

C. COTTA.
CHANGE SPEED GEARING.
APPLICATION FILED JUNE 7, 1906.

934,505.

Patented Sept. 21, 1909.

2 SHEETS—SHEET 1.

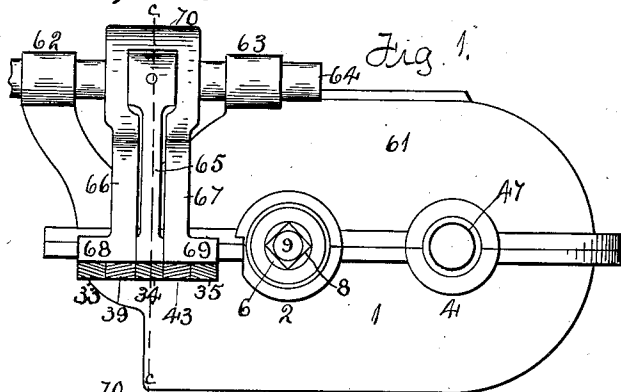


Fig. 1.

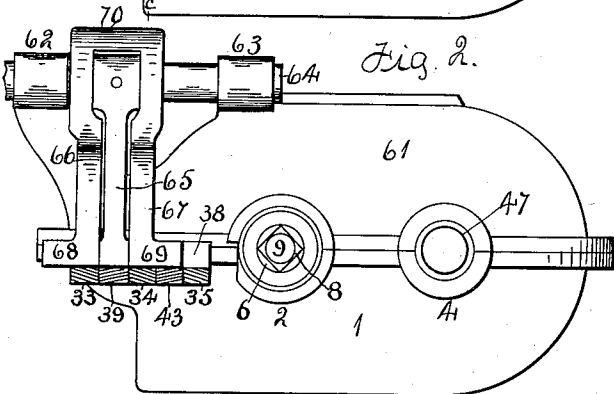


Fig. 2.

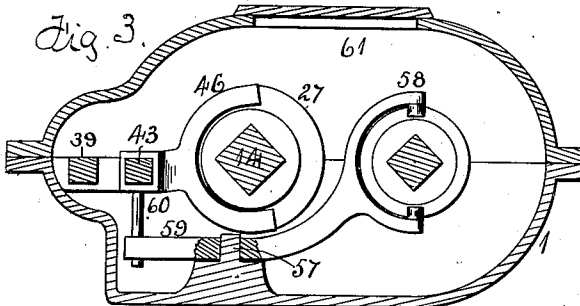


Fig. 3.

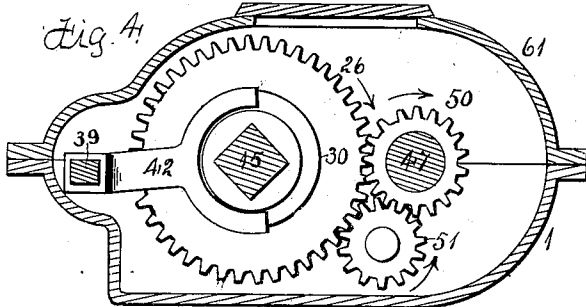


Fig. 4.

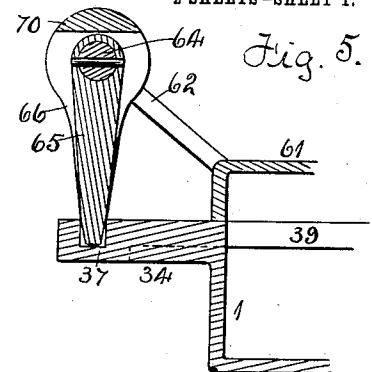


Fig. 5.

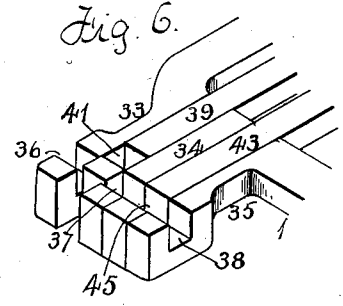


Fig. 6.

