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MECHANISM FOR TRANSMITTING SPEED AND POWER.

APPLICATION FILED DEC. 2, 1907. RENEWED OCT. 17, 1910.

991,754.

Patented May 9, 1911.

Fig. 1.

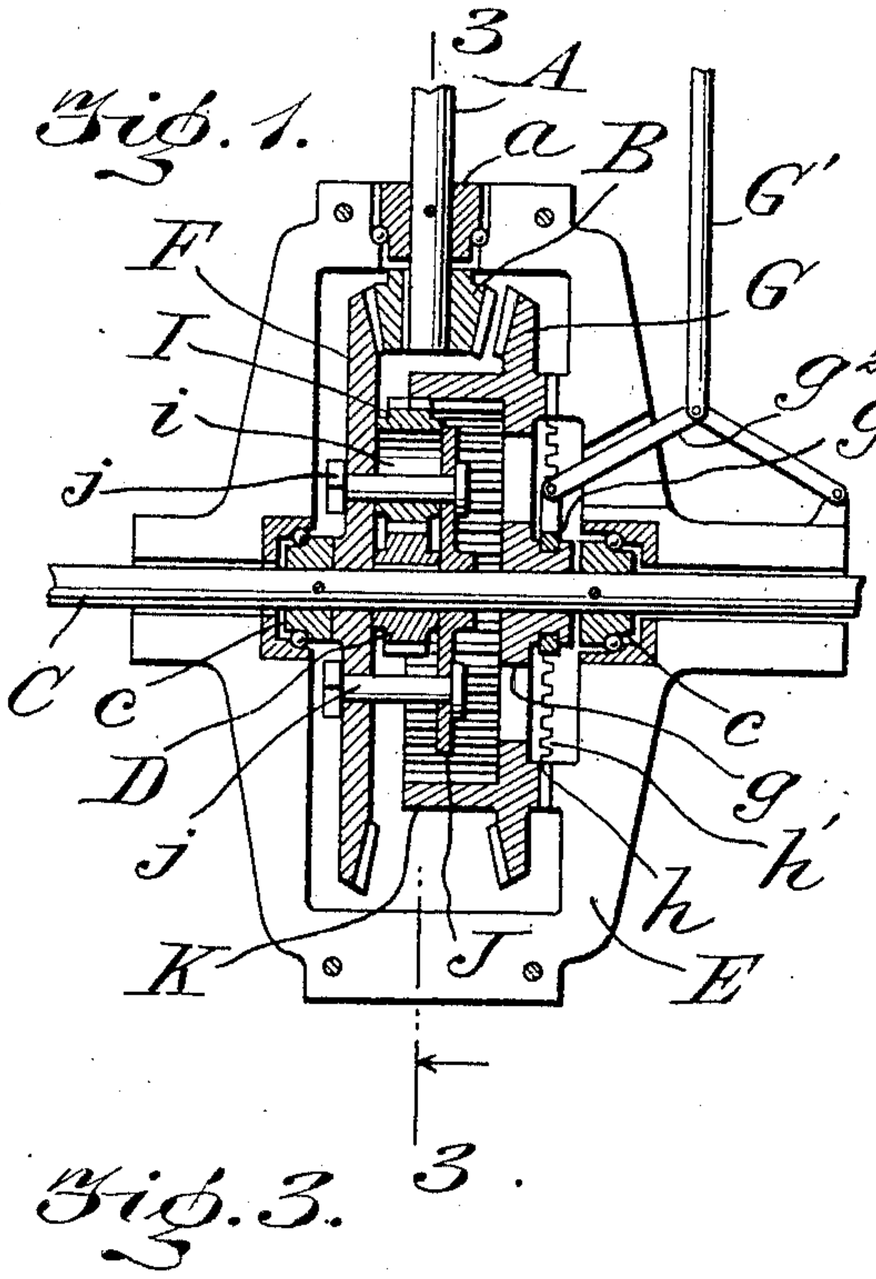


Fig. 2.

