No. 695,894. Patented Mar. 18, 1902.

V. V. TORBENSEN.

CHANGEABLE SPEED GEARING.

(Application filed June 26, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

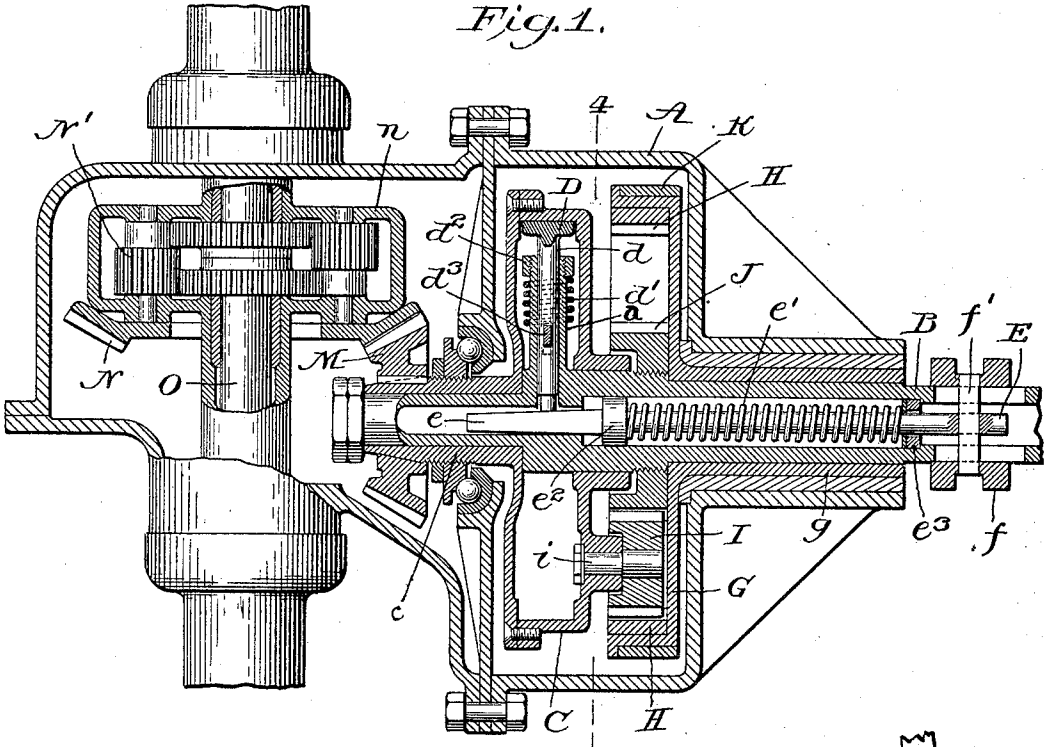
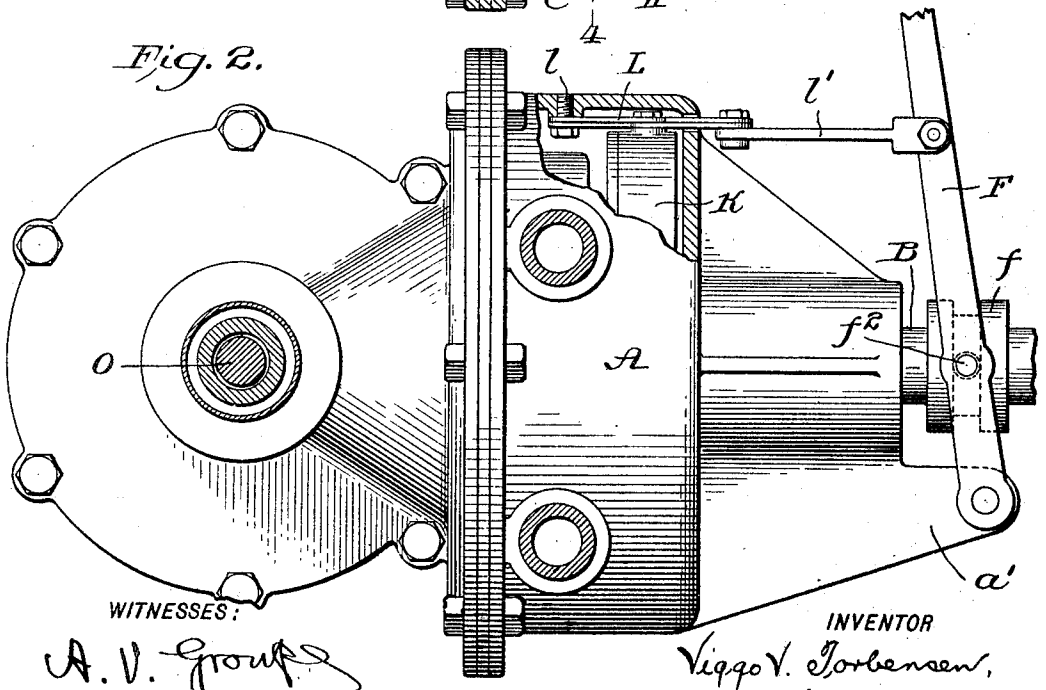


