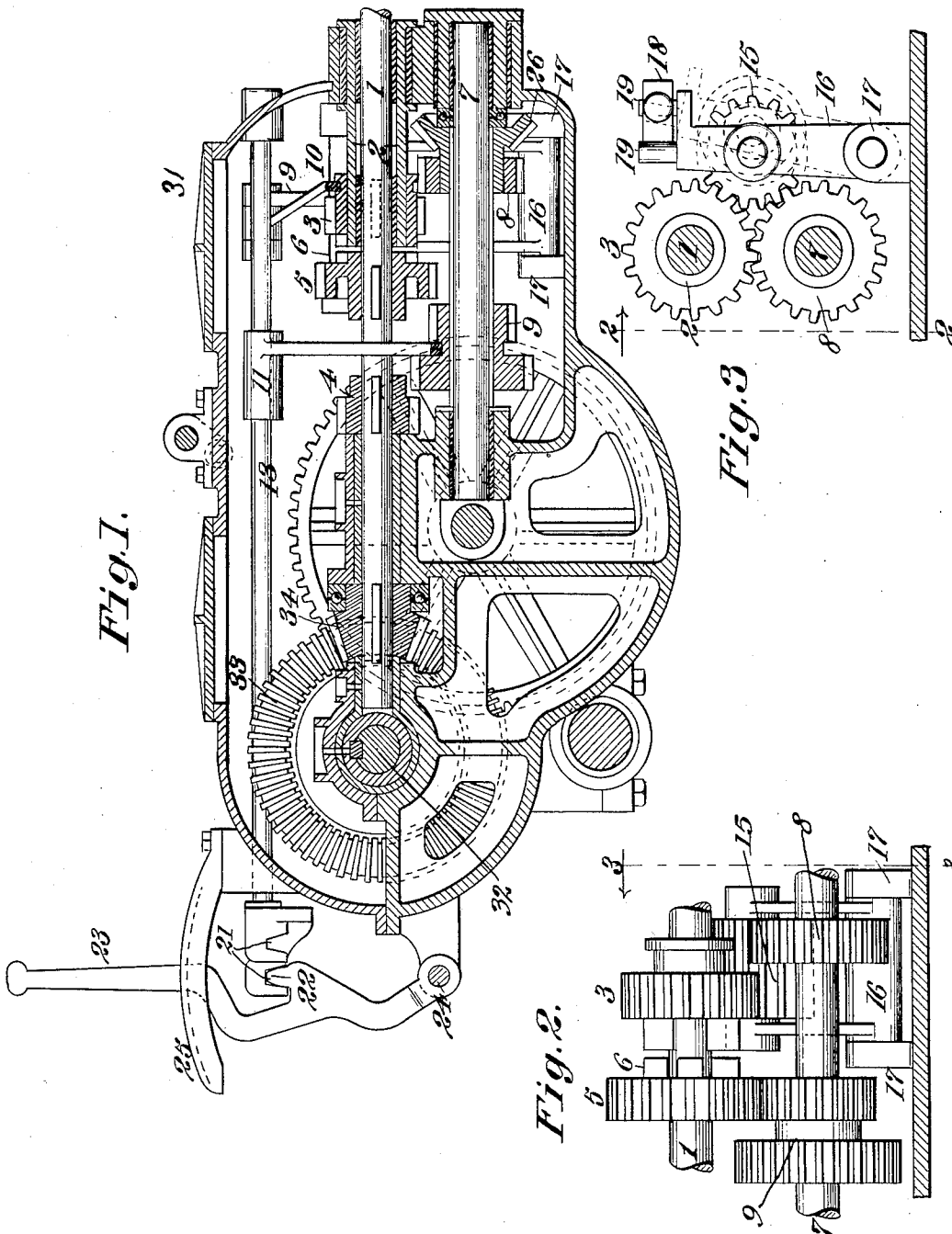


W. TURNBULL.
TRACTION ENGINE MECHANISM.
APPLICATION FILED JAN. 15, 1917.

1,395,019.

Patented Oct. 25, 1921.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 4.

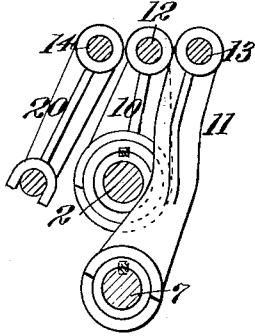


Fig. 5.

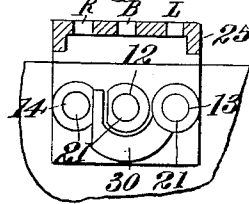


Fig. 6.

