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W. SCHEPPMANN
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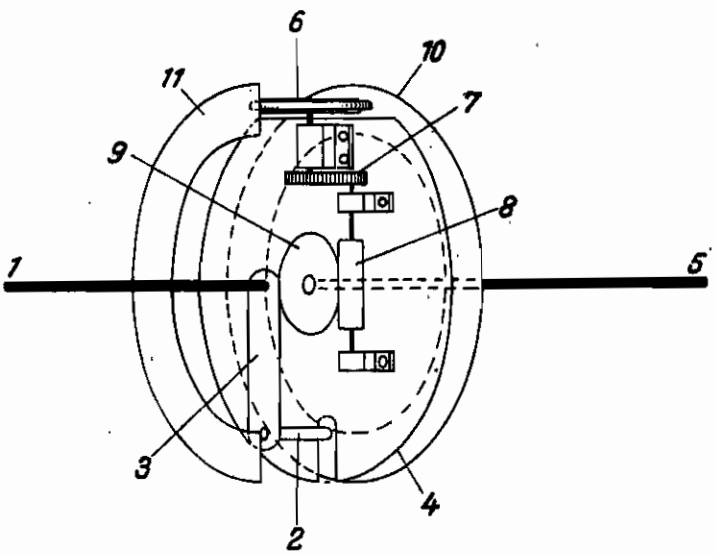

Inventor:
Wilhelm Scheppmann
by E. O'Shea
Attorney.

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MECHANICAL SYNCHRONIZING DEVICES

Wilhelm Scheppmann, Berlin, Germany; vested in the Alien Property Custodian

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The present invention relates to mechanical synchronizing devices or coupling means for maintaining synchronism between two rotating shafts, in which also the relative phase relation between the two shafts may arbitrarily be adjusted.

Requirements frequently arise, for example, in picture transmitting devices, high-speed telegraph systems and the like, to secure in addition to a perfect synchronous relation between the transmitting and receiving shaft, respectively, a correct phase relation between these shafts. Several different systems are known in the art which enable synchronism to be established between a plurality of rotatable shafts and in which the correct phase relation may be obtained with respect to a reference or control shaft. According to one of these known systems there is used a driving device comprising a stator which is provided with synchronizing windings, whereby this stator is subjected to an angular shift with respect to the armature or rotor of this driving device until the correct phase relation is obtained. This method is a pure electrical one and encounters certain constructive disadvantages which will be obvious by bearing in mind the particular and complicated design of such driving device, since all connections to the stator windings must be established over slip-rings and, moreover, that special bearings are necessary in order to render the stator rotatable about the axis of the rotor.

These drawbacks are eliminated according to the present invention by the provision of a pure mechanical synchronizing or coupling device, wherein a worm-gear fixedly attached to a member of this device is caused to circulate around the axis of the driving shaft, thereby simultaneously acting as the rotary motion transmitting means and as the adjustable member capable of varying the angular or phase relation between the driving and the driven shaft in accordance with the instantaneous requirements. Normally, that is, when the driving and the driven shaft rotate synchronously, the rotary movement of the former is transmitted to the driven shaft through the agency of the worm-gear, whereby the worm and the worm-wheel of this gear means are immobile with respect to one another; if, however, the angular or phase relation between the driving and the driven shaft should be changed, the worm is caused to rotate either in the one or in the other direction depending upon the desirability to cause the driven shaft to lead or to lag with respect to the driving shaft. It is thus possible arbitrarily and uniformly to vary the angular relation of the two shafts either in a positive or in a negative sense.

The aforementioned objects of the invention will be apparent from the following description taken in conjunction with the accompanying drawing, the single figure of which is a perspective diagrammatical representation of the invention.

In the figure, reference numeral 1 denotes a driving shaft, the rotation of which is synchronous with respect to that of a given reference axis, this shaft 1 carries at its outer end a fixedly secured arm 3 to which is attached a driving pin 2. This pin engages a slot in a disc-shaped member 4 rotatably mounted on the driven shaft 5, so that this member exactly follows the rotational movement of the shaft 1. The disc-shaped member 4 carries gearing means comprising a driving wheel 6 and toothed wheel gearings 7. The driving gear and the wheel 6 are fixed on an axis common thereto and rotatably mounted in a bearing which is fixedly attached to the disc member 4, while the driven gear is mounted on the axis of a worm 8. This worm which is likewise rotatably mounted in a bearing fixed in the disc-shaped member 4 engages a worm-wheel 8 secured to the end of the driven shaft 5. It is thus obvious that the driving shaft 1 drives the shaft 5 through the agency of its arm 3, the pin 2, the disc 4, the worm 8 which is fixed to this disc, and the worm-wheel which is secured to the shaft 5, and that the shaft 5 rotates synchronously with the driving shaft 1.

If, however, the angular relation of the driving shaft with respect to the driven shaft should be changed in a leading or lagging sense, this may be accomplished during operation by turning the axis of the worm 8 of the worm-gear either in the one or the other direction. Such rotational movement imparted to the worm turns the worm-wheel either in a clockwise or anti-clockwise sense with respect to the disc-shaped member 4, whereby the magnitude of this angular shift depends upon the pitch of the worm-gearing and the speed with which the worm is rotated.

In order to effect this angular shift between the two shafts 1 and 5, the driving wheel 6 is provided for imparting rotation to the worm through the toothed wheel-gearing 7. For this purpose, annular discs 10 and/or 11 are provided on either side of the disc-shaped member 4 and hence on either side of the driving wheel 6 in order to obtain rolling surfaces for the wheel 6. These annular discs are axially movable and

spaced apart at such a distance that at any instant only one thereof may be brought in engagement with the driving wheel 6. When it is desirable to introduce an angular shift between the driving and the driven shaft, either of these annular discs 10 and 11 is moved manually, electrically or mechanically into engagement with the driving wheel 6 with the result that this wheel is caused to rotate and to turn the worm 6 through the gear means 7. Depending upon which of these annular discs is brought into engagement with the wheel 6, the driven shaft 5 is caused to lead or to lag with respect to the driving shaft 1. As soon as the correct phase or angular relation is obtained between the two shafts, the annular disc in question is again withdrawn from the wheel 6.

WILHELM SCHEPPMANN.