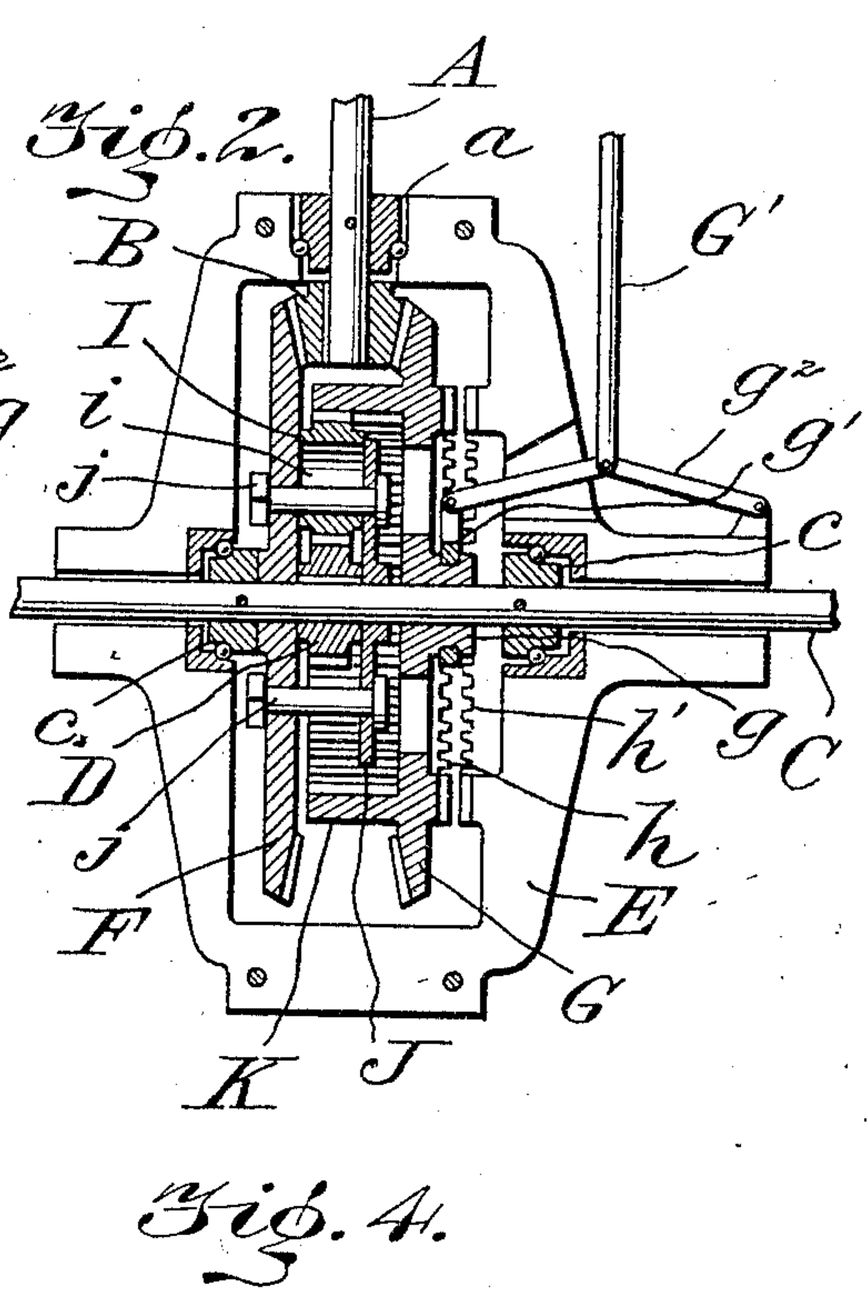


Fig. 3.

