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SHIFTABLE BELT DRIVE

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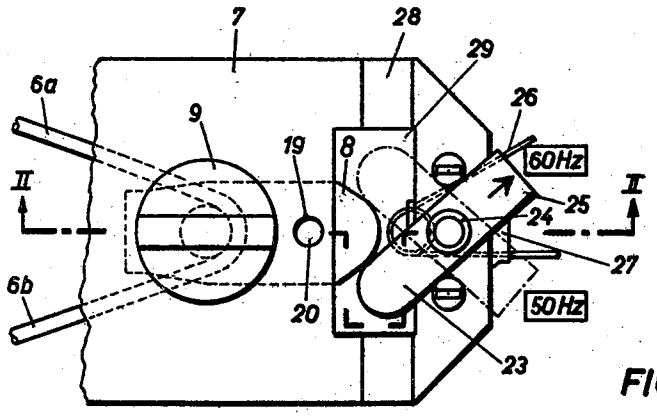


FIG. 1

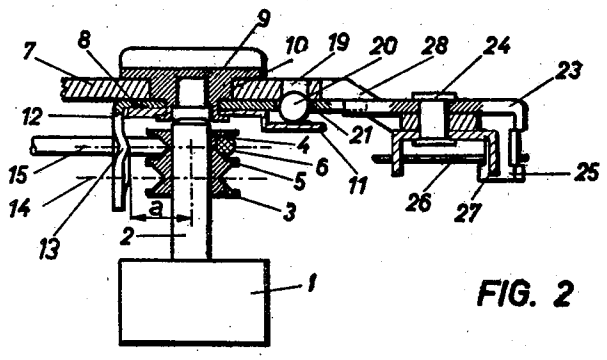


FIG. 2

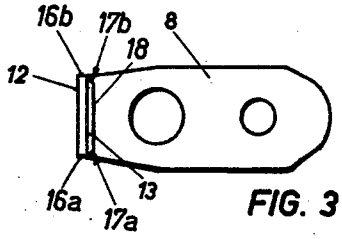


FIG. 3

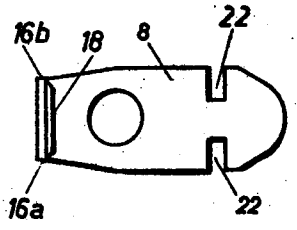


FIG. 6

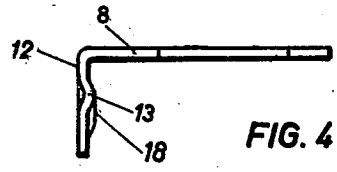


FIG. 4

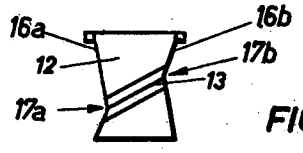


FIG. 5

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SHIFTABLE BELT DRIVE

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In apparatus for recording and/or reproducing sound and/or pictures belt drives are frequently utilized for transmitting the movement of one shaft to another. It is then often necessary for the transmission to be made switchable either for varying the rotational speed of the shaft to be driven, for example when driving the spindle of a magnetic recorder at several speeds, or for driving the shaft to be driven, for example that of the winding table through a sliding coupling, or through a rigid coupling.

According to the invention, for shifting an elastic belt on two coaxially-arranged pulleys, a reversing member is provided which can rotate about the shaft of the pulleys and which has a shaped member provided with two surfaces inclined to the running plane of the belt and laterally guiding the belt upon shifting same. In a preferred embodiment of the invention the reversing member is a lever in the form of a strip of sheet metal, one end of which is rectangularly bent to form a part substantially parallel to the shaft of the pulleys, which part is provided with a groove having an inclined position between the running planes of the belt, the two edges of the bent part of the lever preferably having shallow cuts merging into the groove. The reversing member has preferably associated with it a locking member which marks a position (or positions) of the reversing member in which the belt moves freely along it and which allows the reversing member to be moved out of this position (or these positions) only with alternately opposite directions of rotation. In a further embodiment of the arrangement, the locking member is formed by a pivotal lever adapted to be driven from both sides by the reversing member upon rotation thereof and having two extreme positions determined by abutments, said pivotal lever co-acting with a spring determining the central position of the same, said central position being located approximately in the plane of symmetry of the portion of the belt running over the pulleys. The distance between the pivotal axis of the pivotal lever and the axis of the shaft of the pulleys, as well as the positions of the abutments for the pivotal lever permits the pivotal lever to be moved from one extreme position to the other when rotating the reversing member a full revolution. Indicia marks are preferably provided to indicate which of the two co-axially arranged pulleys carries the belt when the reversing member occupies one of the extreme positions determined by the locking member. The arrangement according to the invention can be provided in a very efficacious manner in an apparatus for recording and/or reproducing sound and/or pictures, comprising a record-carrier and driving means for this carrier, which is driven from the shaft of a driving motor through a belt. In this case, the two pulleys are arranged on the shaft of said driving motor and have diameters in inverse relationship to their number of revolutions, thereby obtaining uniform speed of said record carrier if said motor, the number of revolutions of which is dependent upon the frequency of the mains to which it is connected, is used on mains of different frequencies.

