

No. 765,445.

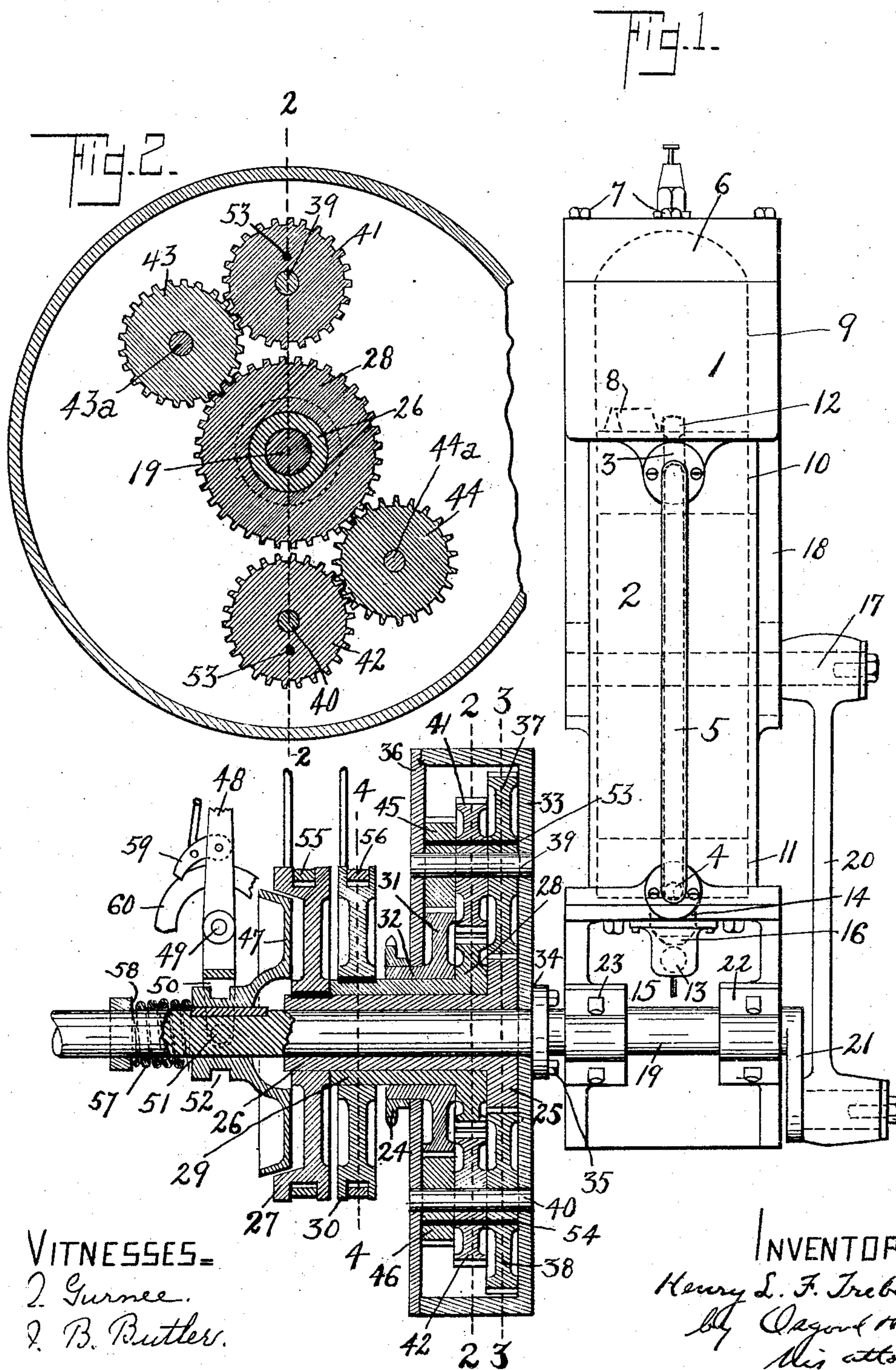
PATENTED JULY 19, 1904.