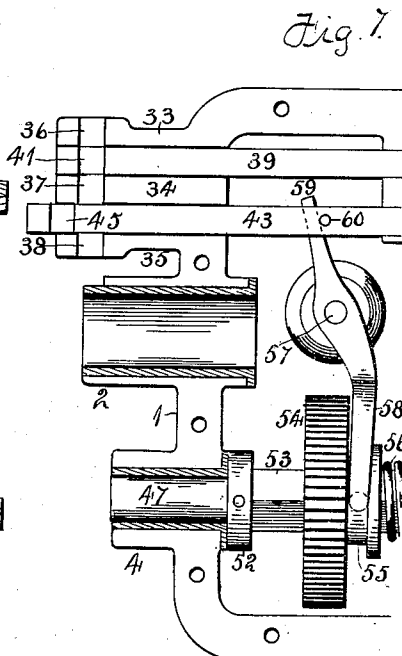


Fig. 7.

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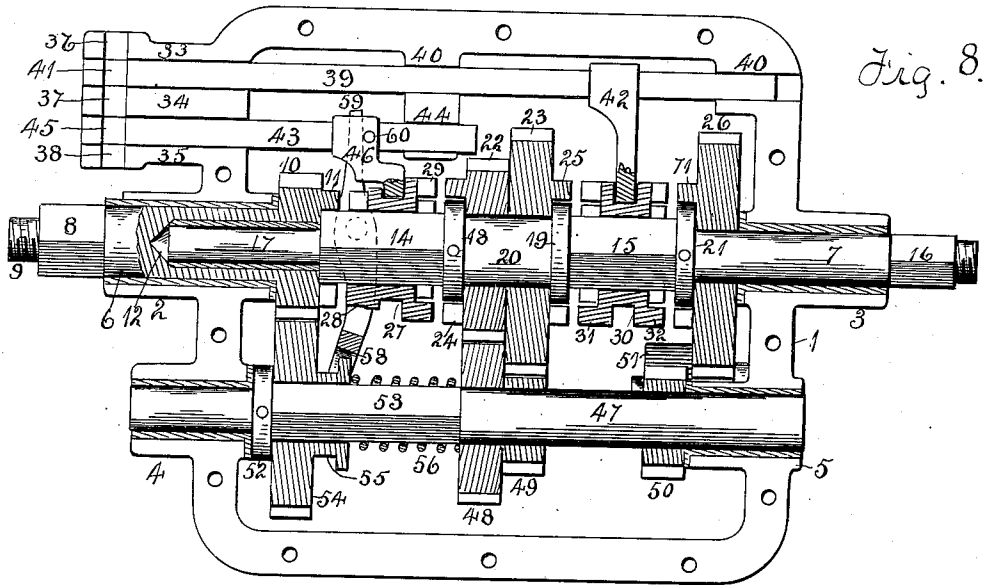


Fig. 8.

