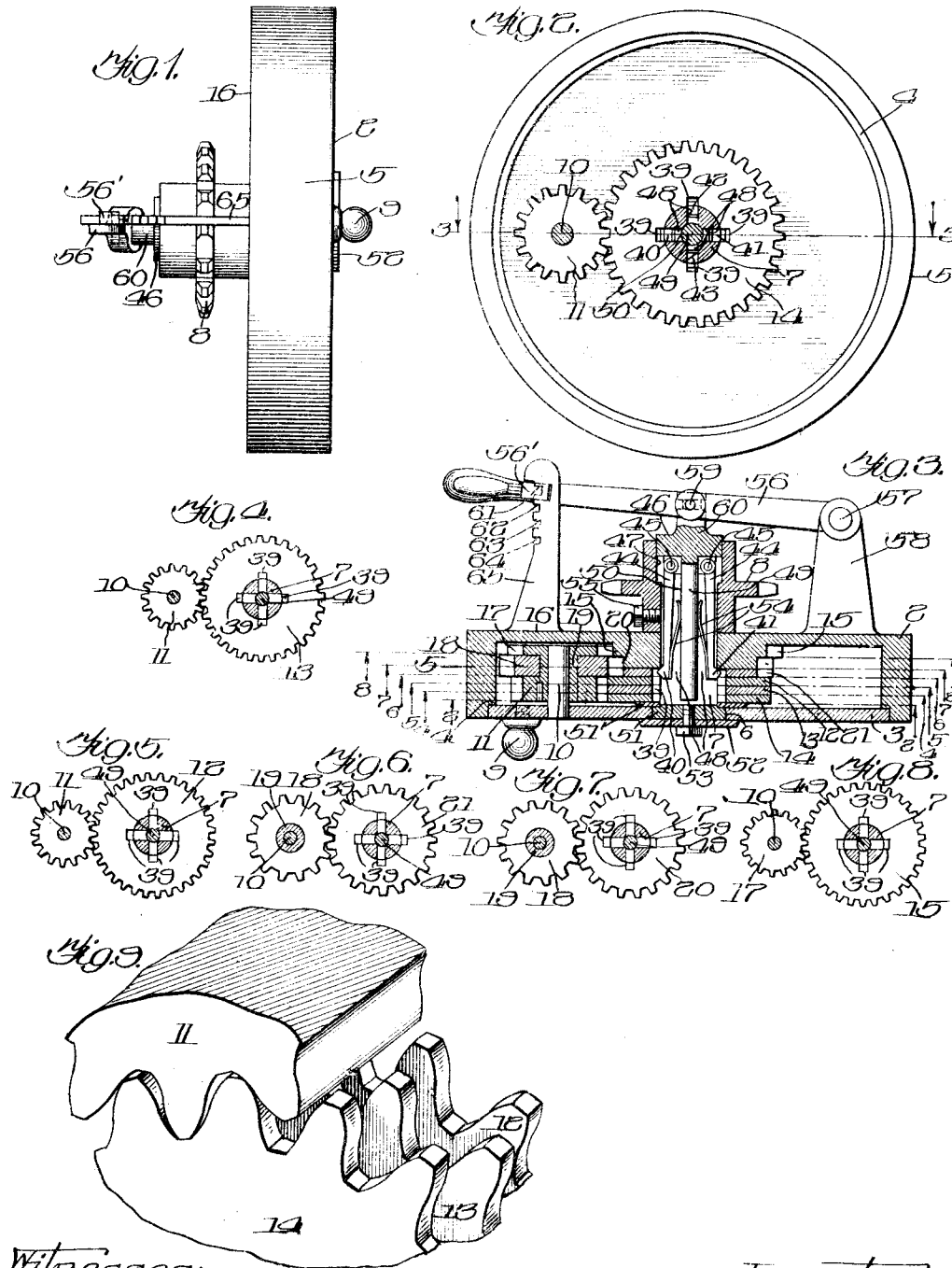


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CHANGE GEARING.  
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1,128,684.

Patented Feb. 16, 1915.



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# UNITED STATES PATENT OFFICE.

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## CHANGE-GEARING.

1,128,684.

Specification of Letters Patent.

Patented Feb. 16, 1915

Application filed October 30, 1913. Serial No. 798,193.

*To all whom it may concern:*

Be it known that I, EMIL G. JOHANSON, a subject of the King of Sweden, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Change-Gearing, of which the following is a specification.

My invention relates to speed changing mechanisms and has particular reference to simple and compact mechanism adapted for automobiles and the like where speed changes are frequently made, where it is desirable to take up a minimum of space, inclose the gears and avoid sudden jarrings incidental to throwing gears into and out of mesh with each other.

In the present invention the gears are always in mesh for the different speeds, those not acting rotating idly, and all incased in a casing part of which is utilized as a driving part for the gears; and the invention consists in the novel construction, combination and arrangement of parts all as hereinafter described in detail, illustrated in the accompanying drawing and more particularly pointed out in the appended claim.

In the drawing—Figure 1 is an edge view showing the outside of a casing and change gear mechanism embodying my invention. Fig. 2 is a section taken substantially on line 2—2 of Fig. 3. Fig. 3 is a section taken substantially on line 3—3 of Fig. 2. Each of Figs. 4 to 8, inclusive, represents one of the different sets of gears shown in Fig. 3. Fig. 9 is an enlarged perspective view of a broken away portion of gears showing the relative toothed arrangement whereby the different speeds are obtained.