Fig. 2.



WITNESSES:

A. V. Groupe

L. Nolan

INVENTOR

Viggo V. Torbensen,

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 695,894. Patented Mar. 18, 1902.

V. V. TORBENSEN.

CHANGEABLE SPEED GEARING.

(Application filed June 26, 1901.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

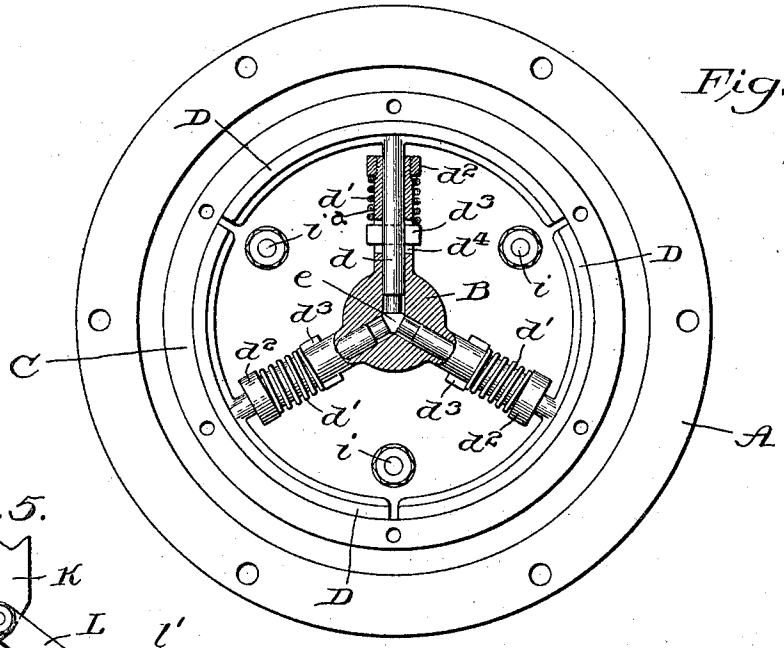
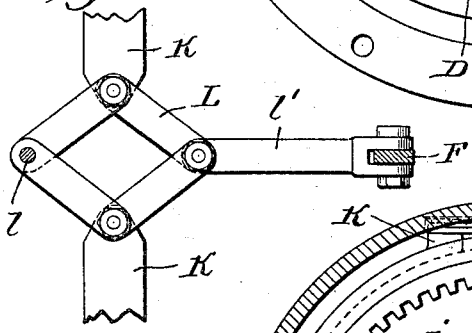


Fig. 5.



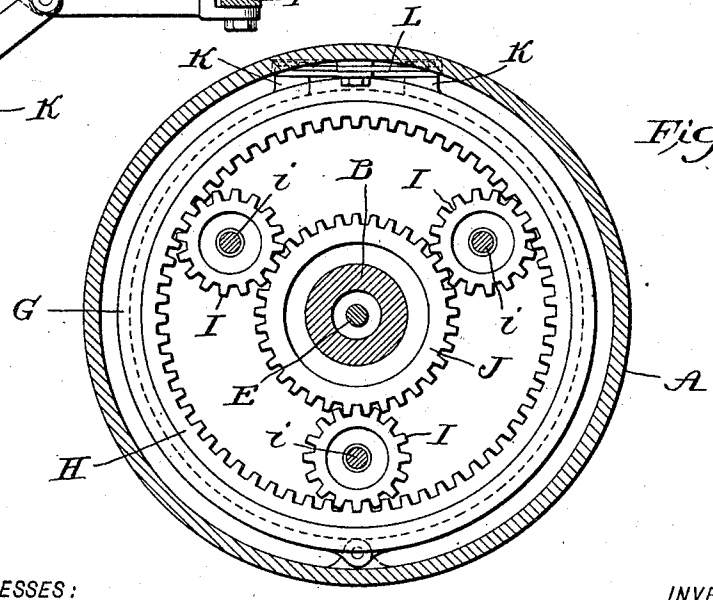


Fig. 4.

