F. E. LUEBKERT.

POWER TRANSMISSION MECHANISM.

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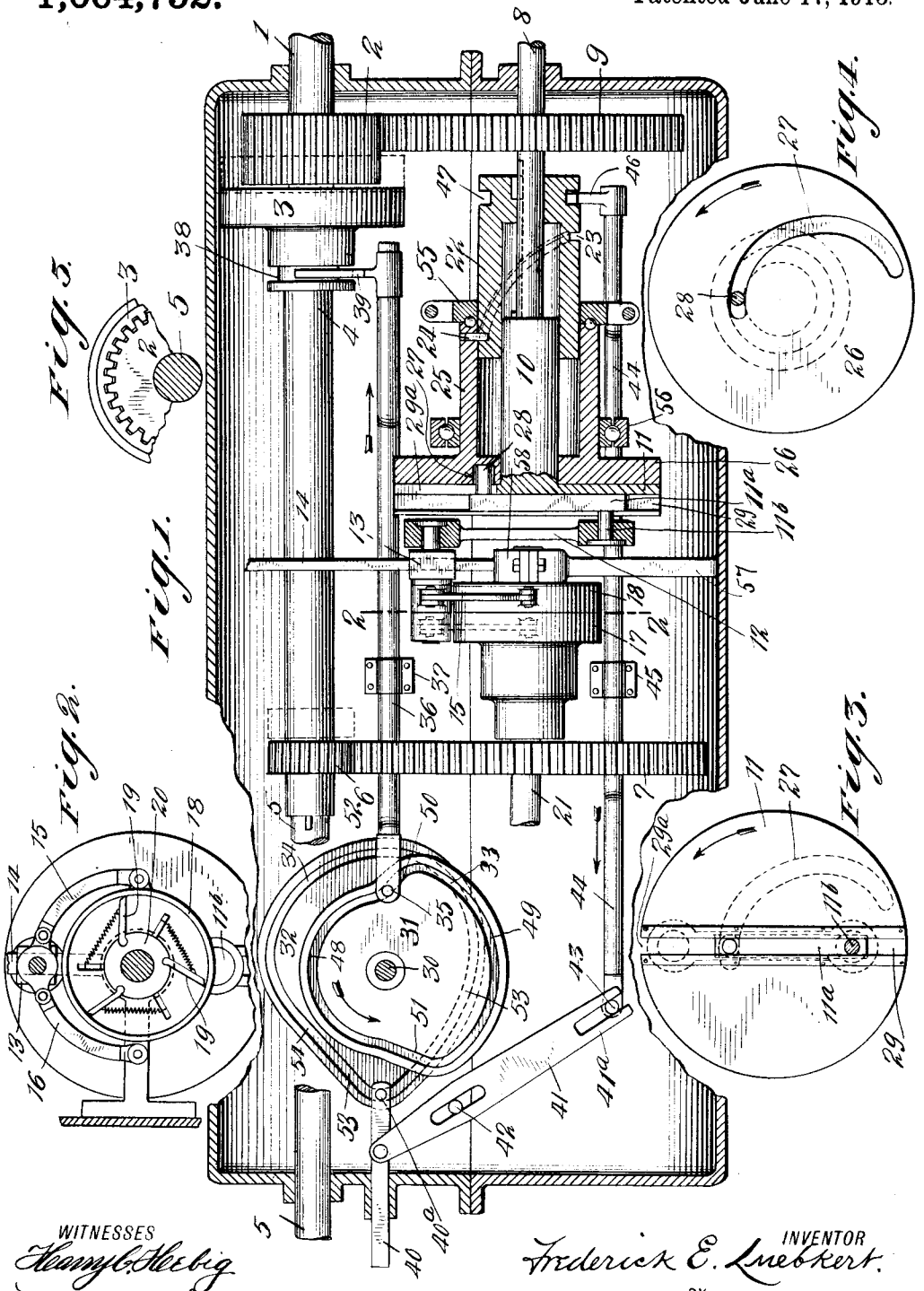
1,064,752. Patented June 17, 1913.



