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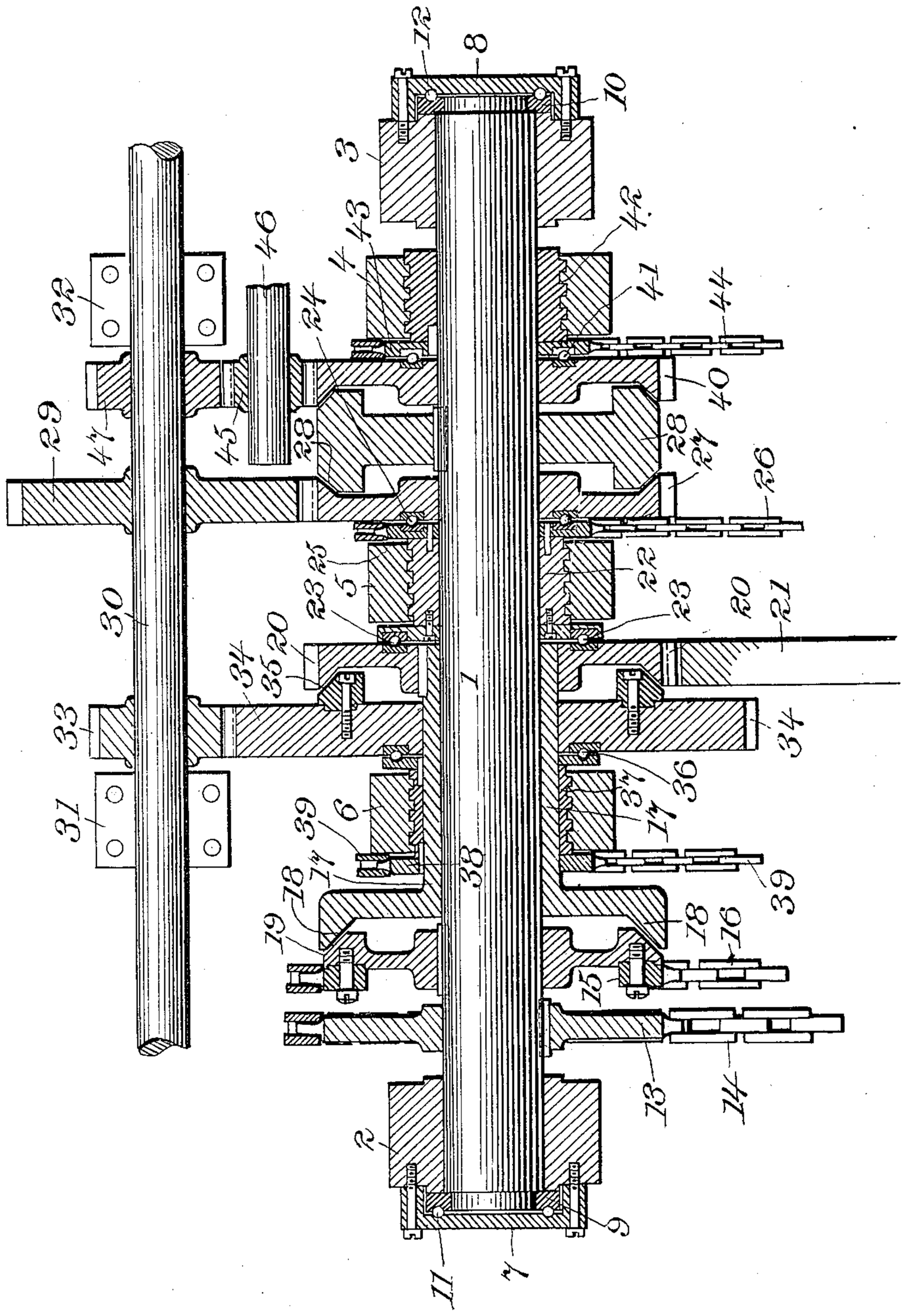
C. D. P. GIBSON.

DRIVING MECHANISM.

(Application filed Dec. 11, 1899.)

(No Model.)



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DRIVING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 658,544, dated September 25, 1900.

Application filed December 11, 1899. Serial No. 739,916. (No model.)

To all whom it may concern:

Be it known that I, CHARLES DAVID PAIGE GIBSON, a citizen of the United States of America, and a resident of Jersey City, county of Hudson, State of New Jersey, have invented certain new and useful Improvements in Driving Mechanism, of which the following is a specification.

My invention relates to driving mechanisms such as may be employed on self-propelled vehicles and other machines which require a compact, but powerful apparatus for this purpose.

The preferred form of apparatus embodying my invention is illustrated in the accompanying sheet of drawings, in which is shown a central section of the mechanism.

