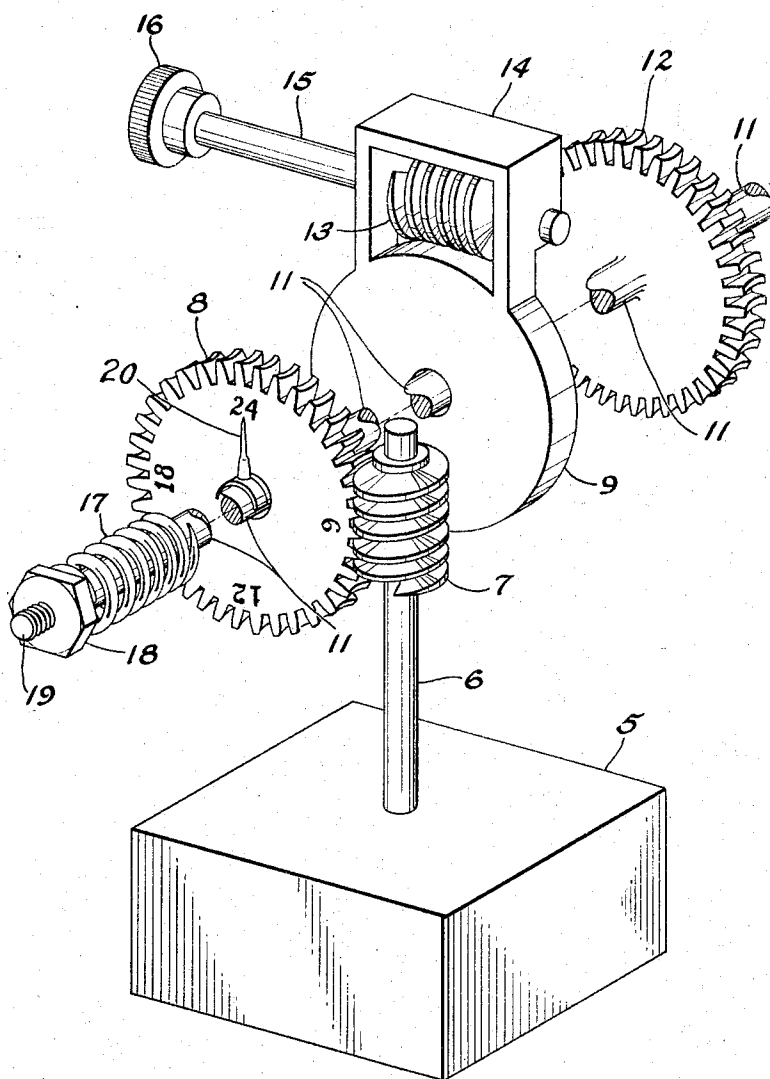


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DIFFERENTIAL MECHANISM

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DIFFERENTIAL MECHANISM

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5 Claims. (Cl. 74-724)

This invention relates to gear mechanisms or systems and more particularly to such mechanisms which can provide a plurality of functions in a compact manner.

This invention is a gear mechanism which provides the functions of a continuous drive at a prescribed rate, a fine differential correction, and a slewing correction. Prior gear mechanisms have provided selective ones of these three functions but have generally been both bulky and costly. This mechanism is economical to construct, is compact in its construction, and yet provides all three of these functions within itself.

An object of this invention is to provide a gear mechanism with a differential correction means. It is a further object of this invention to provide a gear mechanism which has no feedback from the differential correction means to the driving means. A still further object of this invention is to provide a gear mechanism with a clutch arrangement which permits the output shaft to be slewed without affecting the operation of the driving means. Yet another object of this invention is to provide a gear mechanism which permits the output shaft to be slewed without disconnecting the fine differential correction mechanism. Still another object of this invention is to provide a gear mechanism whereby a continuous drive from a motive power source is applied to an output shaft at a uniform rate with a minimum of backlash when correction is applied.

These and other objects of this invention will become apparent when the following description is read in conjunction with the accompanying drawing, in which the single figure is an isometric representation of one embodiment of this invention.

Referring now to the drawing, a source of motive power and a gear train of a desired nature are enclosed in the housing 5. This source of motive power and the gear train are not depicted in particularity because they do not form a part of the invention and any one of a number of commercially available means may be used to provide the desired functions.

In the one embodiment of this invention which was caused to be constructed, the motive power applied through the gear train in the housing 5 is the output of a clock mechanism. This invention is utilized in the particular embodiment to drive a telescope attached to the output shaft. This telescope is rotated at a predetermined rate in order to maintain its pointing at a predetermined or desired celestial body.