An arrangement according to the present invention excels by simplicity and compactness. Furthermore it affords the very special advantage that the belt may be shifted when the drive is at rest. Therefore the apparatus may be switched to the desired kind of operation prior to switching on of the apparatus and it will be possible for the operator readily to determine the kind of operation just adjusted by making provision of a simple indication.

In order that the invention may be readily carried into effect, it will now be described in detail, by way of example, with reference to the accompanying diagrammatic drawing relating to a magnetic recorder in which the spindle provided with a centrifugal mass and driving the sound carrier is driven in known manner from the shaft of a driving motor through an elastic belt and which may be used on mains having frequencies of 50 c./s. and 60 c./s. at uniform speed of the sound carrier.

FIGURE 1 is a plan view of an arrangement according to the invention.

FIGURE 2 is a sectional view thereof taken along the line II—II in FIGURE 1.

FIGURES 3, 4 and 5 show views in front and in side elevation, respectively, of a lever used in the arrangement of FIGURES 1 and 2.

FIGURE 6 shows a further embodiment of such a lever.

An electric motor **1**, which is of the induction motor type and proportioned for connection to mains of 50 c./s. and 60 c./s. is rigidly secured to the chassis of an apparatus (not shown). Its rotational speed is substantially proportional to the frequency of the mains and its shaft **2** carries two pulleys **3** and **4**. The beaded edge **5** is common to the two pulleys. The diameters of the pulleys are in inverse relationship to the rotational speed of the motor at the mains frequencies of 50 c./s. and 60 c./s. An elastic belt **6** transmits the rotation of shaft **2** to a centrifugal mass and driving spindle, not shown. A lever **8** acting as a reversing member is journalled in a carrier plate **7** to be rotatable co-axially with the shaft **2**. To this end, the lever **8** is secured in a rivet **9** rotatably arranged in an aperture **10** of carrier plate **7**. The rivet **9** is slotted as the head of a screw to permit it to be turned with the aid of a piece of tool, for example a coin. As a matter of fact, other kinds of bearings and other operating members are also usable. A spring plate **11** is fixed, together with the lever **8**, on the rivet **9**. (The meaning thereof will be explained hereinafter.) One extremity of lever **8** is bent rectangularly and thus forms a part **12** substantially parallel to the pulley shaft **2**. The part **12** has a groove **13** which extends in inclined position between the running planes **14** and **15** of the belt. The edges **16***a* and **16***b* of part **12** are provided with shallow cuts **17***a* and **17***b* which merge into groove **13**, thus making the groove extend to a certain degree further in the edges **16***a* and **16***b* as the cuts **17***a* and **17***b* have their tops situated at the groove **13**. These lateral shallow cuts may be omitted, under certain conditions, but assist the groove in its function and render it unnecessary to adhere to severe tolerances. From the requirement for the groove **13** in part **12** to have an inclined position between the running planes **14** and **15** of the belt determined by the pulleys **3** and **4**, it follows automatically that the internal distance *a* between the inner surface **18** of the angularly-bent part **12** of the lever **8** and its axis of rotation must be larger than the largest of the pulleys. Said distance will be maintained as small as possible, since optimum conditions for shifting the belt result therefrom.

The operation of the shifting the belt over the pulleys will now be described in detail. FIGURE 2 shows the belt located on the pulley **4** and thus in the running plane **15** of the belt. Since the groove of pulley **4** has the smaller diameter and thus corresponds to the higher rotational speed of the motor, the device is switched to 60 c./s. When the lever **8** is turned in a direction

such that its edge 17*b* engages the belt portion 6*b*, thus in the counter-clockwise direction in FIGURE 1, the edge 17*b* first lifts the belt portion 6*b* out of the groove of pulley 4, whereby the distance between the belt and the axis of shaft 2 becomes larger than the radius of the common beaded edge 5. Upon further rotation, the belt portion 6*b* settles in the groove 13 and is guided by it into the running plane 14 associated with pulley 3 until it eventually lies in the groove of pulley 3 itself. When the lever at last releases the belt portion 6*a*, which requires substantially a full revolution of the lever in the example shown, the switching operation to 50 c./s. is terminated. For switching back to 60 c./s. it is necessary to turn in the opposite direction. If, when starting from the position shown, lever 8 would have been turned in the wrong direction and thus in the clockwise direction, the belt would not have been shifted. Alternate directions of rotation are required for alternate switchings.

During operation of the device the lever 8 may, of course, be left only in a position in which both belt portions 6*a* and 6*b* freely move along it. In the example shown, this position is marked by a rest formed by an aperture 19 in carrier plate 7 and a ball 20 which is held in an aperture 21 of the lever by spring 11. The direction of rotation required for carrying out a switching operation is not determined by the said rest position. Marking could be provided in the form of arrows. However, the rest position at any rate locks the lever 8 in a position in which it does not make contact with the belt, so that damage during operation of the device is avoided.