The main shaft 1 is journaled at either end in pillow-blocks 2 and 3 and at intermediate points in other pillow-blocks 4, 5, and 6. At either end of the shaft I provide end thrust-bearings, preferably in the form of caps 7 and 8. The ends of the shaft may be provided with bearing-rings 9 and 10, these rings and the caps 7 and 8 being grooved for the reception of ball-bearings 11 and 12. Power is transmitted to the shaft from any prime mover or other source of power (not shown) by a sprocket-wheel 13 and sprocket-chain 14 or by a second sprocket-wheel 15 and sprocket-chain 16, or by both. I propose two such connections, intending to operate them alternately from gears running at different speeds. A sleeve 17 is fitted on the main shaft 1 and is normally free to turn or slide thereon. It has a concave flange 18, which fits over the convex face 19 of one of the sprocket-wheels, as 15, or of some other wheel or disk rigidly keyed to the shaft 1. On the other end of the sleeve 17 is keyed a gear-wheel 20, from which the power may be taken off by a gear-wheel 21, meshing therewith, or by any other form of gearing.

One of the intermediate pillow-blocks 5 has an internal screw-thread cut or cast in it, and the corresponding journal-bearing 22 has a similar exterior thread meshing therewith. Between the abutting faces of the journal-bearing 22 and the sleeve 17 or gear-wheel 20 thereon I preferably place ball-bearings 23. Between the opposite face of the journal-bearing 22 and loose gear-wheel 27 I also place similar ball-bearings 24. On the journal-bearing 22 I pin or cast a sprocket-wheel 25, over which runs a sprocket-chain 26, which runs to any conveniently-mounted hand-wheel. (Not shown.) The loose gear wheel or disk 27 last referred to has a concave face which corresponds to and coöperates with a convex face on the disk 28 of opposite inclination to that of the face 19 of the gear wheel or disk 15 first referred to. This last disk 28 is also keyed to shaft 1. A counter-shaft 30 has a gear-wheel 29, meshing with gear-wheel 27. This counter-shaft is journaled in independent bearings 31 and 32. The counter-shaft carries a pinion 33, meshing with a loose gear-wheel 34, mounted on the sleeve 17. This loose gear-wheel has a coned ring 35, which coöperates with a concave face on the flange or gear-wheel 20, which is keyed to the sleeve 17, as before described, or which is otherwise rigidly attached thereto. Another intermediate pillow-block 6 is similarly provided with a threaded journal-bearing 37, between which and the loose gear 34 is another ball-bearing 36. A sprocket-wheel 38 and chain 39 are also provided for rotating this journal-bearing 37. A loose gear 40 is mounted on the main shaft on the opposite side of the rigid disk 28, before described, and corresponding cone-faces are provided between said disk 28 and loose gear 40. These may be forced into contact by a ball-bearing 41, threaded journal-bearing 42, sprocket-wheel 43, and chain 44, as before described. This loose gear 40 meshes with an idler-pinion 45 on a short shaft 46, and this idler-pinion meshes also with a pinion 47 on the counter-shaft 30.

Such being the construction and arrangement of parts, the operation of the invention is as follows: Motion is transmitted to the shaft 1 through one of the sprocket-chains 14 or, at a higher rate of speed, through the other sprocket-chain 16. While the parts are in the position shown in the drawings, in which all the cone-faces are out of engagement, the shaft 1, sprocket-wheels 13 and 15, and coned disk 28, which are all keyed to the shaft, will revolve idly, and no motion will be transmitted to the driven gear-wheel 21. If the threaded journal 22 be partially rotated by means of its sproket-wheel and chain 25

and 26 in a direction to cause it to shift to the left, the sleeve 17 on the main shaft 1 will be also forced to the left, and its coned flange 18 will be forced into engagement with the coned face 19 on one of the sprocket-wheels 15. This will lock the sleeve to the shaft and it will rotate with it, the ball-bearings 23 reducing the friction between the abutting faces of the journal-bearing 22 and the gear-wheel 20, keyed to the sleeve. This gear-wheel 20 will then rotate at the same speed as the shaft 1, and motion will be transmitted to the driven gear 21 at full speed. If slower speed is desired, the threaded journal-bearing 22 is rotated in the opposite direction. This forces it toward the right and first breaks the connection between the coned faces 18 and 19. Further movement to the right forces the coned face on the gear 27 into engagement with the left-hand coned face on the double-coned disk 28 and locks these two clutch elements together. Motion is then transmitted through this gear-wheel 27 and the counter-shaft 30 and gears thereon to the loose gear-wheel 34, mounted on the sleeve 17. Rotation of the journal-bearing 37 of this sleeve in a direction to produce motion to the right forces the loose gear-wheel 34 and its coned ring 35 also to the right. Engagement between this coned ring 35 and the coned face of gear-wheel 20, keyed on the sleeve 17, conveys motion to the said gear-wheel 20 in the same direction as before, but at a slower speed. This slower motion in the same direction is transmitted to the driven gear 21. If reverse motion is desired, the journal-bearing 22 is returned to its middle position, (shown in the drawings,) thus leaving the sleeve 17 and the loose pulley 27 both free of engagement with the main shaft 1. The journal-bearing 37 must be turned back slightly to allow the loose gear-wheel 34 and gear-wheel 20 on the sleeve to move a corresponding distance to the left, still retaining the engagement of the coned clutch-faces. The third intermediate threaded journal-bearing 42 is then rotated, so as to force the loose gear-wheel 40, located on the right side of the double-coned disk 28, to the left and into engagement with said disk. The motion of the main shaft 1 is then transmitted through the idler-pinion 45 and pinion 47 on the counter-shaft 30 to said counter-shaft, rotating the counter-shaft in a direction similar to that of the main shaft. This motion is transmitted and reversed through the other pinion 33 on the counter-shaft and the loose gear 34 on the sleeve 17 to the gear 20 (rigid on said sleeve) by reason of the engagement of the coned clutch-faces. The reverse motion is then transmitted from the last gear 20 to the driven gear 21.