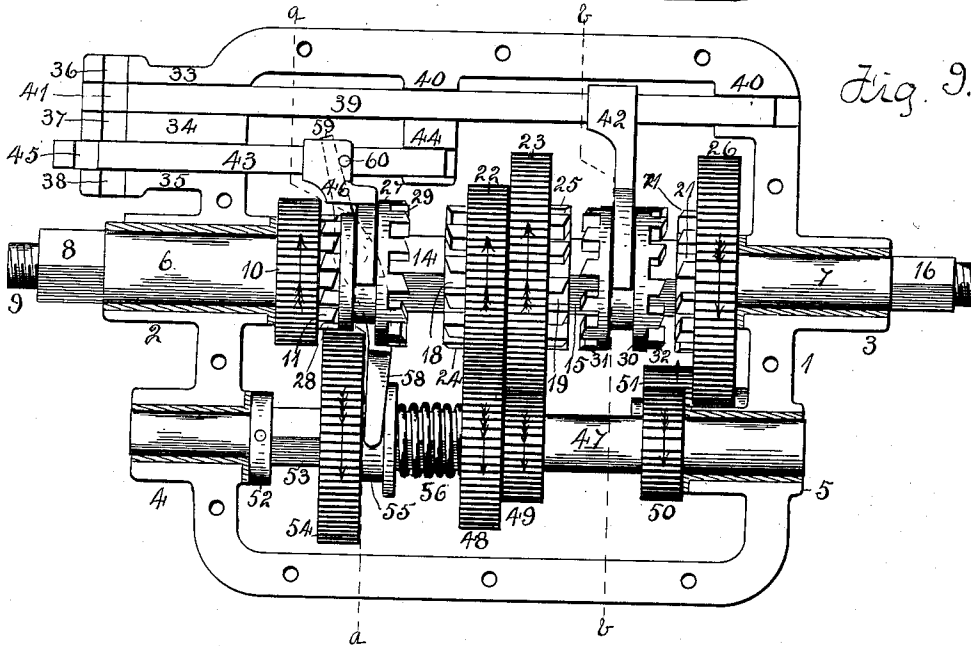


Fig. 9.

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UNITED STATES PATENT OFFICE.

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CHANGE-SPEED GEARING.

934,505.

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REISSUED

To all whom it may concern:

Be it known that I, CHARLES COTTA, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Change-Speed Gearing, of which the following is a specification.

The object of this invention is to construct a change speed gearing adapted more particularly for motor cars, in which all the gears with the exception of the pinion directly connected to the motor, remain at a standstill when the driven shaft is in direct communication with the driver or motor shaft, and this is accomplished by the employment of two double-faced slidable clutch-sections and disengaging the driven spur toothed-wheel from the pinion on the motor shaft, all other toothed-wheels and pinions remaining in mesh all the time.

The further object of this invention is to lock one of the slidable clutch-sections against movement when the other slidable-clutch section is being moved.

In the accompanying drawings, Figures 1 and 2 are end elevations of the casing as seen from the driving end, or that end next the motor and partly in section. Fig. 3 is a transverse section on dotted line *a a* Fig. 9. Fig. 4 is a transverse section on dotted line *b b* Fig. 9. Fig. 5 is a vertical section on dotted line *c c* Fig. 1. Fig. 6 is an isometrical representation of the slidable-clutch operating bars and a portion of the lower section of the casing. Fig. 7 is a top view of a portion of the lower section of the casing showing the counter-shaft and the means for sliding the toothed-wheel thereon. Fig. 8 is a top view of the lower section of the casing, with the operative parts supported thereby and in which the slidable clutch-sections are in their normal positions. Fig. 9 is a view like Fig. 8, but in which one of the slidable clutch-sections is in engagement with the direct pinion and the toothed-wheel on the counter-shaft disengaged from the direct pinion.

The lower section 1 of the casing is provided with bearings 2, 3, 4 and 5. The bearings 2 and 3 support the driving shaft 6 and the driven shaft 7. The driving shaft has a squared section 8, a round section 9, a spur toothed-wheel 10 formed integral with the round portion 6, and a clutch section 11 in this instance formed integral with the pin-

ion. This pinion will be designated herein after as the driving pinion. The round section 6 is provided with a central cavity 12 extending in the lengthwise direction of the section and also extends through the section 60 and through the driving pinion 10. The motor, not shown, has a connection with the driving shaft which will rotate it in the direction indicated by the arrows. The driven shaft has three squared sections, 14, 15, and 16. A round section 17 is located in the round cavity 12, and the round section 7 is located in the bearing 3. The squared section 16 receives the coupling not shown, connecting it with the wheels of the car. Two collars 18 and 19 are fixedly attached to the round section 20, and a collar 21 is fixedly attached to the round section 7.

Two spur toothed-wheels 22 and 23 are located loosely on the round section 20 and held against movement in the lengthwise direction of the section by the collars 18 and 19. The toothed-wheel 22 has a clutch face 24, in this instance formed integral therewith. The toothed wheel 23 has a clutch face 25, in this instance formed integral therewith.

A spur toothed-wheel 26 has a clutch face 71 and is located on the round section 7 between the collar 21 and the bearing 3, and can rotate independent of the driven shaft.

The square section 14 of the driven shaft supports a slidable clutch section 27 which has two clutch faces 28 and 29. The square section 15 of the driven shaft supports the slidable clutch section 30 which has two clutch faces 31 and 32.