WITNESSES

Henry C. Hoebig

Minnie S. Miller

INVENTOR

Frederick E. Luebkert.

BY

Frank W. Ashley

ATTORNEYS

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FREDERICK E. LUEBKERT, OF NEW YORK, N. Y.

POWER-TRANSMISSION MECHANISM.

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Application filed June 22, 1912. Serial No. 705,174.

To all whom it may concern:

Be it known that I, FREDERICK E. LUEBKERT, a citizen of the United States, and a resident of New York city, in the county of Kings and State of New York, have invented certain new and useful Improvements in Power-Transmission Mechanism, of which the following is a specification.

This invention relates to power transmission mechanism, more particularly to the type used in automobiles wherein it is desired to obtain a plurality of speeds while the motor is running at constant speed.

The principal object of this invention is to provide a speed changing mechanism whereby the uniform speed of the motor may be transformed into any desired speed from rest up to the full speed of the motor and transmitted to a driven shaft.

A further object is to provide means whereby the driven shaft is clutched directly to the driving shaft when the former has attained a speed equal to the driving shaft through the intermediary of the speed changing mechanism.

A still further object is to provide means whereby the change speed mechanism is thrown to an inoperative position when the driven shaft is clutched directly to the driving shaft.

Further objects and advantages will hereinafter appear.

In the drawings illustrating one embodiment of this invention, Figure 1 is a sectional elevation illustrating my transmission mechanism assembled in a casing. Fig. 2 is a section along line 2—2 of Fig. 1, illustrating in detail the intermittent gripping device constituting a portion of my change speed mechanism. Fig. 3 is a detail illustrating the slotted disk and variable throw-crank, the connecting rod connected to the crank and the spiral groove on the adjacent disk for adjusting the throw of the crank being shown in dotted lines. Fig. 4 is a detail illustrating the disk with the spiral groove for engaging the crank. Fig. 5 is a fragmental detail illustrating the annular toothed clutch.

The shaft 1 running from the motor has mounted thereon a pinion 2 which is adapted to be clutched by an annular toothed clutch member 3 fast to a sleeve 4 which is splined to the driven shaft 5. When the annular clutch is shifted over to the position shown in dotted lines in Fig. 1, the driven shaft is clutched directly to the driving shaft and runs at the full speed of the motor. When it is desired to obtain speeds lower than the full speed of the motor, the sleeve 4 is shifted to the left so as to unclutch the annular member 3 from the pinion 2 and throw the pinion 6 mounted on the sleeve 4 into mesh with a gear wheel 7. The power will then be transmitted through my improved speed changing device which permits any desired adjustment from rest up to the full speed of the motor.

This speed changing mechanism is constructed as follows: Mounted parallel with the driving shaft 1 is a counter-shaft 8 having fixed thereto a gear 9 meshing with the pinion 2 of the driving shaft. Shaft 8 has fixed thereto at its inner end, a sleeve 10 having a head 11 in which is slidably mounted an adjustable crank 11^a having a wrist 11^b, which may be adjusted from a position of concentricity with the shaft to a position of a maximum throw. This crank operates through a connecting rod 12, a reciprocating slide 13 mounted on a guide 14. To this slide are connected by means of a pair of links 15 and 16, a pair of oscillating drums 17 and 18, the inner surfaces of which drums engage one-way clutches or gripping devices 19 mounted on a sleeve 20 fixed to a shaft 21, on which shaft is mounted the gear 7 meshing with the pinion 6 which is splined to the driven shaft 5.

It will be understood that by varying the throw of the crank from a position of concentricity with the shaft 8 to a position of maximum throw, the driven shaft may be gradually speeded up from rest to any desired intermediate speed up to the maximum speed of the driving shaft 1.