H. L. F. TREBERT.
VARIABLE SPEED MECHANISM.

APPLICATION FILED JULY 16, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



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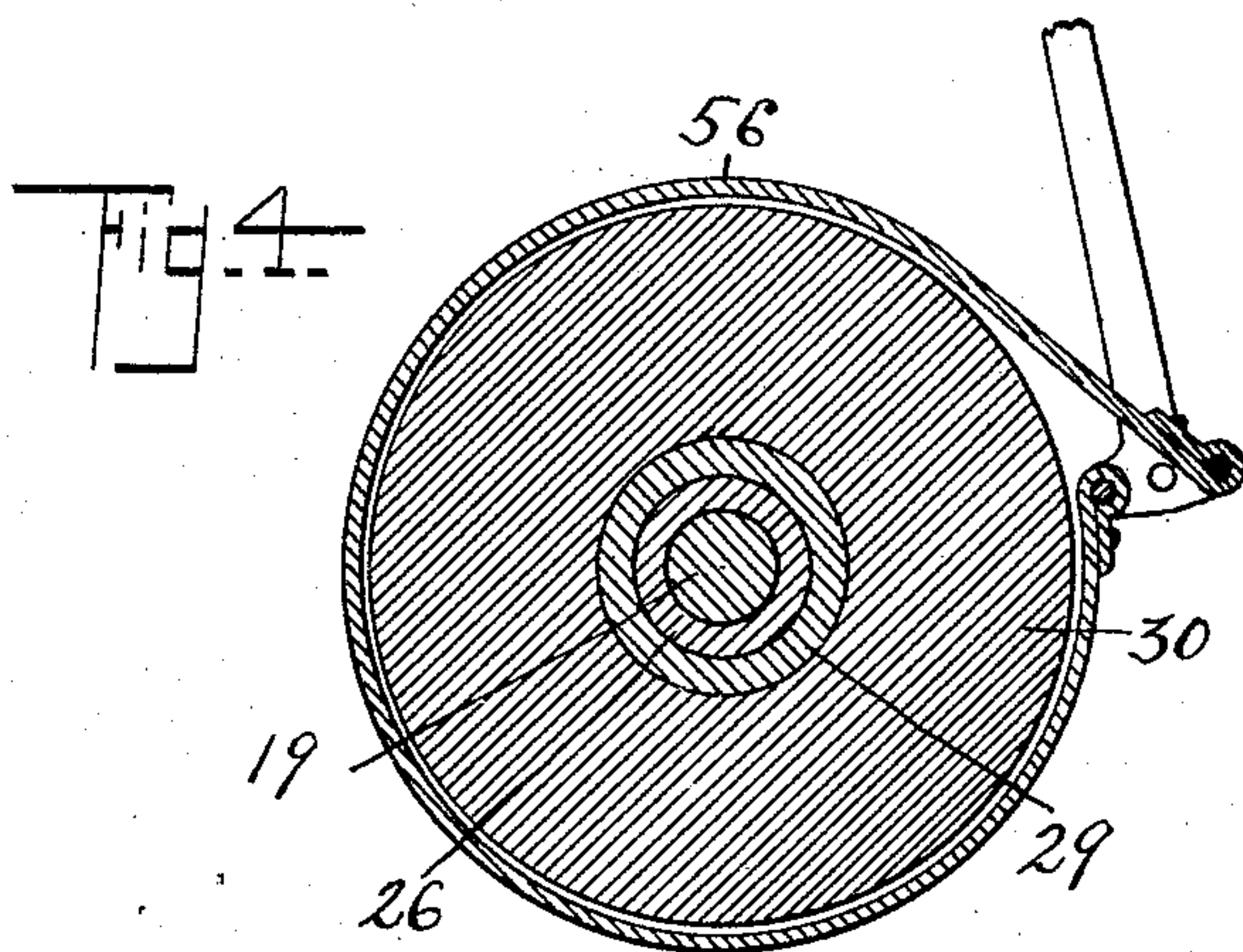
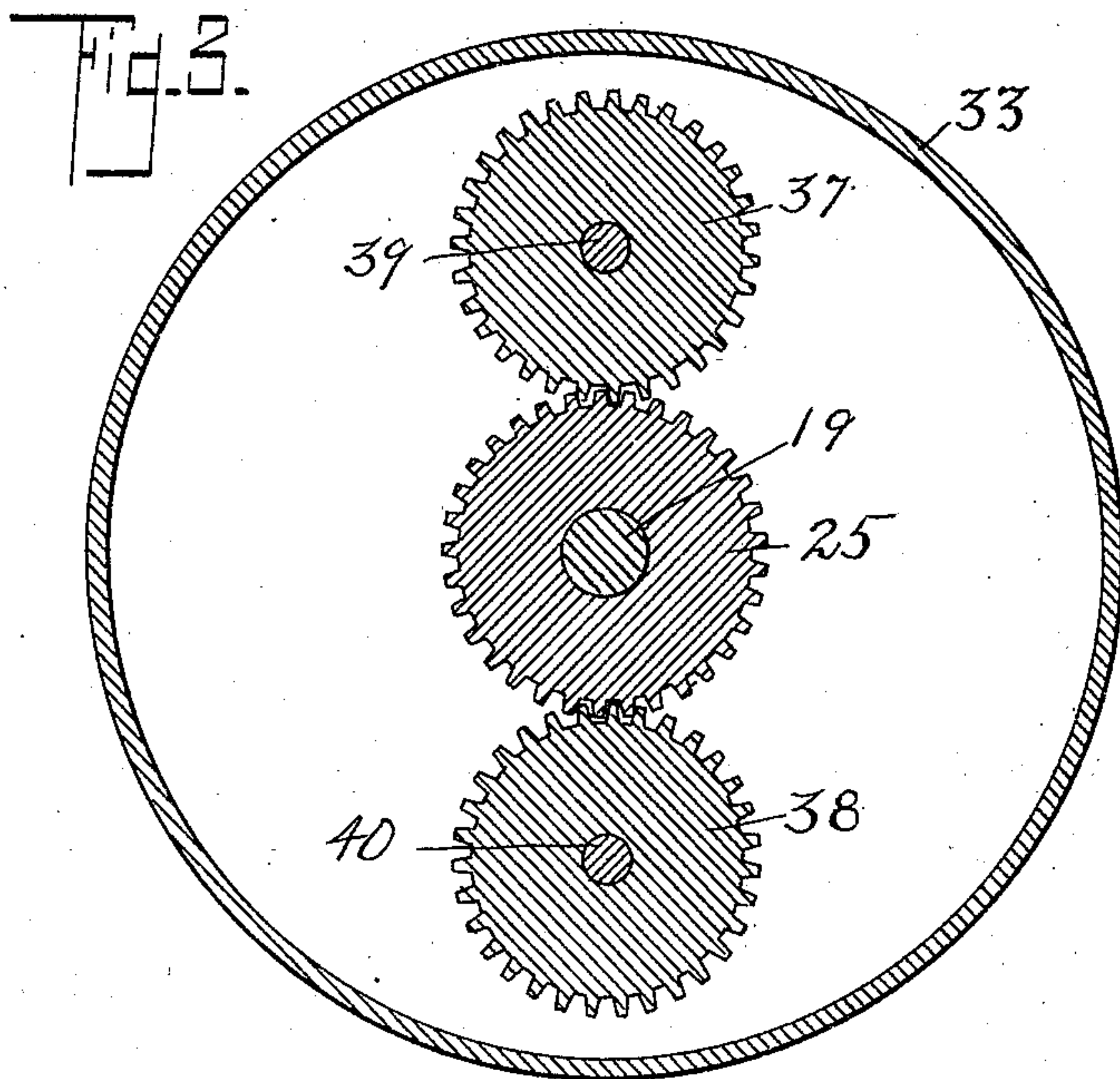
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UNITED STATES PATENT OFFICE.

