(No Model.) 4 Sheets—Sheet 1.

G. D. LOWRY.

TRACTION ENGINE.

No. 492,303. Patented Feb. 21, 1893.

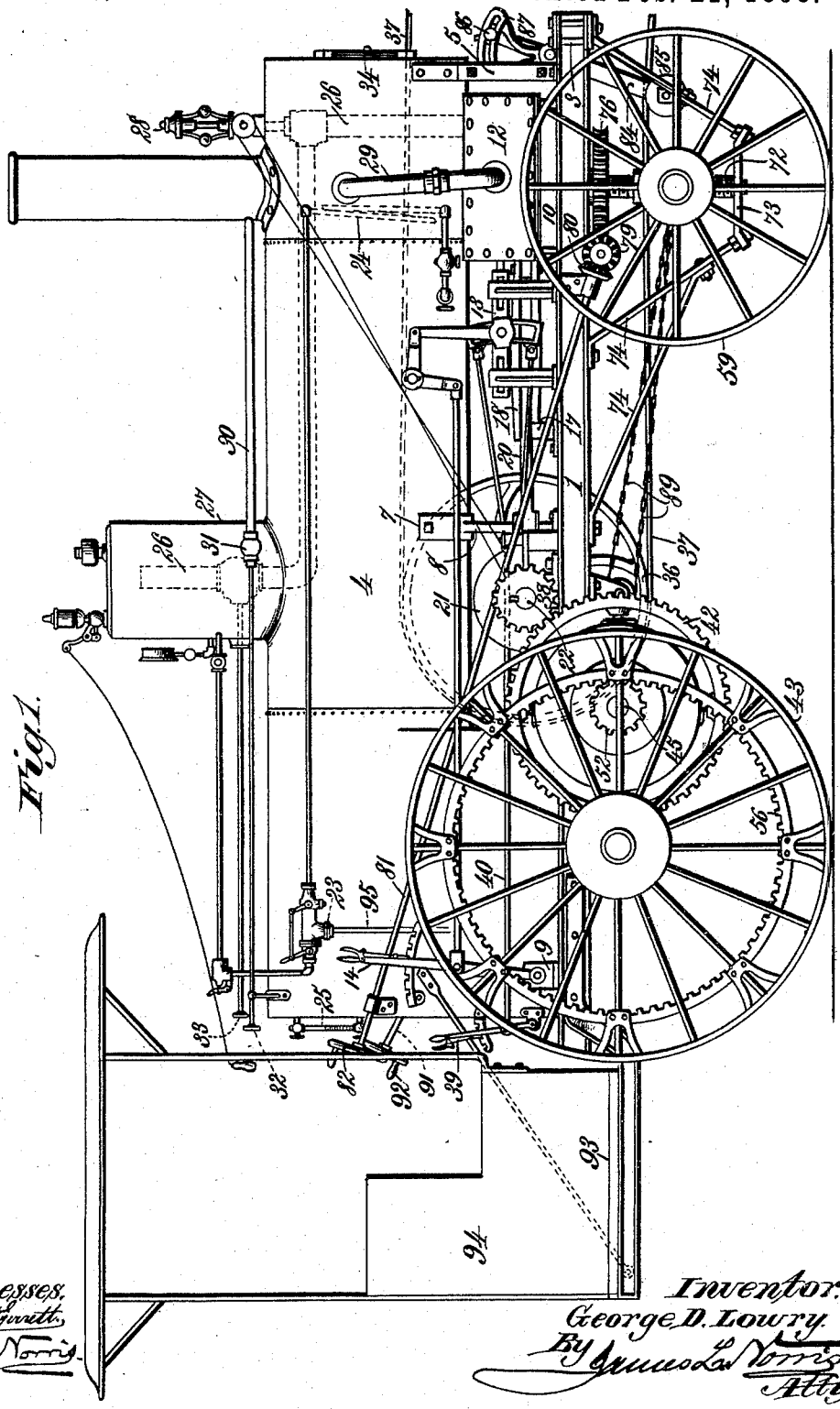

Fig. 1.

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(No Model.)

4 Sheets—Sheet 2.

G. D. LOWRY.

TRACTION ENGINE.

No. 492,303. Patented Feb. 21, 1893.