The mechanism for adjusting the position of the crank is as follows: Splined to the shaft 8 is a sleeve 22 having a spiral, peripheral slot 23 engaging a pin 24 fixed to the interior of a sleeve 25 having a disk or head 26, in the outer face of which is formed a spiral slot 27 engaging an inwardly extending pin 28 mounted on the crank 11^a, which latter slides in a slot 29 formed in the head 11. The pin 28 extends through a longitudinal opening or slot 29^a formed in the rear wall of slot 29. When the sleeve 22 is moved longitudinally of the shaft 8, it gives the sleeve 25 a partial turn relative to the shaft through the intermediary of the spiral slot 23 engaging the pin 24. This partial

turn of the sleeve and hence the head 26, causes the pin 28 to move inwardly or outwardly through its engagement with the spiral slot 27 formed in the head 26. The wrist 11^b of the crank is thus moved to any desired position as above pointed out for the purpose of increasing or decreasing the speed of rotation of the shaft 21 and hence the driven shaft 5. According to my invention, the driven shaft may be started from a position of rest and given any desired intermediate speed up to the full speed of the driving shaft, at which speed the driven shaft is clutched directly to the driving shaft and is disengaged from the intermediate change speed mechanism. The mechanism for obtaining these adjustments is as follows: Mounted on a controlling shaft 30 are a pair of cams 31 and 32 having slots 33 and 34 respectively. Engaging the slot 33 of cam 31 is a pin 35 mounted in a rod 36 which is slidable in a bearing 37 and engaging the groove 38 of the clutch member 3 by means of a yoke 39 fixed to this rod. When the controlling shaft 30 is operated, the rod 36 is shifted to throw in or out of engagement the clutch member 3 with the pinion 2. The cam 32 engages the pin 40^a fixed to a rod 40 slidable in a bearing formed on the casing. To this rod is pivoted a lever 41 fulcrumed at 42 and having a forked extremity 41^a engaging the pin 43 of a rod 44 slidably mounted in a bearing 45. Fixed to this rod is a yoke 46 engaging the slot 47 of sleeve 22. When the controlling shaft is rotated, it will, through the connections above described, shift the sleeve 22 to vary the throw of the wrist 11^b as above described. The slot 33 of cam 31 has two concentric portions 48 and 49 and abruptly inclined sections 50 and 51. The cam 32 has a concentric section 52 and inclined sections 53 and 54. In the position of parts as illustrated in Fig. 1, the rod 36 is just on the point of passing from the concentric portion 48 while the lever 41 is in engagement with the peak of the inclined portions 53 and 54. In this position the clutch 3 is unclutched from the pinion 2, so that the shaft 5 is driven through the change speed mechanism. The wrist 11^b is adjusted to its maximum throw which gives the shaft 5 a speed substantially equal to the speed of the driving shaft. Should the controlling shaft 30 now be rotated in the direction of the arrow, the clutch 3 will be thrown into engagement with the shaft 1 and through the sleeve 4 the pinion 6 will be thrown out of mesh with gear 7. A further rotation of the shaft 30 in the same direction will cause the pin 35 of the rod 36 to ride in the concentric portion 49 of the cam 33 and thus maintain the clutch 3 in engagement with the pinion 2. During this movement of the shaft, the lever 41 will be actuated so as to adjust the position of the wrist 11^b until it is in position of concentricity with the shaft 8. The driven shaft will thus be running at full speed while the intermittent gripping devices of the change speed mechanism and their reciprocating parts operated by the adjustable wrist, will be at rest. Still further motion of the controlling shaft 30 will cause the inclined portion 51 of the slot 33 of the cam 31 to come into engagement with the pin 35 and thus unclutch the driven shaft from the driving shaft and this unclutched relation will continue during the engagement of the pin 35 with the concentric portion 48 of the cam 31. During the engagement of the pin 35 with this concentric portion 48, the inclined portion 53 of the cam 32 will engage the pin 40 of the lever 41 and will gradually increase the throw of the wrist 11^b to speed up the intermittent gripping mechanism of the change speed transmission.