HENRY L. F. TREBERT, OF ROCHESTER, NEW YORK.

VARIABLE-SPEED MECHANISM.

SPECIFICATION forming part of Letters Patent No. 765,445, dated July 19, 1904.

Application filed July 16, 1903. Serial No. 165,837. (No model.)

To all whom it may concern:

Be it known that I, HENRY L. F. TREBERT, a citizen of the United States, and a resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Variable-Speed Mechanism, of which the following is a specification.

This invention relates to improvements in variable-speed mechanism, and has for its object to provide a simple and easily-operated mechanism for use with gas-engines and in other connections in order to drive a wheel at several different speeds without changing the speed of the driving-shaft and to drive said wheel in a reverse direction to that in which the driving-shaft revolves.

The novel features of the invention will be pointed out and described in the course of the following specification.

The variable-speed mechanism is shown in connection with a gas-engine.

In the drawings, Figure 1 shows both an end view of the engine proper and a section of the gearing on the line 2 2 of Fig. 2. Fig. 2 is a section on the line 2 2 of Fig. 1. Fig. 3 is a section on the line 3 3 of Fig. 1, and Fig. 4 is a section on the line 4 4 of Fig. 1.

1 is the cylinder, and 2 the piston, of the gas-engine. 3 and 4 are ports connecting said cylinder with the compression-chamber 5. The cylinder-head is indicated by 6. The explosion-chamber is indicated by 9, and a deflector 8 directs the gas into it. The upper end 10 of the piston and its lower end 11 are packed to fit the cylinder snugly. 12 is a port through which the exhaust gases pass out from the explosion-chamber. The explosive mixture is conducted to the cylinder from the carbureter (not shown) through the pipe 13. This pipe is represented as discharging into a chamber 14, formed on the frame 15, which constitutes the lower end of the cylinder. The chamber 14 opens directly into the cylinder and has a valve 16 beneath said opening that controls the flow of gas. The piston-rod 17 passes laterally through said piston at its center and is rigidly attached thereto. Said rod works between guides 18 and is con-

nected to the driving-shaft 19 by the connecting-rod 20 and the crank 21.

The driving-shaft 19 is supported in bearings 22 and 23 on the frame 15 and is connected with the driven member—in this instance the sprocket 24—through gearing by which said sprocket may be driven either at the speed of the engine or at a lower speed or reversed or disconnected altogether from the driving-shaft, as desired. Said gearing comprises the following parts, viz: The spur-gear 25 is attached to the sleeve 26, the latter being revoluble upon the driving-shaft 19, the brake-wheel 27 keyed to said sleeve 26, the spur-gear 28 attached to the sleeve 29, the latter being revoluble upon said sleeve 26, the brake-wheel 30 keyed to said sleeve 29, the spur-gear 31 attached to the sleeve 32, the latter being revoluble upon said sleeve 29, the fly-wheel 33 attached to the shoulder 34 on the shaft 19, as by the bolts 35, so as to revolve therewith, and having the removable casing 36, the two similar spur-gears 37 and 38 revolubly supported on the fly-wheel 33 by the shafts 39 and 40, respectively, on opposite sides of the shaft 19 and both in mesh with said gear 25, the two similar spur-gears 41 and 42 also revolubly supported by the said shafts 39 and 40, respectively, the two similar spur-gears 43 and 44 revolubly supported on the fly-wheel 33 by the shafts 43^a and 44^a, respectively, on opposite sides of the shaft 19, said gear 43 meshing with said gears 28 and 41 and said gear 44 meshing with said gears 28 and 42, so that they are respectively reverse driving connections between the gear 28 and gears 41 and 42, the two similar spur-gears 45 and 46 also revolubly supported by the shafts 39 and 40, respectively, and both adapted to mesh with said gear 31, and a clutch 47 keyed to the driving-shaft 19, so that it revolves therewith, but is movable longitudinally thereon to engage the said brake-wheel 27 and lock it to said driving-shaft. The intermediate gearing connections between the gears on the sleeves 26 and 29, respectively, and the gear on the sleeve 32, that carries the driven member—the sprocket 24—are revolubly supported by and rotate with a support 33, that is attached in them to the

shaft, so that said gearing connections are radially attached to said shaft. The gearing connections, comprising the shafts 39, 40, 43^a, and 44^a and the gears that said shafts support, respectively constitute parts of the said fly-wheel, and accordingly the weight of said parts is made to increase the efficiency of said fly-wheel. An arm 48 for throwing the said clutch 47 in and out of engagement is pivoted to the frame of the engine, as at 49, and provided with a yoke 50, having pins 51, that lies in a groove 52 in said clutch. The said gears 37, 41, and 45 are fastened together, as by a pin 53, so that they revolve as one piece, and the said gears 38, 42, and 46 are likewise fastened together, as by a pin 54, so that they also revolve as one piece. Band-brakes 55 and 56, of ordinary construction, are adapted to retain the wheels 27 and 30, respectively, against rotation. Fig. 4 shows in cross-section the band-brake 56, with the lever by which it is operated. The band-brake 55 upon the wheel 27 is similar to that and similarly operated.

The operation of the gearing is as follows: When the clutch 47 is disengaged from the wheel 27 and the band-brakes 55 and 56 are loose, as represented in Fig. 1, the gears 37, 41, and 45 revolve upon their shaft 39 and the gears 38, 42, and 46 revolve on their shaft 40, causing the gears 25 and 28, and consequently the sleeves 26 and 29, to revolve in the same and opposite directions, respectively. The chain on the sprocket 24 will hold the gear 31, and consequently the sleeve 32, from revolving with said gears. In this position of the parts the driving-shaft 19 and driven member—viz., the sprocket 24—run independently of each other. If the clutch is kept out of engagement and the band-brake 55 is applied to the wheel 27, the gear 25 is held stationary thereby and causes the gears 37 and 38 to revolve as their respective supporting-shafts revolve about the driving-shaft 19, and inasmuch as the gears 45 and 46 are revoluble with said gears 37 and 38, respectively, the gear 31 is driven by means of said last-mentioned gears, and consequently the sprocket 24. This is the low speed. If the clutch 47 is thrown into engagement with the wheel 27, the gears 37, 41, and 45 and the gears 38, 42, and 46 are locked to the gear 25, which now revolves with the shaft 19, and the gear 31 and consequently the sprocket 24 are driven by means of the gears 45 and 46 at the speed of the engine. If the clutch 47 is disengaged from the wheel 27 and the band-brake 56 is applied to the gear 30, so that the gear 28 is held against rotation, the gears 43 and 44, both of which are in mesh with said gear 28, are caused to revolve and drive, respectively, the sprocket 24 through the gears 41, 45, (pinned to 41,) and 31 on one side of the driving-shaft 19 and the gears 42, 46, (pinned to 42,) and 31 on its other side. This will drive