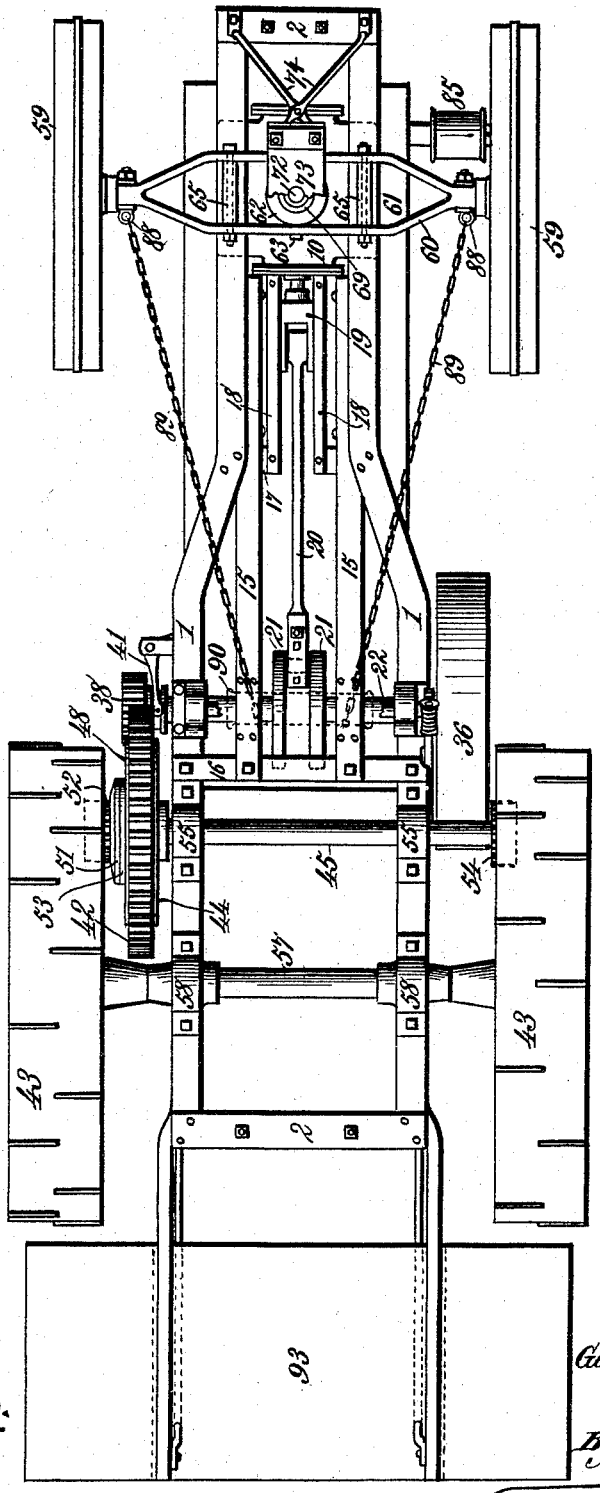

Fig. 2.

Witnesses.
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(No Model.) 4 Sheets—Sheet 3.

G. D. LOWRY.

TRACTION ENGINE.

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Fig. 3.

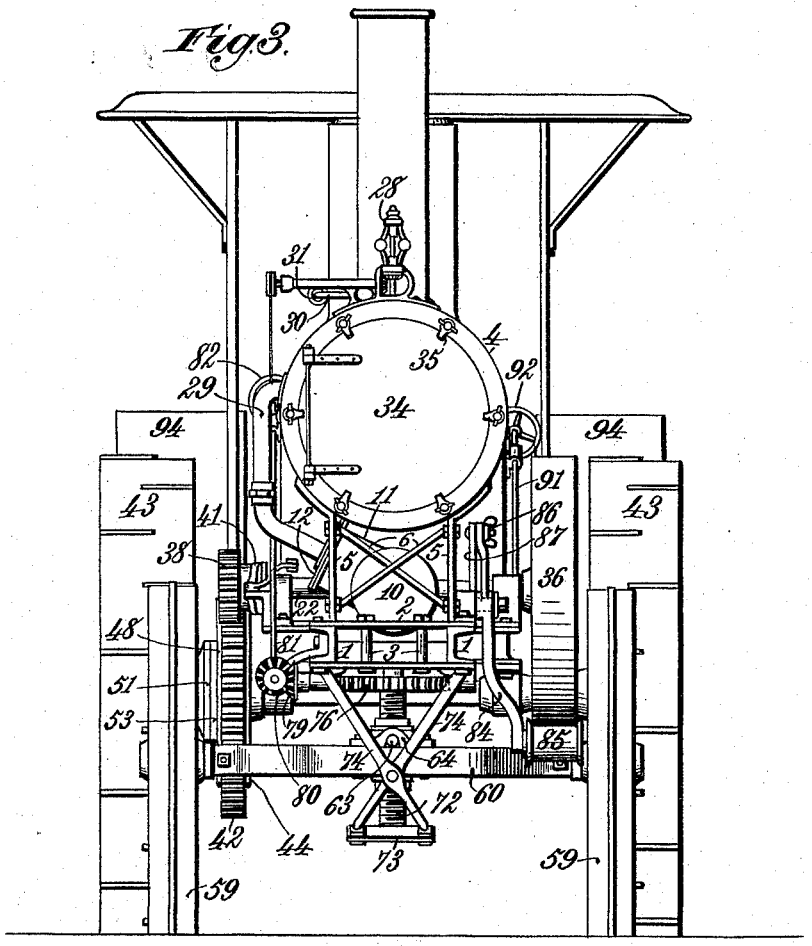


Fig. 4.

