

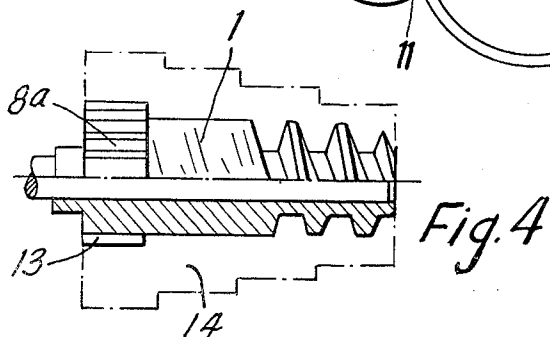
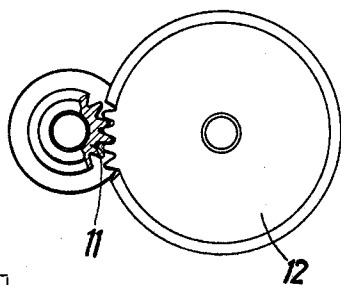
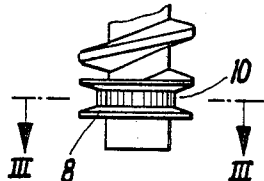
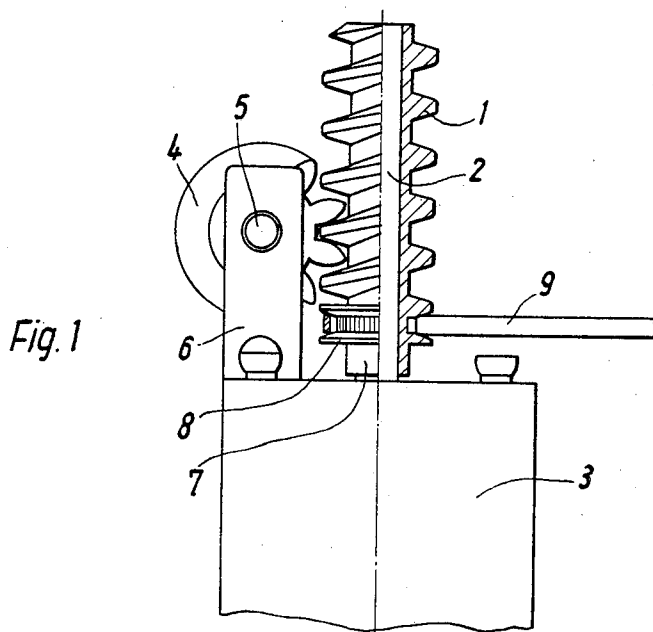
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TOY ERECTION KIT

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TOY ERECTION KIT

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10 Claims

ABSTRACT OF THE DISCLOSURE

A toy erection kit which includes an elongated worm gear having spaced axial end portions at least one of which is provided with a torque-transmitting portion, such as an annulus of gear teeth surrounding the axis of rotation of the worm gear, so that torque may be transmitted to or received from another element of the toy erection kit via the torque-transmitting portion.

BACKGROUND OF THE INVENTION

The present invention relates to toy erection kits, and more particularly to a gear member for use in such toy erection kits. Still more specifically the present invention relates to a worm gear for use in toy erection kits.

It is known to provide toy erection kits with various gears by means of which the child using the kit may construct operating models of vehicles, machines and the like. Frequently, such gear arrangements comprise a worm-gear drive, for instance when the relatively high number of rotations per minute of the output shaft of an electric motor must be reduced to a lower number of rotations for the actual operation of the model. Heretofore such worm gears have been capable of fulfilling only their most elementary function, namely to be driven by a prime mover and to reduce the output speed of the prime mover for transmittal to the input shaft of a model. It is advantageous, however, if such worm gears can be utilized in other ways because this evidently will enhance their versatility—and thereby the versatility of the erection kit—while at the same time reducing the complexity and expense of the erection kit.

