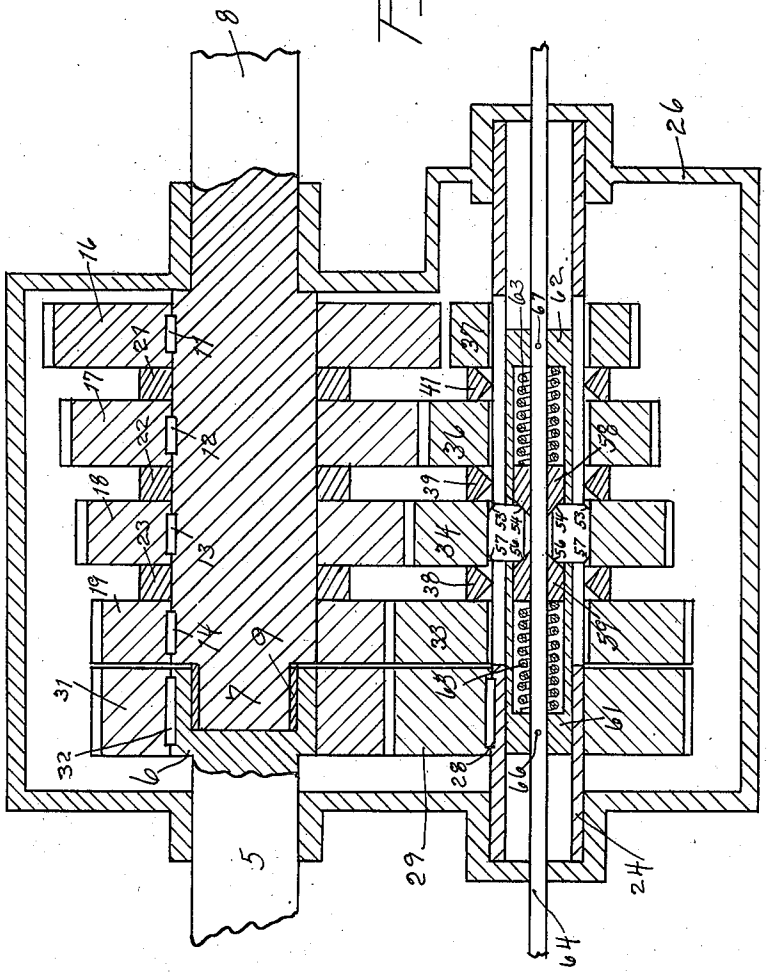
Sept. 9, 1924. 1,508,193

J. H. LORD

GEAR SHIFTING DEVICE

Filed Nov. 30, 1923 2 Sheets-Sheet 1

Fig. 1.



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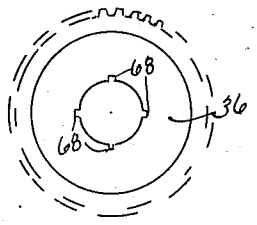


Fig. II.

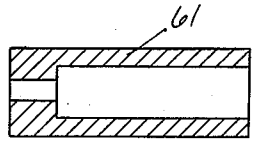


Fig. III.

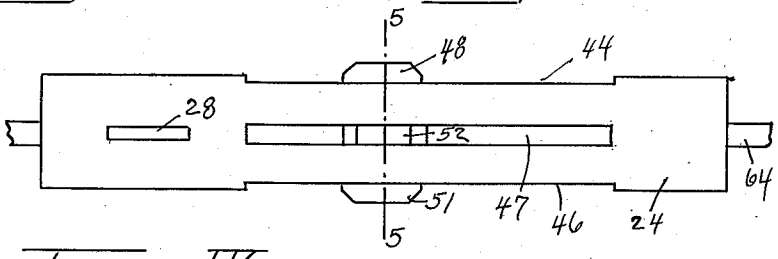


Fig. IV.

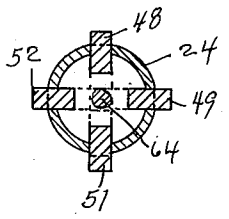


Fig. V.

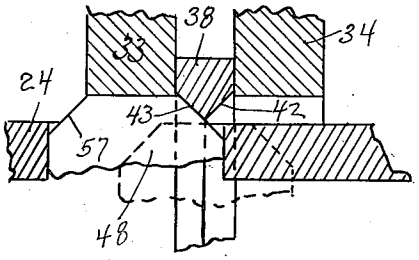


Fig. VI.

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Patented Sept. 9, 1924. 1,508,193

UNITED STATES PATENT OFFICE.

JAMES H. LORD, OF OAKLAND, CALIFORNIA.

GEAR-SHIFTING DEVICE.

Application filed November 30, 1923. Serial No. 677,765.

To all whom it may concern:

Be it known that I, JAMES H. LORD, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Gear-Shifting Devices, of which the following is a specification.

This invention relates to improvements in gear shifting devices and has particular reference to means for bringing into driving engagement gears of different speed ratio.

