly according to claim 1 or 2, wherein a collar or sleeve provided on said shaft above said bearing acts a thrust bearing and wherein optionally a slip washer is interposed between said collar or sleeve and said bearing.

4. A spindle assembly according to claim 3, wherein said collar or sleeve is tapered away from said bearing to permit at least partial insertion of the shaft into a tape cassette.

5. A spindle assembly according to claim 3 or 4 wherein said collar or sleeve is axially secured to said shaft by bonding.

6. A spindle assembly according to claim 3 or 4, wherein said collar or sleeve is axially secured to said shaft by radial deformation of the internal surface of said collar or sleeve into circumferential scoring provided on said shaft.

7. A spindle assembly according to claim 3 or 4, wherein said collar or sleeve is split longitudinally and is secured to said shaft by inherent or induced spring action.

8. A spindle assembly according to any of claims 3 to 7, wherein said locking nut has an internal diameter greater than the external diameter of said thrust bearing and said slip washer.

9. A spindle assembly substantially as hereinbefore described and illustrated in the accompanying drawing.

HYDE, HEIDE & O'DONNELL
Chartered Patent Agents
2 Serjeants' Inn
LONDON EC4Y 1LL
Agents for the Applicants



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