The clock mechanism or the motive power mechanism and the gear train in housing 5 rotates the output shaft 6 at a constant rate. This rate, as is obvious, is determined by the clock and gear mechanism. Affixed to one end of shaft 6 is worm 7. Meshed with worm 7 is worm gear or wheel 8. Worm gear 8 and plate 9 are rotatably mounted on shaft 11. Gear 12, however, is affixed to shaft 11. Meshed with gear 12 and mounted in cage 14 is worm 13. Cage 14 is attached to and offset from plate 9. The offset from plate 9 is sufficient

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to permit the meshing of gear 12 and worm 13. Worm 13 is affixed to one end of shaft 15 which has a control means or knurled knob 16 affixed to the other end of shaft 15. The coupling means for this gear mechanism includes worm gear 8 and plate 9 which are spring loaded in a clutch arrangement against gear 12. The spring loading of gear 8 and plate 9 is the resultant of the action of spring 17 which is held on shaft 11 by nut 18 on threads 19 of shaft 11. The movement of nut 18 on shaft 11 will provide a variable spring loading pressure between worm gear 8 and plate 9.

In operation, worm gear 8 is rotated by worm 7 at a constant rate due to the clock and gear mechanisms described above. Rotation of worm gear 8 by worm 7 rotates gear 12 due to the spring loading action described above. Rotation of gear 12 turns an extension of the shaft 11 which is attached to gear 12. This extension of shaft 11 in the embodiment which was caused to be constructed is attached to a telescopic device. The slewing action, previously described, is the result of positioning the output shaft including the telescopic device to point at a desired celestial body. The slewing motion normally results from a rapid movement of the extension of shaft 11 by the application of an external force, namely, being pushed by the observer. If the telescopic device should vary from observing the desired celestial body in its tracking function due to some slight error in the clock mechanism or due to an apparent fluctuation in the rotation of the earth which cannot be accounted for in the clock mechanism, a small differential correction may be inserted by rotating the knob 16 and the shaft 15. This differential correction is applied to the output shaft without disturbing the original drive rate as it emanates from the clock mechanism. It is obvious that the input drive on shaft 6 is not affected by the slewing action on output gear 12. The differential correction action obviously is applied only to the gear 12 and thence to output shaft 11 and thereby does not affect the input driving mechanism.

In the particular embodiment of this invention which was caused to be constructed, worm gear 8 rotates once every 23 hours, 56 minutes, .091 second (mean solar time). Any desired corrections to the time shown on the face of worm gear 8 may be corrected by moving point 20 about shaft 11. Pointer 20 is normally rotated with shaft 11 but due to its spring mounting may be manually moved to any desired position with respect to the face of worm gear 8.

Although this invention has been described with respect to a particular embodiment thereof, it is not to be so limited as changes and modifications may be made therein which are within the full intended scope of the invention as defined by the appended claims.

What is claimed is:

1. A gear system comprising a source of motive power, a first worm gearing, an output shaft, a plate, a second worm gearing, said plate rotatably mounted between said first worm gearing and said second worm gearing on said shaft, and spring means holding the plate and said worm gearings in contact with each other whereby said second worm gearing may rotate the shaft without reacting on said first worm gearing.

2. A gear system comprising a source of motive power, a first worm gearing comprising a worm and a worm gear, said first worm connected to said source of motive power, an output shaft, said first worm gear rotatably mounted on said output shaft, a plate rotatably mounted on said shaft, a second worm gearing comprising a worm and a worm gear, said second worm gear attached to said output shaft, spring means holding the plate and said worm gears of said worm gearings in contact with each other

whereby said first worm normally drives said output shaft but said output shaft may be rotated by said second worm without affecting the drive of said first worm.

3. A gear system comprising a source of motive power, a first worm gearing comprising a worm and a worm gear, said first worm connected to said source of motive power, an output shaft, said first worm gear rotatably mounted on said output shaft, a plate rotatably mounted on said shaft, said plate including a cage mounted thereon and offset from said plate, a second worm gearing comprising a worm and a worm gear, said second worm gear attached to said output shaft, spring means holding the plate and said worm gears of said worm gearings in contact with each other whereby said first worm normally drives said output shaft but said output shaft may be rotated by said second worm without affecting the drive of said first worm.

4. A gear system comprising a source of motive power, a first worm gearing comprising a worm and a worm gear, said first worm connected to said source of motive power, an output shaft, said first worm gear rotatably mounted on said output shaft, a plate rotatably mounted on said shaft, said plate including a cage mounted thereon and offset from said plate, a second worm gearing comprising a worm and a worm gear, said second worm rotatably mounted in said cage whereby said second worm meshes with said worm gear, said worm gear attached to said output shaft, spring means holding the

plate and said worm gears of said worm gearings in contact with each other whereby said first worm normally drives said output shaft but said output shaft may be rotated by said second worm without affecting the drive of said first worm.

5. A gear system comprising a source of motive power, a first worm gearing comprising a worm and a worm gear, said first worm connected to said source of motive power, an output shaft, said first worm gear rotatably mounted on said output shaft, a plate rotatably mounted on said shaft, said plate including a cage mounted thereon and offset from said plate, a second worm gearing comprising a worm and a worm gear, said second worm mounted in said cage whereby said second worm rotates in said cage and meshes with said second worm gear, said second worm gear attached to said output shaft, a spring member mounted on said shaft, said spring means holding the plate and said worm gears of said worm gearings in contact with each other whereby said first worm normally drives said output shaft but said output shaft may be rotated by said second worm without affecting the drive of said first worm.

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