The lower section of the casing has three extending portions 33, 34 and 35, each provided with a transverse groove 36, 37 and 38 respectively. Between the portions 33 and 34 is located a slidable bar 39 and which has other bearings 40 formed in the casing. This bar 39 has a cross-groove 41, and to the bar is fixedly attached a shipping lever 42 which engages the slidable clutch section 30. Between the portions 34 and 35 is located a slidable bar 43 and which has another bearing 44 formed in the casing. This bar 43 has a cross-groove 45, and to the bar is fixedly attached a shipping lever 46 which engages the slidable clutch section 27.

The bearings 4 and 5 support a counter-shaft 47 and to it are fixedly connected the three spur toothed-wheels 48, 49 and 50. The wheel 48 meshes with the wheel 22 on

the driven shaft, and the wheel 49 meshes with the wheel 23 located on the driven shaft. The toothed-wheel 50 meshes with an intermediate toothed-wheel 51, and this intermediate toothed-wheel meshes with the toothed-wheel 26 located on the driven shaft 7. The toothed wheels 23 and 49 are for the slow speed, the toothed-wheels 22 and 48 are for the intermediate speed, and the toothed-wheels 26, 50 and 51 are for the reverse speed.

A collar 52 is fixedly connected to the counter-shaft 47 and bears against the bearing 4. This collar in connection with the toothed-wheel 50 serves to hold the counter-shaft against lengthwise movement. On the square section 53 of the counter-shaft is located a spur toothed-wheel 54 in a manner to slide in connection therewith. This toothed-wheel has an annular groove 55 formed in one face, and a spring 56 surrounds the square section 53, one end resting against the toothed-wheel 48 and its other end resting against the toothed-wheel 54. The action of this spring is to hold the toothed-wheel 54 against the collar 52 in a yielding manner.

From the bottom of the lower section 1 of the casing extends a stud 57. A shipping lever has a pivoted connection with the stud 57. The end 58 of this shipping lever is located in the annular groove 55, and its other end 59 is located beneath the slidable bar 43. From the slidable bar 43 extends a pin 60, which is located to engage the end 59 of the shipping lever.

The upper lever-section 61 of the casing is located over the lower section and is provided with bearings which hold the driving, driven and intermediate shafts in place. The upper section of the casing, also holds the slidable bars 39 and 43 in their grooved-way supports.

From the upper section of the casing project two tubular supports 62 and 63. A rod 64 is located in these supports in a manner to oscillate and reciprocate therein. To this rod is fixed a finger 65, and when in the position shown at Figs. 1 and 5 is located in the cross-groove 37 of the portion 34. A yoke is supported by the rod 64 and comprises the two arms 66 and 67, having the foot pieces 68 and 69 respectively, and a cross-bar 70 connects the arms. The finger 65 is located between the arms 66 and 67 of the yoke. When the yoke is in the position shown at Fig. 1, the foot 68 of the arm 66 will be located in the cross-grooves 36 and 41 of the portion 33 and slidable-bar 39, and the foot 69 of the arm 67 will be located in the cross-grooves 38 and 45 of the portion 35 and slidable-bar 43. When the yoke and finger are in the positions shown at Fig. 1, the slidable-bars 39 and 42 will be locked

69 embrace one of the stationary portions 33 and 35, and one of the slidable bars. The rod 64 will also be held against oscillatory movement as the finger 65 is located in the cross-groove of the stationary portion 34.