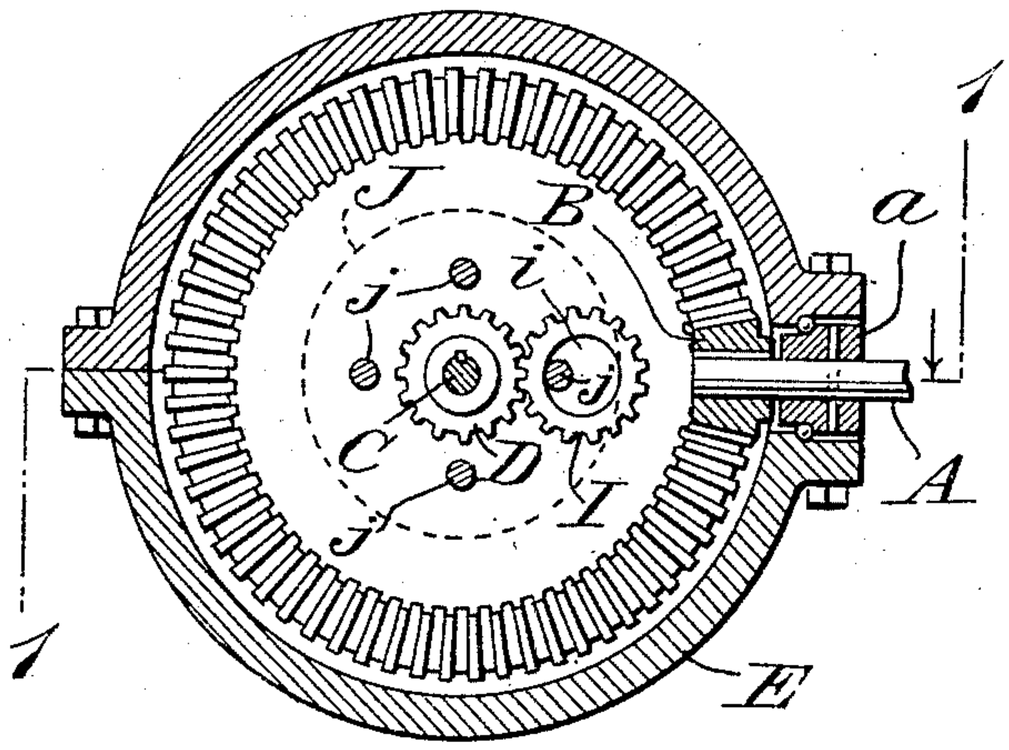
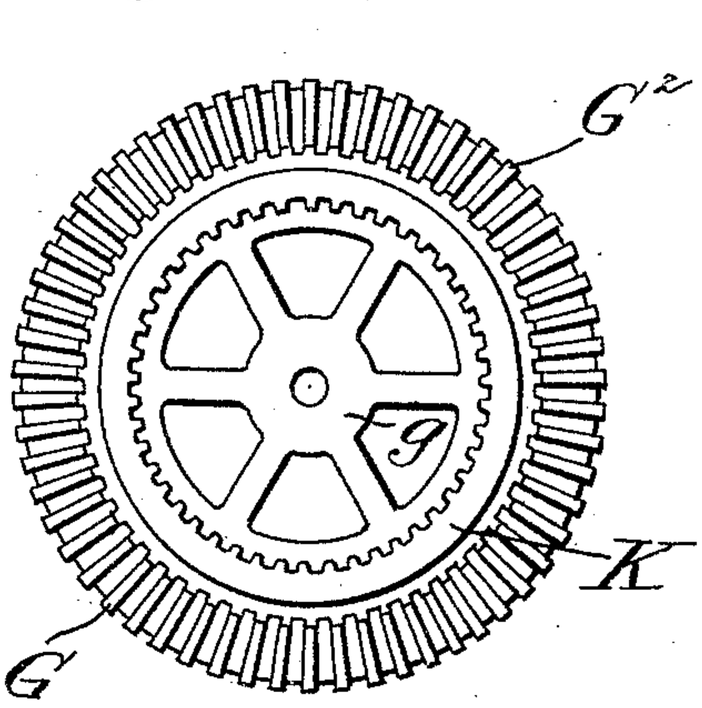


Fig. 4.



WITNESSES

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MECHANISM FOR TRANSMITTING SPEED AND POWER.

991,754. Specification of Letters Patent. Patented May 9, 1911.

Application filed December 2, 1907, Serial No. 404,669. Renewed October 17, 1910. Serial No. 587,508.

To all whom it may concern:

Be it known that I, ELMER SCHOONMAKER, a citizen of the United States, residing in the city of New York, borough of Bronx, and State of New York, have invented a certain new and useful Mechanism for Transmitting Speed and Power, of which the following is a specification.

The invention relates to mechanism adapted to increase the power derived from a driving element, such as a shaft, or to attain an increased speed over and above the speed of such driving element. These results are accomplished by means of certain devices, mainly particular forms of gear mechanism, located intermediate the driving element and the driven element whereby I am enabled to increase the leverage, so to speak, thereby resulting in the production of enhanced power, or, on the contrary, diminish the leverage with a proportionate increase of speed.

The preferred form of the invention embodies a driving shaft provided with a driving element, such as a bevel pinion; two members, such as gears, driven thereby in opposite directions, one of said members having an internal gear, and the other a pinion meshing with said internal gear, a driven shaft carrying a driven gear meshing with said last mentioned pinion.