For instance, it is advantageous that the worm gear be capable of cooperatively engaging with other gears, either by direct engagement or by indirect engagement via a drive belt or the like. Thus, it becomes possible to transmit torque to or receive torque from the worm gear rather than having the latter be directly coupled with and driven by the prime mover. On the other hand it is clear that, even if the worm gear is driven directly by a prime mover, such an arrangement as proposed herein will be advantageous because frequently a single prime mover is intended to drive two or more separate models or elements of a model wherein it is necessary that one model be driven at a rotational speed significantly lower than the output speed of the prime mover whereas it is desired that the other model be driven at a higher speed which may perhaps approach the output speed of the prime mover.

It is therefore a general object of the present invention to provide a construction possessed of the aforementioned advantages.

SUMMARY OF THE INVENTION

In accordance with one feature of my invention, I provide, in a toy erection kit, an elongated gear member mounted for rotation about its axis and having spaced axial end portions. At least one of these end portions is constructed and arranged for torque-transmitting cooperation with another element so as to enable transmitting

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of torque from the gear member to or receiving of torque from the other element.

This gear member, that is the worm gear, may be constructed in such a manner that the one end portion may be configured as a flange or disc having on its peripheral edge face a recessed groove in which a drive belt or similar instrumentality is received which can cooperate with the aforementioned other element. Again, the groove may be provided on its side walls or its bottom wall, or on both, with an annulus of gear teeth which can matingly engage with the teeth of another gear positioned so as to permit such arrangement. The end portion may be separate and be suitably secured to the remainder of the worm gear, but advantageously it will be of one-piece construction with the same.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a somewhat schematic illustration of a transmission arrangement utilizing a worm gear constructed in accordance with the present invention, the worm gear being partly shown in longitudinal section;

FIG. 2 is a detail view of FIG. 1;

FIG. 3 is a section taken on the line III—III of FIG. 2; and

FIG. 4 is a further detail view, in fragmentary illustration, of a worm gear embodying a further feature of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing now the drawing in detail, and firstly FIGS. 1-3 thereof, it will be seen that reference numeral 1 identifies a worm gear which is mounted on a shaft 2 so that torque can be transmitted from the shaft 2 to the worm gear 1. Reference numeral 3 identifies schematically a prime mover, for instance an electromotor or the like, and it will be understood that the shaft 2 may be the output shaft of the prime mover 3, or may be coupled in suitable manner with this output shaft. A worm wheel 4 is mounted on a shaft 5 about which it rotates and which in turn is supported in a housing 6 connected in suitable manner with the prime mover 3. The worm wheel 4 is in engagement with the worm gear 1.

In accordance with the invention one end portion of the worm gear 1, namely the one adjacent the prime mover 3 in the illustrated embodiment, is provided with or configured as a torque-transmitting portion 8. In the illustrated embodiment this portion 8 is of one-piece construction with the remainder of the worm gear 1, and is configured as a disc or flange being provided in its peripheral edge face with a radially inwardly extending recess of annular configuration so that a drive belt or analogous member can be trained about the portion 8 in the annular recess. Such drive belt is identified with reference numeral 9 and it will be understood that by this connection torque can be transmitted from the worm gear 1 to another, non-illustrated element. Conversely it is of course clear that, should the worm gear not be covered with the output shaft of a prime mover, torque can be transmitted from such non-illustrated other element to the worm gear if desired.

FIGS. 2 and 3 illustrate that in this embodiment the portion 8 is constructed as a disc or flange, as already pointed out, and that the peripheral groove is identified

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with reference numeral 10. While it will be appreciated that the side walls and the bottom wall bounding this groove 10 may be smooth, it will be seen that in the illustrated embodiment the bottom wall is provided with an annulus of teeth 11, thus making it possible to utilize the portion 8 not only in conjunction with the drive belt or analogous element, but in conjunction with another gear, such as the one identified with reference numeral 12, which in FIG. 3 is shown in engagement with the teeth 11 of the portion 8 provided on the worm gear 1. Again, torque of course be transmitted to or from the worm gear 1 in this manner.