In order to slide the bar 39, the rod 64 is moved lengthwise in its bearings until the finger 65 is located in the cross-groove 41 of bar 39. This movement of the rod will move the foot 69 of the arm 67 into connection with the stationary portion 34 of the slidable-bar 43, thereby locking the slidable-bar 43 against sliding movement. As the finger 65 is now in the cross-groove 41 of the slidable-bar 39, by oscillating the rod 64, the finger will be oscillated in either direction, thereby imparting a sliding movement to the bar 39 in either direction. By sliding this bar 39 inward, the clutch-section 30 will be moved into engagement with the clutch face 71 of the toothed-wheel 26, and by moving the bar 39 outward the clutch-section will be moved into engagement with the clutch-face 25 of the toothed-wheel 23. In order to move the slidable-bar 43, the rod 64 is moved to carry the finger 65 into the cross-groove 45 of the bar 43. This movement will carry the yoke with it, so that the foot 68 of the arm 66 will move into the cross-grooves 41 and 37 of the slidable-bar 39 and the stationary portion 34, thereby holding the slidable-bar 39 against lengthwise movement. By oscillating the rod 64, the finger 65 will move the bar 43 in either direction, and if moved inward, the clutch-section 27 will engage the clutch-face 24 of the toothed-wheel 23, and if moved outward the clutch-section will engage the clutch-face 11 of the toothed-wheel 10. When the slidable-bar 43 is moved outward from its normal or central position, the pin 60 will engage the end 59 of the shipping-bar causing it to oscillate, thereby moving the toothed-wheel 54 from engagement with the toothed-wheel 10 into the position shown at Figs. 7 and 9. When the slidable-bar 43 is moved inward to its normal position from its outward position, the spring 56 will move the toothed-wheel 54 into engagement with the toothed-wheel 10. The further inward movement of the slidable-bar 43 will move the pin 60 free of the arm 59 of the shipping lever, at the same time the clutch-section 27 is moved into engagement with the clutch-face 24 of the toothed-wheel 22. When the clutch-section 30 is in engagement with the clutch-face of the toothed-wheel 23, motion will be transmitted from the driving-shaft through the wheels 10, 54, 49 and 23 to the driven shaft 7 which will give the slow speed. When the clutch-section 27 is in engagement with the clutch-face 24 of the toothed-wheel 22 motion will be transmitted from the driving shaft through the wheels 10, 54, 48 and 22, to the driven-shaft, which will give the intermediate

speed. When the clutch-section 27 is in engagement with the clutch-face 11 of the toothed-wheel 10, the toothed-wheel 54 will be moved out of engagement with the toothed-wheel 10, and a direct connection will be formed between the driving and driven-shafts. When the clutch-section 30 is in engagement with the clutch-face 71 of the toothed-wheel 26, motion will be transmitted from the driving-shaft through the wheels 10, 54, 50, 51 and 26, to the driven-shaft, thereby imparting a reverse rotary movement to the driven-shaft. By this arrangement, when a direct connection is made the counter-shaft 47 and all the toothed-wheels, with the exception of the toothed-wheel 10 will remain at a standstill, as the toothed-wheel 54 will be held out of engagement with the toothed-wheel 10. While the slidable-bar 39 is being moved, the slidable-bar 43 is held against movement, and while the slidable-bar 43 is being moved, the slidable-bar 39 is held against movement, which prevents the accidental engagement of the gearing imparting different speeds at the same time.

It is evident that the motor may be connected to the shaft 7 and the running gear of the car operated from the shaft 6 without departing from the scope of my invention.

I claim as my invention.

1. In change speed gearing, the combination of a shaft 6, a shaft 7, a counter shaft,

gearing connecting the counter shaft and shaft 7 to impart to the shaft 7 two different speeds in one direction and one speed in the reverse direction, clutches for connecting the gears of the shaft 7 with the shaft 7, means for locking one clutch against movement while the other is being moved, means for forming a direct connection between the shafts 6 and 7, and a gear connection between the shaft 6 and counter shaft, the counter shaft being at rest when a direct connection is formed between the shafts 6 and 7.

2. In change speed gearing, the combination of a shaft 6, a shaft 7, a counter shaft, gearing connecting the counter shaft and shaft 7 to impart to the shaft 7 two different speeds in one direction and one speed in the reverse direction, clutches for connecting the gears of the shaft 7 with the shaft 7, means for locking one clutch against movement while the other is being moved, means for forming a direct connection between the shafts 6 and 7, a gear connection between the shaft 6 and counter shaft, the counter shaft being at rest when a direct connection is formed between the shafts 6 and 7, and a spring for restoring the connection between the shaft 6 and counter shaft.

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