The member having the internal gear is adapted to be shifted out of engagement with the driving element and locked in its non-engaging position, and when in this position said internal gear is in mesh with the pinion carried by the other member or gear. When the mechanism is positioned as just described, it operates to produce greater power in the driven shaft than that which obtains in the driving shaft. When the two oppositely rotating members are in mesh with the driving pinion, whereby one of said members carrying the internal gear is rotated in one direction, and the other member carrying the pinion is rotated in an opposite direction, increased speed is secured in the driven element over and above the speed of the driving element.

In the accompanying drawings, I have illustrated one practical embodiment of the invention, but the construction shown therein is to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a plan view, partly in horizontal section, of a mechanism for transmitting speed and power embodying my invention, the plane of the section being indicated by the dotted line 1—1 of Fig. 3, said view showing the mechanism adjusted for increasing the power applied to the driven shaft. Fig. 2 is a view similar to Fig. 1 showing the mechanism adjusted for increasing the speed of the driven shaft above the speed of the driving shaft. Fig. 3 is a vertical transverse section on the line 3—3 of Fig. 1. Fig. 4 is a detail view of the member which is provided with the internal gear.

The invention is shown in the drawings as a mechanism adapted for use in connection with an automobile, but it is to be understood that said invention is not restricted to this particular field, for the reason that the mechanism may be used in any and all arts where it is desirable to apply to the driven part or element an increased speed or increased power as compared with the driving element. The apparatus may, therefore, be used generally as a shaft drive.

A designates a driving shaft which is provided with a driving member, B, the latter being preferably in the form of a bevel gear pinion. The driven shaft, C, is provided with a spur gear pinion, D. The two shafts, A, C, are shown as being mounted by bearings, *a*, *c*, respectively, in a gear casing or housing, E, adapted to serve as a frame for supporting the working parts, as well as for precluding dust and dirt from lodging on the transmitting mechanism, but the particular form of housing herein shown is not considered essential, for the reason that any suitable frame work may be employed for supporting the working parts of the transmission. The shaft, C, extends through the housing in a direction at right angles to the shaft, A, but the particular arrangement of the two shafts relative to each other is not important, nor is it necessary that the shaft, C, shall be a continuous, solid or unbroken shaft. For example, my new transmission may be used in connection with a divided shaft or axle, such as is commonly employed in the differential gears of automobiles, but as this is an obvious expedient, I have not considered it necessary to more fully describe the same, nor to illustrate it in the drawings.

F and G designate rotary members dis-

posed loosely with relation to the driven shaft, C, and on opposite sides of the plane of the driving shaft, A, and the driving element, B, thereon. Said members; F, G, are represented as bevel gears which are disposed in facing relation. The member, F, is mounted loosely on the driven shaft, C, so as to have a predetermined relation to the driving shaft, A, whereby said member, F, is normally in mesh with the driving pinion, B. The other member, G, however, is slidable with relation to the driving shaft, A, and the pinion, B, and in one position of the member, G, it is adapted to mesh with the pinion, B, whereby the members, F, G, are adapted to be driven simultaneously from the pinion, B, and in opposite directions to each other, the speeds of said members, F, G, being substantially the same. Said member, G, is mounted loosely on the shaft, C, so as to have a sliding movement thereon, and this sliding movement may be communicated or imparted to said member, G, by any suitable or preferred devices.

As shown in Figs. 1 and 2, the member, G, is provided with a grooved hub, g, in which loosely fits a collar, g', and to this collar is pivoted one link of a toggle joint, g^2, the latter being operated by a rod, G'. When the rod is moved in one direction the collar, g', is operated to shift the member, G, toward the driving pinion, B, and into mesh therewith, but a reverse movement of the rod, G', operates to withdraw said member, G, from engagement with said driving pinion. The disengagement of the member, G, from the driving pinion operates simultaneously to move said member into fixed relation with a locking device for the purpose of locking the member, G, against rotation on the shaft, C. Any suitable means may be employed for locking the member, G, in position, but as shown, said member is provided in one side with clutch teeth, h, which are adapted to interlock with clutch teeth, h', the latter being provided on one side of the gear casing or frame, E, as shown more clearly in Fig. 2.