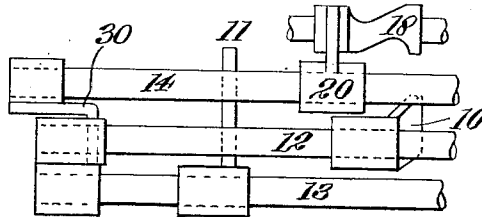


Fig. 7.

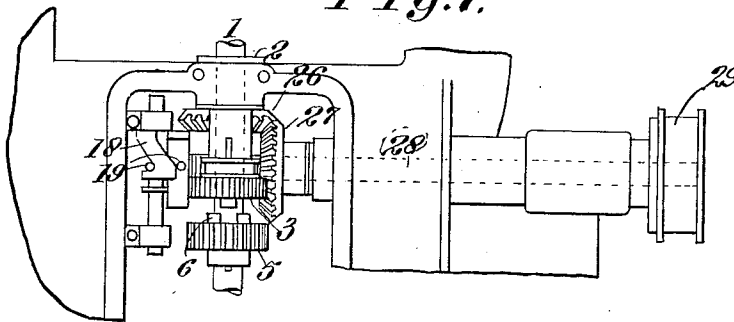
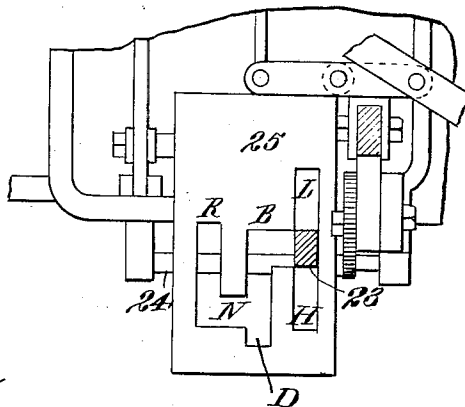


Fig. 8.



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UNITED STATES PATENT OFFICE.

WILLIAM TURNBULL, OF STOCKTON, CALIFORNIA, ASSIGNOR TO THE HOLT MANUFACTURING COMPANY, OF STOCKTON, CALIFORNIA, A CORPORATION OF CALIFORNIA.

TRACTION-ENGINE MECHANISM.

1,395,019.

Specification of Letters Patent.

Patented Oct. 25, 1921.

Original application filed February 10, 1916, Serial No. 77,382. Divided and this application filed January 15, 1917. Serial No. 142,535.

To all whom it may concern:

Be it known that I, WILLIAM TURNBULL, a citizen of the United States, residing at Stockton, in the county of San Joaquin and State of California, have invented new and useful Improvements in Traction-Engine Mechanism, of which the following is a specification.

This invention relates to traction engines of the kind in which the whole of the weight of the vehicle is supported upon a pair of endless tracks and the vehicle is steered by varying the relative speeds of the tracks.

The object of the present invention is to provide an improved gear box for this type of tractor or traction engine.

According to the present invention I provide a self-contained gear box having a direct drive, higher and lower indirect drives, a reverse drive, and a drive for a belt or power pulley capable of being used when the machine is employed as a stationary engine; and this gear box is wholly controlled by a single lever. This single lever is slidable laterally upon a fulcrum rod and is adapted to be rocked to engage any one of three push rods arranged side by side. These push rods can be advanced or retracted by means of the lever and through suitable fork-arms will effect the meshing of the pinions upon the rotatable members within the gear box.

A driving sleeve rotated from the motor is provided with a slidable pinion keyed thereon and a main shaft passes through said sleeve. On this shaft are arranged two fixed pinions and a stepped pinion upon a counter-shaft is adapted to be engaged with either of said fixed pinions. The slidable pinion upon the driving sleeve can be locked to one of these fixed pinions on the main shaft or can be slid to engage a fixed pinion on the counter-shaft. This fixed pinion on the counter-shaft is provided with a bevel pinion meshing with a similar pinion on a belt pulley shaft. A reversing pinion is also adapted to be swung into position between the fixed pinion on the counter-shaft and the slidable pinion on the sleeve.

Upon the accompanying drawings, illustrating the present invention as applied to

a tractor of the type employing endless self-laying tracks and indicated in my copending case, Serial No. 77,382, filed on or about the 10th day of February, 1916, of which this is a division.

Figure 1 shows a central, longitudinal sectional view of the transmission and associated parts.

Fig. 2 shows a detached side elevation of the shiftable gears of the transmission.

Fig. 3 shows an end elevation seen from the right hand side of Fig. 2.

Fig. 4 shows a detached sectional view of the gear shifting mechanism.

Fig. 5 shows a vertical, sectional view of the guide plate for the gear-shifting lever, illustrating the push-rods therefor in end elevation.

Fig. 6 shows a detail plan view of the gear-shifting mechanism.

Fig. 7 shows a plan view of the belt pulley drive.

Fig. 8 shows in plan a suitable guide plate for the gear-shifting lever.