the sprocket in a reverse direction to that in which the shaft 19 revolves.

The clutch 47 is held in engagement with the brake-wheel 27 by a coiled spring 57 on the driving-shaft 19 between the shoulder 58 on said shaft and the clutch 47. A key 59 is shown for locking the clutch in its disengaged position, in which it is represented in Fig. 1, by engaging with a guide 60.

What I claim is—

1. The combination with a driving-shaft, of two gears independently revoluble upon said shaft; a driven member, so connected with one of said gears as to be revoluble therewith; means adapted to hold the other of said gears against rotation; means for locking said last-mentioned gear to said driving-shaft so that it revolves therewith; gearing connections between said gears; and a support revoluble with said shaft, adapted to revolubly support said gearing connections; whereby said driven member may revolve independently of said driving-shaft, or be driven at either the speed of the driving-shaft or a lower speed.

2. The combination with a driving-shaft, of three gears, independently revoluble upon said shaft; a driven member so connected with one of said gears as to be revoluble therewith; means adapted to hold one of the other said gears against rotation; means for locking the third of said gears to said driving-shaft so that it revolves therewith; gearing connections between the said gear that is connected with the driven member and the said gear that is adapted to be locked to said driving-shaft; reverse-gearing connections between the said gear that is connected with said driven member and the said gear that is adapted to be held against rotation; supports revoluble with said driving-shaft adapted to revolubly support said gearing connections, respectively; whereby said driven member may revolve independently of said driving-shaft, or at the speed of said driving-shaft, or be reversed.

3. The combination with a driving-shaft, of three gears independently revoluble upon said shaft; a driven member so connected with one of said gears as to be revoluble therewith; means adapted to hold the other two gears, respectively, against rotation; means for locking one of said last-mentioned gears to said driving-shaft so that it revolves therewith; gearing connections between said gear that is connected with the driven member and said gear that is adapted to be locked to said driving-shaft; reverse-gearing connections between said gear that is connected with said driving member, and that other said gear that is adapted to be held against rotation; and supports, revoluble with said driving-shaft, adapted to revolubly support said gearing connections, respectively; whereby said driven member may revolve independently of said

driving-shaft, or may be driven at a higher or lower speed than said shaft, or reversed.

4. The combination with a driving-shaft, of a fly-wheel attached to said shaft and revoluble therewith; two gears independently revoluble upon said shaft; a driven member so connected with one of said gears as to be revoluble therewith; means adapted to hold the other said gear against rotation; means for locking said last-mentioned gear to said driving-shaft so that it revolves therewith, gearing connections between said gears, revolubly supported by said fly-wheel.

5. The combination with a driving-shaft of a fly-wheel attached to said shaft and revoluble therewith; three gears independently revoluble upon said shaft; a driven member connected with one of said gears so as to be revoluble therewith; means adapted to hold one of the other said gears against rotation; means for locking the third of said gears to said driving-shaft so that it revolves therewith; gearing connections between the said gear that is connected with said driven member and the said gear that is adapted to be locked to said driving-shaft, supported by said fly-wheel; and reverse-gearing connections between the said gear that is connected with said driven member and the said gear that is adapted to be held against rotation, revolubly supported by said fly-wheel.

6. The combination with a driving-shaft, of a fly-wheel attached to said shaft and revoluble therewith; three gears within said fly-wheel, independently revoluble upon said shaft; a driven member so connected with one of said gears as to be revoluble therewith, means adapted to hold the other two gears respectively against rotation; means for locking one of said last-mentioned gears to said driving-shaft so that it revolves therewith; gearing connections between said gear that is connected with said driven member and said gear that is adapted to be locked to said driving-shaft, revolubly supported by said fly-wheel and reverse-gearing connections between said gear that is connected with said driving member and that other said gear that is adapted to be held against rotation, revolubly supported by said fly-wheel.

