Aug. 13, 1929. C. E. RUF 1,724,518

GEARING

Filed March 2, 1928

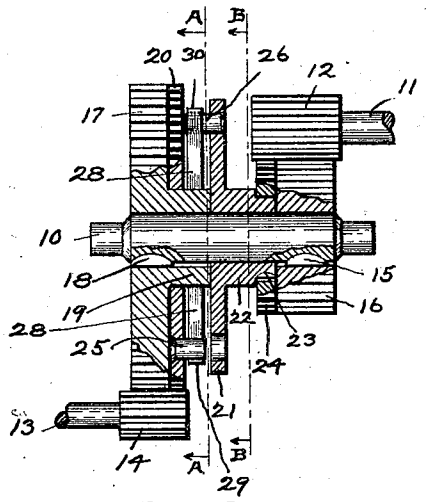


Fig 1

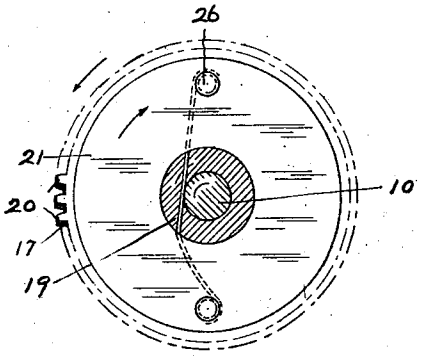


Fig 2

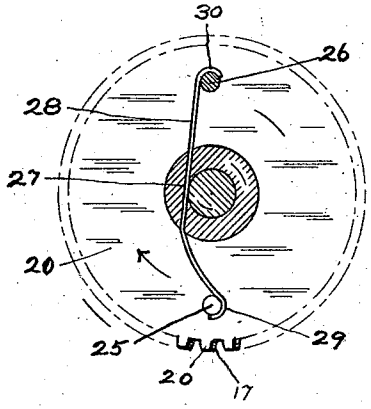


Fig 3

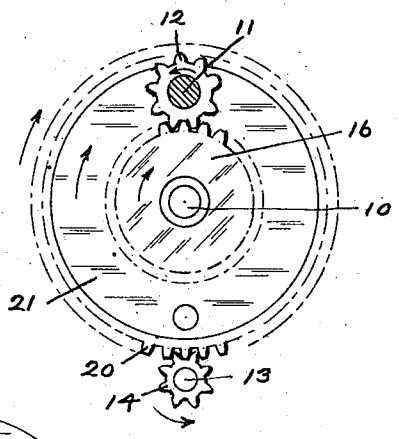


Fig 4

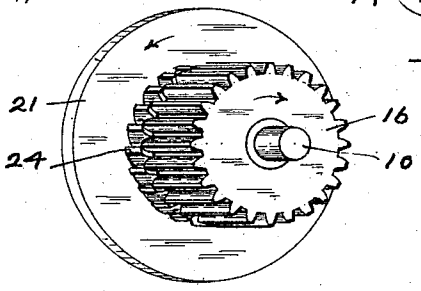


Fig 5

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UNITED STATES PATENT OFFICE.

CRISTIAN EUGENE RUF, OF POUGHKEEPSIE, NEW YORK, ASSIGNOR TO STANDARD GAGE COMPANY, INC., A CORPORATION OF NEW YORK.

GEARING.

Application filed March 2, 1928. Serial No. 258,498.

This invention relates to a novel construction of compensating compound gearing, whereby all lost motion and backlash between the teeth of the intermeshing gears, or a gear and a rack is prevented; the device being particularly adaptable to operating fine and delicate mechanisms, such as gear driven indicating gauges, speedometers, time and recording instruments, or other devices requiring driving means for the indicating hand which shall have no lost motion to cause any inaccuracy.

In the construction of dial indicators or gear driven gauges for measuring purposes, it has been found that there must not be any lost motion or backlash in the train of gears which transmit movement from the contact plunger to the indicating hand on the dial, and this has been accomplished heretofore by the use of a spiral or hair spring, so mounted as to exert a tension on one or more of the gears to bring one side of their teeth into a pressing or follow-up contact with the teeth of the gear or rack which it is to drive, but such a spring has many disadvantages, among which is the difference in tension of such a spring according to the position of the gears; exerting a varying tension or pressure according as to how tight the spring is wound up, thus producing an instrument having a jerky movement; further such a spring is very delicate, easily broken and gotten out of order, and also adding many extra parts to the mechanism.

Also in some of the devices which have been devised for this purpose, provision has been made to prevent lost motion between the operating pinion on which the indicating hand is mounted, and the gear that drives it directly, but no provision has been made to prevent lost motion between the actuating plunger, and the above mentioned gear that drives the pinion, so that the amount indicated on the dial may still be inaccurate owing to the lost motion between the plunger and the first gear in the train of gearing.

The object of the present invention is to produce a novel compound gear that shall at all times and under all conditions prevent any and all lost mostion or backlash between it and any gear or rack into which its teeth shall be meshed.

Another object of the invention is to provide such a gear that shall be cheap, simple, durable and contain few parts and require no adjustments of any kind, and be fully automatic in the compensation for wear in the teeth.

