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DOUBLE WORM PAIR REDUCTION

HP INC

Double Worm Pair Reduction

Abstract: A worm gear arrangement is disclosed in which the central idlers mate with a hex feature to transmit torque. A secondary worm reduction is directly coupled to the primary worm reduction to re-align (untwist) the torque direction so as to make it possible to drive parallel shafts in a minimal space.

This disclosure relates to the field of mechanics.

A worm gear arrangement is disclosed in which the central idlers mate with a hex feature to transmit torque.

It is desirably in many mechanical systems to provide a gear arrangement that can achieve a substantial speed reduction in minimal space across parallel shafts - inexpensively, with few parts, providing ease of assembly and quiet operation.

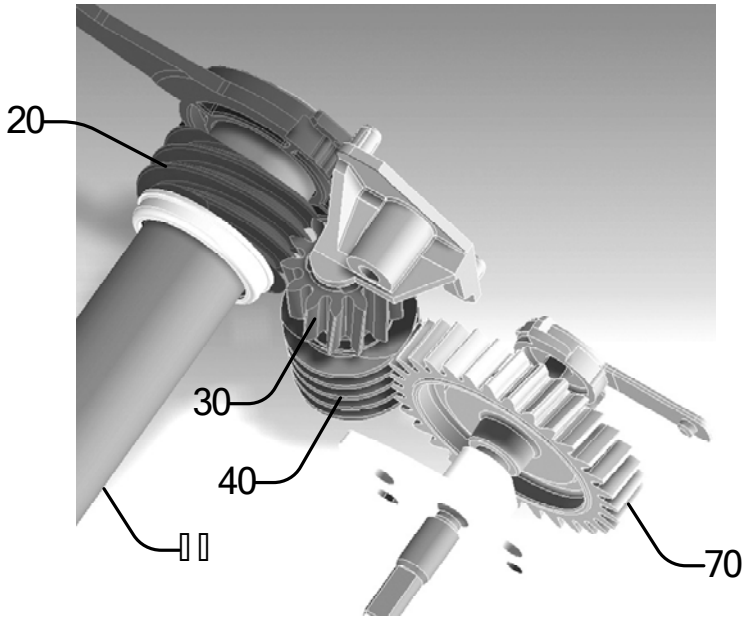
Conventional methods are typically inadequate. Using a gear train of compound spur gears uses too much space, requires many parts to achieve the desired reduction, difficult to assemble, costly, creates unbalanced gear tooth loading resulting in broken teeth. Using a one-way clutch to engage rotation on the output shaft only when the input shaft was incrementally reversed is difficult to assemble, uses expensive parts, and the reversals of the input shaft shorten the motor life and require higher belt tension on the input shaft. A single worm gear reduction is inadequate because the input shaft and output shaft must be on different axis (i.e the input is typically 90 degrees to the output, and thus is not suitable for parallel shafts).

According to the present disclosure, and as understood with reference to the Figure, a secondary worm reduction is directly coupled to the primary worm reduction to re-align (untwist) the torque direction so as to make it possible to drive parallel shafts in a minimal space.

The input shaft 10 has mounted an input worm gear 20 driving a helical idler gear 30. This is the first stage of reduction. The helical idler gear 30 is directly coupled to an idler worm gear 40 by a feature to transmit torque (in this case, a hexagonal plug 50 and socket 60). This idler worm gear 40 then drives the output helical gear 70. This is the second stage of reduction.

The disclosed design advantageously achieves a substantial speed reduction in minimal space across parallel shafts. It does so with few parts, inexpensively, with ease of assembly, quietly, and robustly.

Disclosed by Asa Weiss, HP Inc.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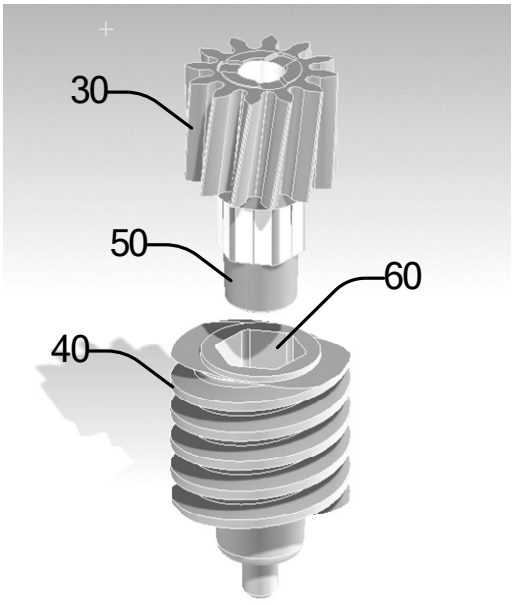
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