A thrust bearing 55 may be conveniently formed for the end of sleeve 25 and a lateral bearing 56 may also be provided at the inner end of this sleeve so as to support the inner end of the shaft 8. A standard 57 having a bearing 58 for the inner end of the shaft 21 may also be provided and the guide 14 may conveniently extend from this standard.

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

1. In change speed mechanism, a shaft having a head, an adjustable crank connected to said shaft, said crank comprising an arm mounted to slide in a slot in said head, a wrist extending from one side of said crank and a pin extending from the other side of said crank through a slot in the head, means for engaging said pin for varying the throw of said wrist and mechanism operated by said crank.

2. In change speed mechanism, a shaft having a head, an adjustable crank connected to said shaft, said crank comprising an arm mounted to slide in a slot in said head, a wrist extending from one side of said crank and a pin extending from the other side of said crank through a slot in the head, a disk having a spiral slot for engaging said pin to actuate the same to vary the throw of the wrist and mechanism operated by said crank.

3. In change speed mechanism, a shaft having a head, an adjustable crank connected to said shaft, said crank comprising an arm mounted to slide in a slot in said head, a wrist extending from one side of said crank and a pin extending from the other side of said crank through a slot in the head, a disk having a spiral slot on its side face engaging said pin to actuate it to vary the throw of the wrist, means slidable on the shaft for giving the disk a partial

rotation relative to the shaft and mechanism operated by said crank.

4. In change speed mechanism, a shaft having a head, a crank comprising an arm mounted to slide in a slot in said head, a wrist extending from one side of said crank and a pin extending from the other side of said crank through a slot in the head, a disk having a spiral slot on its side face engaging said pin to actuate it to vary the throw of the wrist, means slidable on the shaft for giving the disk a partial rotation relative to the shaft, said means comprising a sleeve splined upon the intermediate shaft and having a spiral peripheral slot engaging a pin connected to said disk and mechanism operated by said crank.

5. In change speed mechanism, a shaft, a crank slidably mounted thereon, means for adjusting said crank to vary its throw, said means comprising a disk having a spiral slot on its side face engaging a projection extending from the crank, a sleeve integral with said disk, a pin extending inwardly from said sleeve, and a second sleeve splined upon the intermediate shaft and sliding within said first sleeve, said second sleeve having a spiral peripheral slot adapted to engage said pin and mechanism operated by said crank.

6. In change speed mechanism, a driving shaft, a driven shaft, an intermediate shaft, a variable gripping mechanism connected to said intermediate shaft, means for transmitting the variable speed of said gripping mechanism to the driven shaft, means for clutching said driven shaft directly to said driving shaft, means for varying the movement of said gripping mechanism, a controlling device for operating said clutch shifter and said adjusting device of the gripping mechanism, said controller having means whereby the clutch shifter is operated to throw in the clutch when the gripping mechanism has attained a movement sufficient to drive the driven shaft at the speed of the driving shaft, said controller also having means whereby the gripping mechanism is adjusted to inoperative position after the driven shaft is clutched directly to the driving shaft.

7. In change speed mechanism, a driving shaft, a driven shaft, variable gripping mechanism actuated by the driving shaft, means for transmitting the movement of the gripping mechanism to the driven shaft, means for clutching the driven shaft directly to the driving shaft, means for varying the movement of said gripping mechanism, a controlling device for operating the clutch and adjusting the gripping mechanism, said controlling device having means whereby the clutch is thrown in when the gripping mechanism has attained a movement sufficient to drive the driven shaft at the speed of the driving shaft, said controlling device also having means whereby the gripping mechanism is adjusted to inoperative position after the driven shaft is clutched directly to the driving shaft.

Signed at New York city, in the county of New York, and State of New York, this 8th day of June, A. D. 1912.

FREDERICK E. LUEBKERT.

Witnesses:
FRANK M. ASHLEY,
MANUEL M. VOIT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."