In the several views 2 represents a drum-shaped or cylindrical casing one side wall 3 of which is rotatably mounted at its edges in an annular groove or rabbet 4 formed on the interior of the annular wall 5 of the said casing. Centrally the wall or disk 3 has a hole 6 which is engaged by one end of a driving shaft 7. To the other end of this shaft is keyed a sprocket wheel 8 from which power is transmitted to the driven mechanism. The disk or wall 3 of the casing may be termed the motor element on which is a wrist-pin 9 which may be connected with the piston of the usual engine (not shown). From the inner face of the motor element, or disk 3 projects a spindle or stud-shaft 10 on which is rotatably

mounted a pinion or gear wheel 11 which meshes with a plurality of gears that are revolubly mounted on the shaft 7 and labeled 12, 13 and 14. The pinion 11 is also in mesh with a fixed gear wheel 15 which projects from the inner face of a wall 16 of the casing and may be an integral part of said wall. The toothed wheel 11 is therefore substantially four pinions secured together and the portion of said wheel or pinion meshing with the fixed gear 15 is distinguished from its remaining portion by the numeral 17. Between this portion and the portion labeled 11 is loosely mounted on a hub portion 19 of the pinion 11—17, a pinion or gear wheel 18 which is thick enough to mesh with a fixed gear wheel 20, (which may also be an integral part of the wall 16 and wheel 15,) and a gear wheel 21. The wheel 20, like the wheel 15, is fixed relative to the wall 16, or a toothed annular extension from the extension 15. When the disk or casing wall 3 is rotated the pinion 11 will be rotated by reason of the mesh of its portion 17 with the toothed portion 15. Likewise the portion 20 will engage and rotate the pinion 18, but the latter, as shown in Fig. 3, is larger in circumference than the pinion 11, or its portion 17, while the stationary ring of teeth 20 is smaller in circumference than the stationary ring of teeth 15. The pinion 18 will therefore be rotated at a slower rate of speed than the pinions 11 and 17. If the loose gears 12, 13 and 14 had the same number of teeth, respectively, as the pinion 11 they would, of course remain stationary while the pinion 11 rotated about the ring of teeth 15. The same would be true of the loose gear wheel 21 in its relation with the pinion 18 and ring of teeth 20.

Motion is imparted to the wheels 12, 13, 14, and 21 by providing the first three with larger numbers of teeth than contained on the ring of teeth 15 and providing the wheel 21 with more teeth than the number provided for the wheel 20. The wheels 15 and 20 may be termed fulcrum wheels and the pinions 11—17 and 18 driving or master wheels or pinions. In the illustration the fulcrum wheel 15 is provided with 30 teeth while the wheel 13 has 31 teeth. The latter wheel will therefore be moved the distance of one tooth at each complete rotation of the pinion 11, or 17, about the wheel 15. The

wheel 12 is provided with 32 teeth, which makes its speed of rotation double that of the wheel 13. The wheel 14 is provided with 33 teeth, making its speed three times that of the wheel 13. The fulcrum wheel 20 carries 20 teeth while the wheel 21 has 21 teeth, which gives the slowest of the four speeds shown in Figs. 3 to 8, inclusive, by reason of the fact that the driving or master pinion 18 is larger and rotates slower than the pinion 11, and the circumference of and number of teeth on the wheel 20 is smaller than that of the wheel 15. In the arrangements shown herein the pinion 11 and its part 17 have sixteen teeth while the pinion 18 has only 14 teeth.

Referring to Fig. 3, the shaft 7 is driven by one of the four wheels 12, 13, 14 or 21, and the arrangement for keying the shaft 7 to either of these wheels consists of the following parts: Each of the wheels 12, 13, 14 and 21 is provided with preferably four key-seats 39 to be engaged by a series of four keys 40, 41, 42 and 43 which are lateral projections on arms 44, pivoted on lugs 45 projecting from the inner face of a head 46 slidably mounted in a bore 47 in the hub of sprocket wheel 8. The arms 44 are placed in slots 48 formed in the periphery of the shaft 7. The head 46 is more firmly supported by a spindle 49 which projects rigidly from the head and is longitudinally slidable in a bore 50 through the axis of the shaft 7. The latter is provided with a flange 51 between which and the wheel 14 is interposed a washer 51'. To the flanged end of the shaft, which is flush with the outer surface of the disk or wall 3, is secured a washer 52 which is larger than the opening for the shaft through said disk or wall. The washer 52 is fastened by a screw 53 which has threaded engagement with a screw hole in the end of the shaft as shown in Fig. 3. The arms 44 are tensioned to spread apart and force the keys into their seats, by means of springs 54 which are each secured to its arm 44 at one end and bear

with the other end against the spindle 49. The hub of the sprocket wheel 8 is secured to the shaft 7 by means of a set screw 55 or by any other suitable means. Looking at Fig. 3 the shaft 7 and its parts are assembled by inserting the shaft from below through the shaft-openings in the loose gear wheels and casing until the flange 50 contacts with the washer 51. The sprocket wheel is then keyed to the shaft. Finally the spindle 49 is inserted from the upper end of the shaft, together with the arms 44. In Fig. 3 the keys 40 to 43 are shown in engagement with the wheel 21, the lowest speed. The mechanism for moving the keys from that position into engagement with either of the other wheels and holding the keys in the adjusted position consists of a lever 56 pivoted at 57 to a lug 58 on the casing 2, and at 59 to a lug 60 on the head 46. This lever is provided with a movable detent 56' that may be engaged with either of four notches 61, 62, 63 or 64 in a bar 65 extending rigidly from the casing.

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

The combination with a drum-shaped casing, one end or plane-side of which is revoluble, of a shaft mounted in said casing and serving as the axis of rotation for said end or plane-side, a set of change gears of equal diameters carried by said side, means to control the rotation of said gears, means to connect said gears to the shaft, and means for changing the connections of said gears and varying the speed of rotation of said shaft, said means being operable through the end of said shaft.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EMIL G. JOHANSON.

Witnesses:

JNO. H. NELSON,  
EDWIN B. NELSON.