Another object is to produce a device of this character which is simple in construction and fool-proof and one which will occupy a minimum of space.

A still further object is to produce a mechanism of this character wherein the gears are in constant mesh at all times.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a vertical cross section of a gear casing having my gear shifting mechanism mounted therein,

Figure 2 is a side elevation partly in phantom of one of the gears,

Figure 3 is a cross section of one of the cone cages,

Figure 4 is a side elevation of an auxiliary shaft having extendable keys slidably positioned therein,

Figure 5 is a cross section taken on the line 5—5 of Figure 4, and

Figure 6 is an enlarged fragmentary detail view showing the manner of depressing one of the keys during the shifting operation.

In automobile construction it is quite common to shift gears so as to change the speed of rotation of the propeller shaft relative to the speed of the motor shaft. In most instances this is accomplished by bringing into mesh sliding gears. I have eliminated this movement of the gears in a novel manner and in Figure 1 the numeral 5 designates the motor shaft having an enlarged end 6, bored to receive a reduced end 7 of the propeller shaft 8 and a suitable bushing 9 is placed around the reduced end 7 of the propeller shaft 8.

Keyed to the propeller shaft 8, as by keys 11, 12, 13, and 14 are gears 16, 17, 18 and 19. These gears are spaced one from the other as by spacers 21, 22 and 23. An auxiliary shaft 24 is mounted parallel to the propeller shaft 8 and is rotatable in suitable bearings formed in the gear housing 26, which gear housing also supports the end of the engine shaft 5 and the propeller shaft 8.

This auxiliary shaft 24 is provided with a bore 27 and has keyed adjacent one end thereof as by a key 28, a gear 29 adapted to mesh with a gear 31 keyed by a key 32 upon the enlarged end 6 of the engine shaft. Freely rotatable upon this auxiliary shaft are mounted gears 33, 34, 36 and 37. The gears 33, 34 and 36 mesh with the gears 19, 18 and 17, respectively, while the gear 37 is connected to the gear 16 through an intermediate gear (not shown) so as to secure a reversal of rotation for reversed movement.

Spacers 38, 39 and 41 are placed between the gears 33, 34, 36 and 37. It will be noted that these spacers have their inner peripheries champered so as to form cam surfaces, best shown at 42 and 43 of Figure 6.

The auxiliary shaft 24 is provided with a plurality of slots as shown at 44, 46 and 47 of Figure 4, within which keys 48, 49, 51 and 52 are adapted to move. These keys are substantially rectangular in shape and are provided with champered corners as shown at 53, 54, 56 and 57.

The champered corners 54 and 56 contact cone members 58 and 59, which cone members are slidable in cone cages 61 and 62, respectively. A coil spring 63 is positioned in each of these cone cages so as to abut one end of the cage and the rear face of each cone. These cone cages are pinned to a control rod 64 as shown at 66 and 67. Each of the gears 33, 34, 36 and 37 are provided with key-ways 68 (see Figure 2).

The result of this construction being that as the engine shaft 5 is rotated, the gear 31 will be rotated, which rotation will impart to the gear 29 and to the auxiliary shaft 24 rotary movement. This rotary movement will also cause the slidable keys 48, 49, 51 and 52 to rotate therewith.

Assuming that these keys are in the position shown in Figure 1, rotation will be transmitted to the gear 34 as the keys are now in the key-ways 68 of that gear. When it is desired to change from one gear to an-

other, as for instance the gear 34 to the gear 36, the control rod 64 is moved to the right of the drawing which moves the keys just referred to into contact with the cam surface 43 of the spacer ring 39. This will cause all of the keys to be depressed as shown in dotted lines in Figure 6. This depression in turn causes cones 58 and 59 to move apart against the tension of the springs 63.

As soon as the keys have passed beneath the spacer ring, the cones will again cause the keys to move outwardly and into the key-way 68, of the gear 36.

It will thus be seen that I have provided a simple and efficient manner of accomplishing the changing of the speed ratio of a gear mechanism.

It is to be understood that the form of my invention, herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention, or the scope of the subjoined claim.

Having thus described my invention, I claim:—

In a device of the character described a propeller shaft, a plurality of gears mounted thereon, a tubular auxiliary shaft positioned parallel to said propeller shaft, a gear keyed to said auxiliary shaft, means for rotating said gear, a plurality of gears freely rotatable on said auxiliary shaft and in constant mesh with the gears keyed to said propeller shaft, spacers positioned between said freely rotatable gears, said spacers having their inner periphery champered, a control rod movable within said auxiliary shaft, cages pinned to said rod and slidable in said tubular auxiliary shaft, a spring pressed cone slidably mounted within each of said cages, key-ways formed in each of said freely rotatable gears, and a plurality of keys radially positioned with respect to said control rod and adapted to be projected and retracted to a point on the outside of the periphery of said auxiliary shaft, the inward movement of said keys being controlled by contact with the champered surface of said spacers and the outward movement of said keys being controlled by said spring pressed cones.

In testimony whereof I affix my signature.

JAMES H. LORD.