Numeral 1 designates the main shaft of the gear box, which shaft is adapted to be driven directly or indirectly by means of the driving sleeve 2. This driving sleeve 2 is rotated in any suitable manner, for example by a motor arranged upon the chassis of the tractor with an interposed friction clutch and connections of the usual type. A driving pinion 3 is slidable on said sleeve 2 and is keyed thereto so as to rotate with said sleeve. Pinions 4 and 5 are fixed to the main shaft 1, the one adjacent to the driving pinion 3 being provided with a jaw clutch face 6 capable of being engaged by a cooperating clutch face on the slidable pinion 3. One of the gears 5 is of comparatively large diameter while the other gear 4 is preferably one-half as large in diameter. Below the main shaft 1 is a counter-shaft 7 carrying a fixed pinion 8 and a slidable stepped pinion 9 both keyed upon the counter-shaft. The fixed pinion 8 is adjacent to the slidable driving pinion 3 and is adapted to be intermeshed therewith, while the stepped pinion 9 is situated in a plane between the fixed pinions 4 and 5 above, and

is capable of being meshed with one or the other thereof. The slidable pinions 3 and 9 are provided with shift arms 10 and 11 respectively, mounted on parallel push rods 12 and 13 respectively (see Fig. 6).

At one side of the shafts 1 and 7 is a reversing pinion 15 (shown in Figs. 2 and 3) mounted upon a yoke 16, pivoted at its lower end to lugs 17 carried on the bottom of the transmission casing. The said gear 15 is in position to mesh with both of the gears 3 and 8, so that it can transmit motion from the former to the latter for the purpose of reversing the direction of rotation of the shaft 7. An inclined cam 18, working between pins 19 carried on the transmission casing, is fixed to the yoke 16 and has an arm 20 connecting it with a third push-rod 14; the latter being arranged parallel to and in a plane with the push-rods 12 and 13. The rear end of each push-rod is formed as a boss notched at 21 so as to be engageable by a toothed lug 22 on a shifting lever 23, the latter being laterally movable upon a fulcrum rod 24 mounted in lugs projecting from the casing. The said lever 23 is guided into position for engaging its lug 22 with any one notch 21 in a selective manner by means of a slotted plate 25 of the gate type which may be shaped as shown in Fig. 8. The three slots in this plate R—N, B—D and L—H correspond with the three push-rods 14, 12 and 13. In that plate, the positions of the lever 23 are as follows: N, neutral position, where no engagement occurs between the lever 23 and the push-rods and no angular movement of the said lever is permitted; this is the position of the parts shown in Fig. 1. D, direct drive wherein the lever 23 is engaged with the rod 12, with said rod retracted for the driving pinion 3 to be clutched with the fixed pinion 5, thereby permitting a direct drive from the driving sleeve 2 to the shaft 1.

When the lever 23 is at B (for operation of the belt pulley) the push-rod 12 is moved forwardly to cause driving pinion 3 to mesh with the fixed pinion 8, and fixedly connected to the latter is a beveled pinion 26, meshing with a beveled pinion 27 carried upon a transverse shaft 28 projecting to one side of the frame and having fixed upon its outer end a belt pulley or power pulley 29 for furnishing power for stationary purposes, such as driving machinery by belt from said pulley.

When the lever 23 is moved to H, the driving pinion 3 remains in mesh with pinion 8, but push-rod 13 is engaged and moved rearwardly whereupon the stepped pinion 9 will engage the small pinion 4 and thereby drive the shaft 1 at an increased speed. L, indicating the low speed, is at the opposite end of the same slot in the plate, and the lever 23 in that position moves the stepped

pinion 9 forward to mesh with the large pinion 5, thus transmitting a slower speed to the drive-shaft 1.

To reverse the direction of rotation of shaft 1, lever 23 is moved to R at the opposite side of the plate 25 (thereby placing the pinions 3 and 9 in neutral position) engaging the rod 14 so as to move the same forwardly and through the action of the inclined cam 18 to cause a rocking of the yoke 16 which will engage the pinion 15 carried thereby with the pinions 3 and 8. At the same time the rod 13 has to be moved by the lever 23. The rod 13 has an arm 30, as shown in Fig. 5, which projects to a point adjacent to the rod 14 where it is adapted to be engaged by the tooth 22 on the lever 23 when the latter is in position for reversing the direction of drive. Thus the rod 13 will be moved forwardly coincident with the rod 14, causing an engagement of the stepped pinion 9 with the large pinion 5 and the consequent transmission of movement from the reversely driven counter-shaft 7 to the shaft 1 at slow speed.

The above-described arrangement gives a simple and easy control of the transmission gearing and allows the use of three speeds for driving the tractor, a reverse driving of the same, and a separate belt-pulley drive, all by means of a single controlling lever 23.