In order that the lever 8 may always be rotated only in the correct direction, it is necessary to provide a locking member which not only marks the positions of the reversing member in which the belt passes freely, but which also guarantees that the reversing member can be moved out of these positions only with alternately opposite directions of rotation. In fact, the belt once having been laid in the pulley associated with a given direction of rotation, namely in such a manner that upon rotation of the lever at first that edge of the lever contacts the belt which is engaged by the end of the groove in the running plane of the belt, this arrangement is also correct for the opposite direction of rotation. In the simplest case the locking member may be in the form of a stop, for example a lug, which is bent downwards out of carrier plate 7 at the aperture 19 and co-acts with notches 22 in lever 8 (FIGURE 6). The lever 8 can be moved from one stop to the next only with alternately opposite directions of rotation. However, the lever 8 cannot then rotate through the full 360° and the space available between the belt ends 6*a* and 6*b* is often, as in the example shown, not sufficient for the belt to pass freely in the two extreme positions of the lever.

A locking member is therefore provided in the embodiment shown which is formed by a lever 23 pivotally journalled on the upper side of carrier plate 7 by means of a hollow rivet 24. A lug 25 bent downwards determines two extreme swing positions by abutting the carrier plate 7. The lug 25 is embraced by a fork-shaped spring 26 arranged by means of a cross-shaped carrier 27, likewise held by the hollow rivet 24 and locked against rotation, so that it always tends to move lever 23 to its central position between the two swing positions. This central position lies in the plane of symmetry of the two portions 6*a* and 6*b* of the revolving belt. The distance between the swing axis of lever 23 and the axis of shaft 2 and the swing positions of lever 23 determined by the abutting of lug 25, together with the dimensions of the lever, are so chosen that a full revolution may be made by lever 8 between the two swing positions of lever 23. In order that the levers 8 and 23 may be co-planar the carrier plate is slightly pressed through

(28) and provided with an aperture 29. When starting from the situation shown in FIGURE 1, the lever 8 can start only a rotation in the counter-clockwise direction and thus the rotation which, as previously explained, is necessary for switching from 60 c./s. to 50 c./s. Lever 23 follows lever 8 until it is held at its central position by spring 26. From this position the lever 8 upon turning further may take it along again until the other swing position is reached, whereafter further rotation of lever 8 is braked. A renewed rotation of lever 8 can take place only in the opposite direction, which implies switching back from 50 c./s. to 60 c./s. The rest position formed by the ball 20 serves, as previously mentioned, in the first place to prevent an inadvertent displacement of lever 8 or a displacement thereof brought about by the pressure of spring 26.

One extreme position of lever 23 corresponds to 50 c./s. and the other to 60 c./s. being switching on. The lever 23 may thus serve directly as an index pointing to the indicia marks provided on the device, as shown in FIGURE 1. As a matter of fact, it is also possible to provide lever 23 with label indicating the two frequencies and to make either of them appear in a viewing aperture as a function of the instantaneous position of the lever. Providing marks neither causes difficulty when using an abutment as a barrier.

Modifications are still possible within the scope of the invention.

What is claimed is:

1. A shiftable belt drive comprising two co-axially arranged pulleys fixed on a common shaft and a shifting lever rotatable about said shaft having one end thereof bent to form a surface extending substantially parallel to the longitudinal axis of said shaft, said surface being provided with an inclined groove relative to the planes of said pulleys, said groove laterally shifting said belt from one pulley to the other of said pulleys.

2. A shiftable belt drive comprising two co-axially arranged pulleys fixed on a common shaft, a shifting lever rotatable about said shaft and having one end thereof bent to form a surface extending parallel to the longitudinal axis of said shaft, said surface being provided with two surfaces inclined relative to the planes of the pulleys, said surfaces laterally shifting said belt from one pulley to the other of said pulleys, and a locking member for said shifting lever having a predetermined marked position in which the belt moves freely, said locking member permitting said shifting lever to move out of said position in alternate opposite directions of rotation.

3. A shiftable belt drive as claimed in claim 2 wherein said locking member is provided with a pivotal lever adapted to be driven from both sides by said shifting lever upon rotation thereof, said locking member having abutments thereon which determine the two extreme positions thereof, the distance between the pivotal axis of the pivotal lever and the axis of the shaft of said pulleys together with the positions of the abutments for the pivotal lever permitting the pivotal lever to be moved from one extreme position to the other when rotating the shifting lever a full revolution.

4. A shiftable belt drive as claimed in claim 3 further comprising indicia thereon to indicate which of the two co-axially arranged pulleys is provided with the belt when said shifting lever occupies one of the extreme positions determined by the locking member.

5. A shiftable belt drive as claimed in claim 1 wherein each of said pulleys on said common shaft has a different diameter that is in inverse relationship to the number of revolutions per minute performed by each pulley.

References Cited in the file of this patent

Grundig: German application, 1,041,756, printed October 23, 1958 (kl. 47h 15).