It will be evident that any suitable means may be employed in lieu of the toggle joint and the rod for operating to impart sliding movement to the member, G, and, further, that other devices than the clutch teeth, h, h', may be resorted to for locking the member, G, in its disengaged position.

The member, F, in its rotation carries with it a transmitting gear, I, said gear being mounted on the inner surface of said member, F, or that surface which is in opposing relation to the member, G. The gear, I, is in mesh at all times with the driven gear, D, and said gear, I, is mounted for rotation on an axis simultaneously with its travel with the member, F, whereby said pinion, I, is capable of two motions, one motion being with the member, F, around the axis thereof, and the other on the axis of the gear, I. While the gear, I, may be connected in any suitable way to the member, F, it is preferred to provide said gear, I, with an enlarged opening, i, and to loosely fit said gear on one bolt, j, of a series of bolts which are employed to rigidly attach a plate, J, to the member, F. The plate, J, is parallel to the member, F, and the gears, D, I, are between said plate, J, and the member, F. It will be understood that the plate, J, is fastened rigidly to the member so as to rotate therewith, and, further, that the plate confines the transmitting gear, I, in proper relation sidewise to the member, F.

The member, G, is provided with an internal gear, K, which is always in mesh with the transmitting pinion, I. The internal gear is formed by a rim having internal teeth, said rim being shown as integral with the member, G, although the internal gear may be made in a separate piece and secured in an approved way to said member, as will be readily understood. The width of the internal gear, K, exceeds the sliding travel which may be given to the member, G, and said internal gear extends from that face of the member, G, which is opposed to the member, F, said internal gear being of less diameter than the members, F, G, whereby the internal gear is adapted to mesh at all times with the transmitting pinion, I. It will be understood that the member, G, is provided with bevel teeth, G^2, near its periphery and on one face thereof; that said member is provided further with the internal gear, K, within the bevel teeth thereof, as shown in Fig. 4, and that on its other face, said member, G, is furnished with the clutch teeth, h.

The operation is as follows: With the member, G, in the position of Fig. 1, the teeth, h, engage with the teeth, h', and said member, G, is fixed or locked to the casing or frame, E, but the internal gear, K, is in mesh with the pinion, I, and said pinion is in mesh with the driven gear, D, on the driven shaft, C. The motion of the shaft, A, is communicated by the driving pinion, B, to the member, F. The gear, I, travels with the member, F, around the shaft, C, and said member, I, meets with resistance afforded by the fixed internal gear, K, whereby the gear, I, is rotated for the purpose of rotating the driven gear, D, with increased power, but at reduced speed relative to the driving shaft, A.

When it is desired to increase the speed of the driven shaft relative to that of the driving shaft, the rod, G', is operated to move the member, G, from engagement with the clutch teeth of the frame or casing, E, thereby engaging the member, G, with the driving gear, B, the internal gear, K, re-

maining in mesh with the transmitting gear, I. The member, G, is free to rotate, and the two members, F, G, are rotated simultaneously and in opposite directions to each other by the driving pinion, B. The internal gear, K, rotates with the member, G, in one direction, whereas the transmitting pinion, I, is carried on the member F so as to be movable bodily therewith and in a corresponding direction, but as said members, F, G, rotate in opposite directions, it follows that the gear, I, is rotated by the internal gear so as to drive the gear, D, and the shaft, C, in the required direction and at an increased speed. The speed is multiplied by the opposite rotation of the members, F, G, and by the ratio of the gears, K, I, to each other, and of the gear, I, to the gear, D, the result of which is to materially increase the speed of the shaft, C, over and above the speed of the shaft, A.

From the foregoing description it will be seen that by adjusting the member, G, in the fixed position of Fig. 1, the apparatus may be employed for driving the shaft, C, with increased power, but a simple change in position of the member, G, to the position of Fig. 2, causes the transmission to drive the shaft, C, at a substantial increase in speed relative to the shaft, A.

The transmitting gear or pinion, I, is shown in the drawings as being loosely confined in position between the internal gear, K, and the driven gear, D; and, furthermore, the stud, *j*, on which the transmitting gear, I, is mounted is eccentric to the imaginary axis of said gear, I, said eccentric stud, *j*, being close to the toothed periphery of the driven gear, D, as shown in Fig. 3.