Obviously by making the transmission case integral with the frame, and housing the various parts of the shifting mechanism by the cover 31, all the moving and lubricated parts of the transmission system are rendered dust-proof and oil-proof. The insertion of the rods 12, 13 and 14 at the ends of the gear-box avoids open slots and other openings through which dirt might enter or oil escape.

This gear box is of a compact nature, the casing apart from its lid or cover being particularly well suited to be incorporated in a one-piece frame casting.

At 32 I have shown the transverse jack shaft on which is mounted the bevel wheel 33 engaged by the bevel pinion 34 keyed upon the shaft 1. Upon the shaft 32 are also mounted the sleeves of the steering friction clutches whereby the relative speeds of the endless tracks may be altered, and for an understanding of those portions of Fig. 1 not herein described, reference should be made to the aforesaid prior application Serial No. 77,382.

Having thus described my invention what I claim and desire to secure by Letters Patent is—

1. In a transmission mechanism, a main shaft, a countershaft parallel therewith, a driving member having a shiftable element alternately connectible with driving gears on the main and countershafts, means to connect the main and countershafts together,

said means having a shiftable element to vary the relative speeds of the two shafts, and a reversing member adapted to be swung into engagement with the shiftable element on the driving member and connectible with the driving gear on the countershaft.

2. In a transmission mechanism, a main shaft, a countershaft parallel therewith, a driving member having a shiftable element to alternately connect with the main and countershafts, means to connect the main and countershaft together, said means having a shiftable element to vary the relative speeds of the two shafts, means to reverse the direction of rotation of the main shaft, said reversing means including a member adapted to be swung into and out of operative position, and a single member for controlling the operation of both of said shiftable elements and means for operatively connecting said control member to the swinging member of the reversing means.

3. A transmission mechanism comprising a main shaft for driving a transmission shaft, a counter shaft parallel with said main shaft, a driving sleeve rotatably mounted upon the main shaft, a pinion fixed upon the main shaft adjacent the end of the driving sleeve, a spur pinion of reduced diameter fixed upon the main shaft in spaced relation to the first named pinion, a step pinion splined upon the counter shaft and adapted to be alternately brought to engage said first and second pinions carried by the main shaft, a fixed pinion carried by the counter shaft, driving means carried by the sleeve adapted to mesh with the fixed pinion on the counter shaft or to interlock with the first named pinion on the main shaft, means for moving said driving means to produce said alternate engagement and means for shifting the step pinion to vary the final driving speed of the main shaft by its engagement with one of the fixed pinions of said main shaft, a reversing gear, and means for moving said gear to simultaneously register with the driving means upon the driving sleeve and the fixed pinion upon the counter shaft.

4. In a transmission mechanism, a main shaft, a countershaft parallel therewith, a driving member having a shiftable element alternately connectible with the main and countershafts, means to connect the main and countershafts together, said means including a shiftable element to vary the relative speeds of the two shafts, means to reverse the direction of rotation of the main shaft, a shift rod for each shiftable element,

a rocking member for the reversing means, a single lever for controlling both shift rods and operative connections between said lever and the rocking member.

5. A power transmission mechanism comprising a shiftable driving gear, a main shaft, a counter shaft parallel thereto, a plurality of speed changing gears upon the main shaft, a shiftable member upon the counter shaft adapted to selectively engage the various gears on the main shaft, a final drive pinion carried by the counter shaft and means whereby the shiftable driving gear may be brought into driving mesh with the final drive pinion or may act to lock the main shaft to rotate with the driving member, and a reverse gear adapted to be brought to simultaneously mesh with the driving gear and the final drive pinion when said gear and pinion are out of engagement.

6. A power transmission mechanism comprising a shiftable driving gear, a main shaft, a counter shaft parallel thereto, a plurality of speed changing gears upon the main shaft, a shiftable member upon the counter shaft adapted to selectively engage the various gears on the main shaft, a final drive pinion carried by the counter shaft and means whereby the shiftable driving gear may be brought into driving mesh with the final drive pinion or may act to lock the main shaft to rotate with the driving member, a reverse gear adapted to be brought to simultaneously mesh with the driving gear and the final drive pinion when said gear and pinion are out of engagement, means for controlling the shiftable member on the counter shaft, means for controlling the shiftable movement of the driving gear, means for moving the reverse gear, and a single control lever for selectively actuating all of said control means.

7. In a power transmission mechanism, a shiftable driving member, a shiftable step gear, a reversing gear adapted to be swung into and out of operative position, operating members for each of said gears and a single control lever adapted to selectively operate said gears to shift the driving gear and the step gear in alternate directions or to swing the reversing gear.

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

WILLIAM TURNBULL.

Witnesses:

J. G. SMITH,

W. J. TALBOT.