The advantages of my invention reside in its compactness. Nearly all the elements of the mechanism are arranged concentrically about the main shaft. The use of the screw mechanism for forcing the clutch-faces into engagement gives great power with smoothness of action, and in case the clutch slips under added load the clutch-faces can be forced into still closer engagement up to a point which will transmit the entire power which the prime mover is capable of giving out. The ball-bearings remove all sources of friction, and the arrangement by which the clutch-faces in the train of mechanism producing one speed are only thrown into gear when those transmitting motion at a different speed are thrown out of gear forms an automatic check against a locking or breaking of the gearing by the coupling up at the same time of trains of mechanism transmitting motion at different speeds.

It is evident, of course, that various changes could be made in the details of construction illustrated without departing from the spirit and scope of my invention so long as the principle of operation described in the specification or the relative arrangement of the elements of the various combinations illustrated in the drawings is preserved. Different forms of gearing might be substituted for those shown, and the form of the coöperating clutch-faces might be varied. Other means of rotating the threaded journal-bearings might be substituted; but all such changes I should consider mere modifications of my invention and still within the boundaries thereof.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. The combination of the shaft, the clutch member rigid with the shaft, the coöperating loose clutch member concentric with the shaft but free to slide and turn thereon, the pillow-block having a screw-thread cut therein, the journal-bearing for the shaft having a screw-thread meshing with the thread cut in the pillow-block in which the journal-bearing is mounted, means for rotating said journal-bearing and means whereby its movement along the line of the axis of the shaft produced by such rotation is transmitted to the loose clutch member.

2. The combination of the shaft, the clutch member rigid with the shaft, the coöperating loose clutch member concentric with the shaft but free to slide and turn thereon, the pillow-block having a screw-thread cut therein, the journal-bearing for the shaft having a screw-thread meshing with the thread cut in the pillow-block in which the journal-bearing is mounted, means for rotating said journal-bearing and ball-bearings between the end of the journal-bearing and the loose clutch member.

3. The combination of the shaft, the clutch member rigid with the shaft, the coöperating loose clutch member concentric with the shaft but free to slide and turn thereon, the pillow-block having a screw-thread cut therein, the journal-bearing for the shaft having a screw-thread meshing with the thread cut in the

pillow-block in which the journal-bearing is mounted, means for rotating said journal-bearing consisting of a sprocket-wheel rigidly fixed to the journal-bearing, and a sprocket-chain engaging therewith, and means whereby its movement along the line of the axis of the shaft produced by such rotation is transmitted to the loose clutch member.

4. The combination of the shaft, the clutch member rigid with the shaft, the coöperating loose clutch member concentric with the shaft but free to slide and turn thereon, the pillow-block having a screw-thread cut therein, the journal-bearing for the shaft having a screw-thread meshing with the thread cut in the pillow-block in which the journal-bearing is mounted, means for rotating said journal-bearing and means whereby its movement along the line of the axis of the shaft produced by such rotation is transmitted to the loose clutch member, together with the end-thrust ball-bearings for the shaft.

5. The combination of the shaft, clutch members rigid with the shaft and having cone-faces of opposite inclination, two loose clutch members coöperating with the rigid members, concentric with the shaft, but free to slide and turn thereon, pillow-blocks having screw-threads cut therein, journal-bearings for the shaft mounted in said pillow-blocks and having screw-threads meshing with the pillow-blocks, means for rotating said journal-bearings, and means whereby the motion along the axis of the shaft so created is transmitted to the two loose clutch members so that as one is thrown into engagement the other is automatically released from engagement.

6. The combination of the shaft, clutch members rigid with the shaft and having cone-faces of opposite inclination, two loose clutch members coöperating with the rigid members, concentric with the shaft but free to slide and turn thereon, pillow-blocks having screw-threads cut therein, journal-bearings for the shaft mounted in said pillow-blocks and having screw-threads meshing with the pillow-blocks, means for rotating said journal-bearings and means whereby the motion along the axis of the shaft so created is transmitted to the two loose clutch members so that as one is thrown into engagement the other is automatically released from engagement, together with the train of gearing conveying motion from one loose clutch member to the other.

Signed by me at New York, N. Y., this 27th day of November, 1899.

CHARLES DAVID PAIGE GIBSON.

Witnesses:
W. H. PUMPHREY,
ROBERT GERBRACHT, Jr.