Still another object being to provide a compound or compensating gear that shall constitute a self-contained unit in which the entire mechanism for preventing lost motion is contained, and such mechanism does not have to be attached to any member outside of the gear unit.

With these and other objects in view, our invention consists in certain construction and combination of parts as will hereinafter be fully described and claimed, and illustrated in the accompanying drawings which form a part hereof and in which like figures of reference refer to corresponding parts in all of the views, and it is to be understood that slight changes may be made without departing from the spirit of the invention.

In the drawings:—

Figure 1 shows a view of such a compound gear, and its relation to a driving and driven gears.

Figure 2 shows a sectional view of the same, without the driven gear, and taken on the line B—B of Figure 1.

Figure 3 shows a sectional view of the same, taken on the line A—A of Figure 1, and showing the compensating spring.

Figure 4 shows an end view of Figure 1.

Figure 5 shows an enlarged detail view, illustrating the action of the split or take-up two part gears.

Referring to the drawings, we provide a shaft 10, which may be rotatably mounted in any suitable manner in the device to which the invention is to be adapted; and we also show a driving shaft 11, carrying a pinion 12; and a driven shaft 13 carrying a gear 14; but it is to be understood that in place of the gears 12 and 14, and the shafts 11 and 13, that racks may be used in either or both cases, or any desirable form of gearing, and that in fact the invention will apply in an equal manner to spur, spiral, bevel, or any other form of gearing, and with any desired number of teeth, and of any pitch, the object being at all times and under all conditions to provide a full or expanding tooth, to mesh with that of the other gear or rack.

To accomplish this we have rigidly secured on the shaft 10, near one end thereof, by the key 15 a two-part gear 16 and 24; and on the

other end of the same shaft 10, another two-part gear 17 and 20, by a key 18 or other suitable means.

The gear 17 is formed with a turned or machined hub 19, on which is freely mounted the narrow faced gear 20, which is of the same size and tooth as the gear 17, and in fact forms a part thereof, only not being secured to the shaft.

Adjacent to this gear 20 and also freely mounted on the shaft 10, is placed a disk 21, which is also formed with a turned hub 22, on the end of which is rigidly secured by a key 23 or other device, a narrow faced gear 24, of the same size and tooth as the gear 16, and forming a part of the same, but not secured to the shaft 10.

The gear 20, at a point near the periphery thereof has attacheed thereto a stud 25; and the disk 21 has a similar stud 26, attached to its side, said studs standing at right angles to and projecting from the sides of the gear and the disk, and being parallel to each other, and pointing in opposite directions.

Referring to Figure 3 of the drawings, the hub 19 of the gear 17, is formed with a slot or saw-cut 27, within which by being staked or otherwise secured is a flat or leaf spring 28, which is formed with oppositely positioned hooked ends 29 and 30; the hook 29 engaging the stud 25 on the gear 20; and the hook 30 engaging the stud 26 on the disk 21.

Now in the assembly of the device, the gear 20 is moved one or more teeth in relation to the gear 17, and in a direction to place tension on the spring 28, and the two gears 17 and 20, forming the two-part gear are meshed with the pinion 14; and the gear 24 is then moved in relation to the gear 16, the same number of teeth, but in the opposite direction, and then the gears 24 and 16, making up the other two-part gear are meshed with the gear 12.

It will thus be seen that the teeth of the gear 20, owing to the exertion of the spring 28 will have a desire to pass or become out of line with the teeth of the gear 17, thus at all times completely filling the spaces of the teeth with which they are in mesh, as in this case the gear 14, thus preventing all lost motion, backlash and noise between said gears, and this same condition exists in regard to the gears 24 and 16, with respect to the pinion 12, only the pressure of the teeth are in the opposite direction.

This provides a self-contained compound gear unit, with compensating means for preventing lost motion, backlash and noise, and comprises two gears, each made up of two parts; one part secured to a shaft, and the other part loose, and all being provided with a novel device for keeping the teeth on each of the two parts out of alinement with each other, and forming a two-part gear with an expanding tooth.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. A self-contained compound gear unit, comprising in combination with a shaft, of two gears, each rigidly secured upon said shaft in spaced relation with each other, a hub formed on one of said gears, a gear mounted on said hub and having rotary movement thereon, a disk mounted on said shaft between said gears, a hub formed on said disk, a gear rigidly secured upon said hub in contact with the second gear, and means carried by said disk, the gear mounted on the hub of the first gear and said hub, for preventing lost motion or backlash between said gear unit and any toothed members it either drives or is driven by.

2. A compound gear unit, comprising in combination with a shaft, of a pair of compensating gears mounted on said shaft in spaced relation, each of said compensating gears composed of two parts, the first part secured to said shaft, and the second part freely rotatable with respect to said shaft, a disk rotatably mounted on said shaft between said gears, one of said loose gears secured to said disk, a stud carried by the other loose gear, a similar stud carried by the disk, and a spring having its body portion secured to one of the gears secured to said shaft, and its ends in engagement with said studs, exerting pressure on said studs in opposite directions from each other, to bring the teeth of said loose gears out of alinement with the corresponding teeth of the gears forming the first parts thereof.

In testimony whereof I affix my signature.

C. EUGENE RUF.