WITNESSES:

A. V. Groupé

L. Nolan

INVENTOR

Viggo V. Torbensen,

BY John R. Nolan

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

VIGGO V. TORBENSEN, OF BLOOMFIELD, NEW JERSEY.

CHANGEABLE-SPEED GEARING.

SPECIFICATION forming part of Letters Patent No. 695,894, dated March 18, 1902.

Application filed June 26, 1901. Serial No. 66,084. (No model.)

To all whom it may concern:

Be it known that I, VIGGO V. TORBENSEN, a citizen of the United States, residing at Bloomfield, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Changeable-Speed Gearing, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to changeable-speed gearing for motor-vehicles, my object herein being to provide a simple and efficient construction and organization of mechanism whereby the speed of the vehicle may be reduced without affecting the speed of the motor, thus proportionally increasing the torque of the driving-wheels to facilitate the mounting of steep grades by the vehicle, as will be hereinafter particularly described and claimed.

In the drawings, Figure 1 is a horizontal section of my improved gearing and adjuncts. Fig. 2 is a side elevation thereof, part of the casing being broken away. Fig. 3 is a sectional view of the clutch mechanism, the heads of clutch and frame cases being removed. Fig. 4 is a transverse section, as on the line 4 4 of Fig. 1. Fig. 5 is a detail of the brake devices.

A represents a fixed casing, B the main shaft mounted in bearings therein and driven by the motor in the usual manner, and C a clutch-case loosely mounted on the said shaft. This shaft has formed on or fixedly secured to it a series of radially-projecting tubular arms a, which are confined in said case. In these arms are slidingly fitted the stems of clutch-segments D, that are adapted to be moved against and from the inner annular wall of the clutch-case in a manner to render the latter fast or loose on the shaft, as desired. The segments are maintained normally retracted from the wall of the casing by the action of spiral springs d', which, encircling the respective arms, bear against collars d^2 on the latter and opposing pins d^3, that extend from the stems through vertical slots d^4 in the respective tubular arms. The inner ends of the stems bear against the elongated tapering portion e of a spindle E, which is fitted to and guided in an axial opening in the shaft, whereby when the spindle is moved longitudinally in one direction the stems are gradually forced radially outward by the action thereagainst of the taper e in a manner to clamp the segment against the casing, and thereby lock the latter fixedly to the shaft. When the spindle is retracted, the stems and segments resume their normal position to free the casing. The spindle is maintained normally in the forward or clamping position by a stout spiral spring e', which, encircling the spindle, bears against a collar e^2 thereon and a shoulder e^3 within the shaft, the force of said spring being sufficient to overcome the combined force of the retracting-springs d' on the radial arms. Loose on the shaft B is a circumferentially-grooved collar f, which is connected with the spindle by means of a pin f', extending through longitudinal slots in the shaft. Embracing this collar is a yoke-lever F, provided with studs f^2, which register with the groove of the collar, the lower end of the lever being fulcrumed to a laterally-extending lug a' on the fixed frame-casing, whereby when the upper or free end of said lever is drawn laterally away from the casing the spindle is retracted against the compression of the spring e' to permit the clutch-sectors to assume their normal or retracted position.

Loosely mounted on the main shaft, laterally of the clutch-case, is the elongated hub of a casing G, carrying an internal spur-gear H, with the teeth of which mesh a series of laterally-disposed pinions I on the clutch-case C. These pinions, of which there are three in the present instance, are loosely mounted on studs i, affixed to the side of the clutch-case at regular intervals apart. Fast on the shaft B is a spur-wheel J, with the teeth of which said pinions are also engaged. Encircling the periphery of the casing G is a brake-band K, the ends of which are united by toggle-jointed levers L, pivoted at l to said casing. These levers are connected by means of a rod l' with the hand-lever F, whereby when the latter occupies its inward or normal position the toggle-levers are open and the brake-band is loose on the casing, and when said lever is pulled outward to effect the release of the clutch-case the toggle-levers are closed and the band drawn tightly with a braking force upon the casing G.