7. The combination with a driving-shaft, of two concentric sleeves independently revoluble upon said shaft; a gear fast upon each of said sleeves; a driven member fast upon one of said sleeves; means for holding the other sleeve against rotation; means for locking said last-mentioned sleeve to said driving-shaft so that it revolves therewith; gearing connections between said gears on said sleeves; and a support revoluble with the driving-shaft adapted to revolubly support said gearing connections.

8. The combination with a driving-shaft, of three concentric sleeves, independently revoluble upon said driving-shaft; a gear fast upon

each of said sleeves; a driven member fast upon one of said sleeves; means for holding another of two sleeves against rotation; means for locking the third of said sleeves to said driving-shaft, so that it revolves therewith; gearing connections between the gear on the sleeve that carries the driven member and the gear on the sleeve that is locked to said driving-shaft reverse-gearing connections between said gear on the sleeve that carries the driven member and the gear on the sleeve that is adapted to be held against rotation; and supports revoluble with said driving-shaft, adapted to revolubly support said gearing connections, respectively.

9. The combination with a driving-shaft, of three concentric sleeves, independently revoluble upon said driving-shaft; a gear fast upon each of said sleeves; a driven member fast upon one of said sleeves; means for holding the other two sleeves, respectively, against rotation; means for locking one of said last-mentioned sleeves to said driving-shaft, so that it revolves therewith; gearing connections between the gear on the sleeve that carries the driven member and the gear on the sleeve that is locked to said driving-shaft; reverse-gearing connections between said gear on the sleeve that carries the driven member and the other said sleeve that is adapted to be held against rotation; and supports revoluble with said driving-shaft, adapted to revolubly support said gearing connections, respectively.

10. The combination with the driving-shaft 19, of the concentric sleeves 26 and 32, independently revoluble upon said shaft; the gears 25 and 31, attached to said sleeves, respectively; the sprocket 24, attached to said sleeve 32; the brake-wheel 27, attached to said sleeve 26, means for holding said brake-wheel against rotation; the clutch 47, attached to said driving-shaft, revoluble therewith, and adapted to lock said brake-wheel 27 to said shaft; means for operating said clutch; the fly-wheel 33, attached to said driving-shaft, and revoluble therewith; the gears 37 and 45, revolubly supported in said fly-wheel; and adapted to mesh with said gears 25 and 31, respectively, and means for connecting said gears 37 and 45 whereby they revolve together.

11. The combination with the driving-shaft 19 of the concentric sleeves 26, 29 and 32, independently revoluble upon said shaft 19, gears 25, 28 and 31, attached to said sleeves, respectively; the sprocket 24 attached to said sleeve 32, the brake-wheels 27 and 30, attached to said sleeves 26 and 29, respectively; means for holding said brake-wheels 27 and 30, respectively, against rotation; the clutch 47, attached to said driving-shaft, revoluble therewith, and adapted to lock said brake-wheel 27 to said shaft; means for operating said clutch; the fly-wheel 33, attached to said driving-shaft, and revoluble therewith; the gear 43 revolubly supported in said fly-wheel, and

meshing with said gear 28; and the gears 37, 41 and 45, connected so as to revolve together, revolubly supported in said fly-wheel, and adapted to mesh with said gears 25, 43 and 31, respectively.

12. The combination with the driving-shaft 19, of the concentric sleeves 26, 29 and 32, independently revoluble upon said shaft 19; gears 25, 28 and 31, attached to said sleeves, respectively; the sprocket 24, attached to said sleeve 32; the brake-wheels 27 and 30, attached to said sleeves 26 and 29, respectively; means for holding said brake-wheels, respectively, against rotation; the clutch 47, attached to said driving-shaft, revoluble therewith, and adapted to lock said brake-wheel 27 to said shaft; means for operating said

clutch; the fly-wheel 33 attached to said driving-shaft and revoluble therewith; the gears 43 and 44 revolubly supported in said fly-wheel, and both meshing with said gear 28; the gears 37, 41 and 45, connected so as to revolve together, revolubly supported in said fly-wheel, and adapted to mesh with said gears 25, 43 and 31, respectively and the gears 38, 42 and 46, connected so as to revolve together, revolubly supported in said fly-wheel on the opposite side of the shaft from the gears 37, 41 and 45, and adapted to mesh also with the gears 25, 43 and 31, respectively.

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Witnesses:

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