FIG. 4 illustrates how this construction can be made still more versatile by providing the end portion 8a, as it is designated in FIG. 4, with a plurality of gear teeth 13 which extend radially beyond the teeth of the worm gear 1. This makes it possible for these gear teeth 13 to cooperatively engage with the corresponding gear teeth of a transmission member 14 which is shown in phantom lines and which is supported and guided on the worm gear 1, simply by being slipped over the same. Engagement of the gear teeth 13 with those of the element 14 couples the latter with the worm gear 1 in torque-transmitting relationship, as will be appreciated.

This construction is of particular advantage if the worm gear 1 is directly secured to the output shaft of a prime mover. It has been found that the small diameter of such output shafts as are provided on the type of prime mover used in toy construction kits makes it impractical or impossible to releasably connect the worm gear in many instances with the output shaft. Thus, in many cases the worm gear must be permanently connected with the output shaft, for instance by press fitting or in similar manner. Resorting to the embodiment of FIG. 4 makes it possible, in such circumstances, not only to non-releasably connect the worm gear with the output shaft of the prime mover but still to use the prime mover for driving other components despite the fact that access to the output shaft cannot be had directly. This is simply accomplished, as pointed out in FIG. 4, by having a member such as the element 14 so configured that the element can be slipped over the worm gear from the free end thereof until the inner teeth in the member 14 engage with the teeth 13 of the portion 8a so that the member 14 is coupled with the worm gear in torque-transmitting relationship. Of course it will be appreciated that the member 14 may in turn be configured so that it can drive a transmission belt or analogous element, or engage with the teeth of further gears. The member 14 is, of course, guided by and on the worm gear 1 in this arrangement.

Needless to say, various different materials may be utilized for constructing the worm gear 1 as well as the various other members and elements discussed herein. I have found it advantageous to use synthetic plastic material but I wish it understood that this is mentioned herein by way of example only and that other materials are also suitable.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a toy erection kit, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention,

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Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. In a toy erection kit, a drive arrangement comprising a prime mover having a rotatable output shaft; and a worm gear fixed to said output shaft coaxially therewith for rotation with the same about its longitudinal axis, said worm gear having spaced axial end portions at least one of which is provided with a peripheral groove surrounding said one end portion and adapted to receive belt means trained about the latter.

2. In a toy construction kit as defined in claim 1, wherein said one end portion and the remainder of said worm gear together are of one-piece construction.

3. In a toy construction kit as defined in claim 1, wherein said one end portion is a peripherally grooved disc.

4. In a toy construction kit as defined in claim 1, said one end portion being a disc provided with said peripheral groove bounded by bottom wall means and side wall means, at least one of said wall means being provided with an annulus of gear teeth adapted for cooperative engagement with similar teeth on another member.

5. In a toy construction kit as defined in claim 1, wherein said one end portion is provided with an annulus of gear teeth surrounding the axis of said worm gear.

6. In a toy construction kit as defined in claim 5, wherein said annulus of gear teeth is concentric with the axis of said worm gear.

7. In a toy construction kit as defined in claim 6, wherein said worm gear comprises a plurality of primary teeth, and wherein said annulus of teeth is constituted by secondary teeth, said secondary teeth projecting radially beyond said primary teeth.

8. In a toy construction kit as defined in claim 1, wherein said worm gear is made from synthetic plastic material.

9. In a toy erection kit, an elongated worm gear mounted for rotation about its axis and having spaced axial end portions at least one of which is configured as a disc provided with a peripheral groove bounded by bottom wall means and side wall means, at least one of said wall means being provided with an annulus of gear teeth adapted for cooperative engagement with similar teeth on another member so that said worm gear may transmit torque to or receive torque from said other member via said one axial end portion.

10. In a toy construction kit as defined in claim 9, said one wall means being said bottom wall means.

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U.S. Cl. X.R.

46-23; 74-15.66