On the clutch-case C is an elongated hub c,

having a bearing in the frame-casing. Keyed or otherwise affixed to this hub is a bevel-gear M, which coacts with a similar gear N, forming part, preferably, of a differential gearing N′, contained in the box *n*, which latter gearing is of any usual or well-known character, constructed and arranged as heretofore to control and drive the secondary shaft O.

The operation is as follows: When the hand-lever F is set in vertical position, the taper spindle E is withdrawn sufficiently to permit the clutch-segments to recede from contact with the clutch-case. The shaft B will rotate freely, and the wheel G, with its internal gear H, will run idly. Upon moving the lever farther toward the right and against the pressure of the confined spring *e′* the resultant closing of the toggle-joints I will tighten the brake-band until it retains the wheel G and internal gear H stationary. The gear J, revolving with the shaft B, will rotate the pinions I, and the latter will revolve about the internal gear, thus effecting the rotation of the clutch-case C and, perforce, the driving-gear M. The ratio of speed of this gear M to the speed of the driving-shaft will of course be as the ratio between the pinions I and the internal gear, and hence said gear M will be driven at a reduced rate of speed in respect to that of the driving-shaft. If the lever F be now released, the spring *e′* will force the spindle E toward the left, thereby effecting the release of the brake-band K and forcing the clutch-segments bodily into engagement with the clutch-case C. The latter will therefore be locked fixedly to the driving-shaft, and the speed of the driving-gear M will in consequence correspond with that of said shaft—viz., normal.

From the foregoing it will be seen that the speed of the driving-shaft remains unaffected in any position of the lever and that therefore the speed of the motor-vehicle equipped with my improved gearing can be reduced without affecting the speed of the motor, thus proportionately increasing the torque of the driving-wheels and enabling the vehicle to mount steep grades. It will also be seen that by the described mode of actuating the clutch through the medium of the elongated tapering portion of the spring-controlled axially-arranged spindle simplicity of construction and efficiency of operation are secured.

I claim—

1. The combination with the main shaft, arms thereon, movable clutch devices carried by said arms, a clutch member on said shaft adapted to be rendered fast or loose thereon by actuation of said devices, means contained within the shaft for actuating said devices, an internal gear loosely mounted on the shaft, a fixed gear on said shaft, pinions on the clutch member coacting with said internal and fixed gears, and brake mechanism for said internal gear.

2. The combination with the main shaft provided with radially-extending tubular arms, segments carried by stems fitted to said arms, springs to maintain said segments normally retracted, a clutch member loosely mounted on the shaft and adapted to be rendered fast or loose thereon by actuation of said segments, a spindle contained within said shaft and provided with a tapering portion engaged by said stems, means for operating said spindle, and gearing between said shaft and the clutch member.

3. The combination with the main shaft provided with radially-extending tubular arms, segments carried by stems fitted to said arms, springs to maintain said segments normally retracted, a clutch member loosely mounted on the shaft and adapted to be rendered fast or loose thereon by actuation of said segments, a spindle contained within said shaft and provided with a tapering portion engaged by said stems, a spring acting upon said spindle to maintain the segments normally engaged with the clutch member, means for retracting said spindle, and gearing between said shaft and the clutch member.

4. The combination with the main shaft, arms thereon, movable clutch devices carried by said arms, a clutch member on said shaft adapted to be rendered fast or loose thereon by actuation of said devices, means contained within the shaft for actuating said devices, a lever for operating said means, a wheel loosely mounted on said shaft and provided with internal gear-teeth, a fixed gear on said shaft, pinions on the clutch member coacting with said internal gear-teeth and fixed gear, a brake-band on said wheel, and connections between said lever and band.

5. The combination with the main shaft provided with radially-extending tubular arms, segments carried by stems fitted to said arms, springs to maintain said segments normally retracted, a clutch member loosely mounted on the shaft and adapted to be rendered fast or loose thereon by actuation of said segments, a spindle contained within said shaft and provided with a tapering portion engaged by said stem, a spring acting upon said spindle to maintain the segments normally engaged with the clutch member, a lever for retracting said spindle, a wheel loose on said shaft provided with internal gear-teeth, a fixed gear on said shaft, pinions on the clutch member coacting with said internal gear-teeth and fixed gear, a brake for said wheel, and connections between said brake and lever.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

VIGGO V. TORBENSEN.

Witnesses:

ANDREW V. GROUPE,

JOHN R. NOLAN.