The pitch line between the intermeshing gears, D, I, is much closer to the center of the stud, *j*, than the pitch line between the intermeshing gears, K, I, whereby the gear, K, is adapted to exert increased leverage on the gear, I, for the purpose of increasing the power exerted by the internal gear on the transmitting pinion, I, which increase in power is communicated to the driven gear, D. The gear, I, is adapted to shift its position around the stud, *j*, so as to preserve the relation of the gears, D, I, as shown in Fig. 3, and this gear, I, is thus adapted to turn on an axis which is eccentric to the imaginary axis thereof. Said gear, I, is confined in position by its engagement with the gears, K, D, and between the plate, J, and the member, F, whereby the gear, I, is kept from working out of position when rotated by the internal gear, K.

Having thus fully described the invention, what I claim as new, and desire to secure by Letters Patent is:

1. In a transmission mechanism, a driving member, two members engaging directly with the driving member, said members being rotated simultaneously and in opposite directions to each other by said driving member, a driven member, and an intermediate member carried by one of the two aforesaid members, said intermediate member engaging with the other of the two aforesaid members and with the driven member.

2. In a transmission mechanism, a bevel gear, a second gear driven thereby, a pinion carried by said second gear, a driven element, a driven gear mounted on said element and in mesh with said pinion, a third gear adapted to mesh with the bevel gear, and an internal gear fixed relatively to the third gear and meshing with said pinion so as to form a rack therefor, said third gear being shiftable into and out of mesh with said bevel gear.

3. In a transmission mechanism, a driving element, a driving member operated thereby, two members engaging directly with the driving member and adapted to be rotated in opposite directions simultaneously thereby, a driven element, a driven member thereon, and means intermediate the two said members for operating the driven member.

4. In a transmission mechanism, a driving element, a driving member operated thereby, two members engaging directly with the driving member and adapted to be driven in opposite directions simultaneously thereby, one of said members being provided with a pinion and the other with an internal gear, a driven element, and a driven gear meshing with said pinion, said driven gear being carried by the driven element.

5. In a transmission mechanism, a driving gear, two members adapted to be simultaneously rotated thereby and in opposite directions to each other, an internal gear on one of said members, a driven gear, and another gear carried by the other of said two members and meshing with said internal gear and with the driven gear.

6. In a transmission mechanism, a driving gear, two members adapted to be driven in opposite directions thereby, an internal gear on one of said members, a driven gear, another gear carried by the other of said two members and meshing with said internal gear and with the driven gear, and means for adjusting one of said two members from engagement with said driving gear.

7. In a transmission mechanism, a driving gear, two members adapted to be driven in opposite directions thereby, an internal gear on one of said members, a driven gear, another gear carried by the other of said two members and meshing with said internal gear and with the driven gear, means for adjusting one of said two members from engagement with said driving gear, and means for locking said member and the in-

ternal gear from rotation when free from the driving gear.

8. In a transmission mechanism, a driving gear, two members adapted to be driven in opposite directions simultaneously by said driving gear, one of said members being normally in mesh with said driving gear, means for shifting the other member from engagement with the driving gear, means for locking said member against rotation when free from said gear, an internal gear fast with said shiftable member, a gear on the other non-shiftable member adapted to mesh with the internal gear, and a driven gear in mesh with said gear on the non-shiftable member.

9. In a transmission mechanism, a driving gear, two members adapted to be driven in opposite directions simultaneously by said driving gear, one of said members being normally in mesh with said driving gear, means for shifting the other member from engagement with the driving gear, means for locking said member against rotation when free from said gear, a driven gear, a transmitting gear carried by the non-shiftable member and normally in mesh with said transmitting gear, and an internal gear carried by the shiftable member and normally in mesh with the transmitting gear.

10. In a transmission mechanism, driving and driven members, a third member normally in mesh with the driving member, a transmitting gear mounted on the third member for movement on an axis eccentric to the axis of said transmitting gear, and an internal gear, said transmitting gear being normally in engagement with the internal gear and the driven member.

11. In a transmission mechanism, driving and driven gears, a third gear normally in mesh with the driving gear, a transmitting gear carried on the third gear and normally in mesh with the driven gear, said transmitting gear being movable freely on an eccentrically located axis, and an internal gear meshing with the transmitting gear, the latter being confined shiftably in position between the driven gear and the internal gear.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ELMER SCHOONMAKER.

Witnesses:

MARGARET C. POWELL,

H. I. BERNHARD.