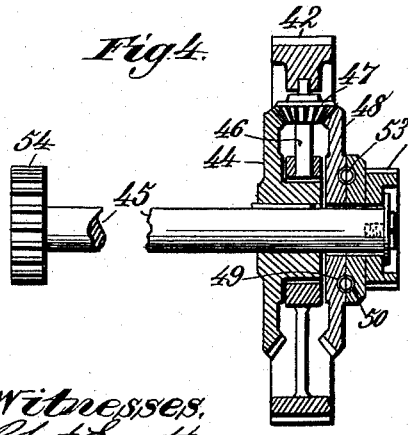


Fig. 5.

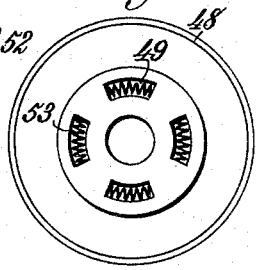
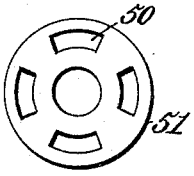


Fig. 6.



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(No Model.) 4 Sheets—Sheet 4.

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TRACTION ENGINE.

No. 492,303. Patented Feb. 21, 1893.

Fig. 7.

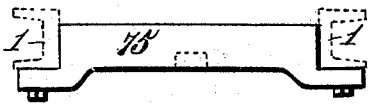


Fig. 8.

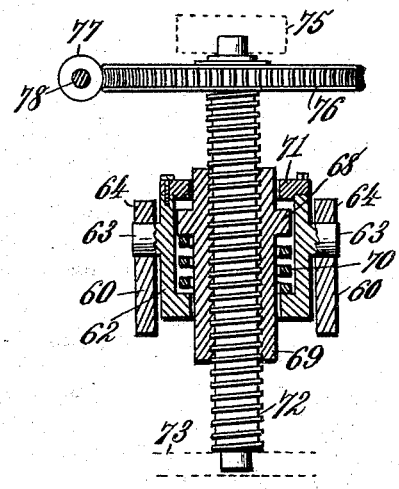


Fig. 9.

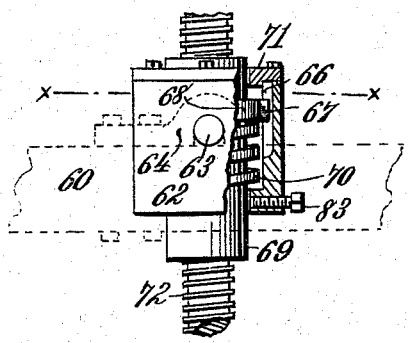
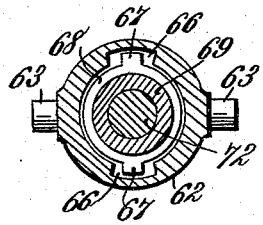


Fig. 10.



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A. H. Norris.

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UNITED STATES PATENT OFFICE.

GEORGE D. LOWRY, OF WHEELING, MISSOURI.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 492,303, dated February 21, 1893.

Application filed October 13, 1892. Serial No. 448,748. (No model.)

To all whom it may concern:

Be it known that I, GEORGE D. LOWRY, a citizen of the United States, residing at Wheeling, in the county of Livingston and State of Missouri, have invented new and useful Improvements in Traction-Engines, of which the following is a specification.

My invention relates to traction engines and has for its objects to provide for relieving the boiler and engine from injurious strains by mounting them independently of each other upon a channel bar iron frame of light, compact and durable construction; to gear the engine crank shaft directly with the spur gear of differential or compensating gearing that is supported upon a countershaft mounted in bearings on said frame and having pinions geared with the rear wheels which are arranged for traction purposes; to relieve the boiler head and engineer's platform from all shafting and gearing whereby ample room is afforded for safely operating the machine; to provide an improved and reliable mechanism for leveling the boiler and machine frame on sloping and uneven ground and to distribute the weight of the machine in ascending hills; and to generally improve the construction and relative arrangement of parts in a traction engine or road locomotive as hereinafter more particularly set forth.

To these ends the invention consists in the peculiar features of construction and novel combinations of devices in a traction engine, as hereinafter described and claimed.

In the annexed drawings illustrating the invention—Figure 1 is a side elevation of my improved traction engine. Fig. 2 is a reverse or under plan view of the same. Fig. 3 is a front elevation of the engine. Fig. 4 is a view of the countershaft and differential gearing through which the traction wheels are driven from the main engine shaft. Fig. 5 is a view of a recessed and spring cushioned bevel gear forming part of the differential gearing. Fig. 6 is a view of a recessed disk or plate adapted to register with the recessed portion of the spring cushioned bevel gear and forming part of a pinion that is loosely mounted on one end of the counter shaft. Fig. 7 is a view of a portion of the machine frame showing the upper bearing for a screw spindle forming part of the leveling mechanism of the boiler and machine frame. Fig. 8 is a sectional elevation of the leveling mechanism showing, also, the divided forward axle in cross-section. Fig. 9 is a partly sectional elevation of the leveling device, at a right angle to Fig. 8. Fig. 10 is a horizontal section on the line $x\ x$ of Fig. 9.

Referring to the drawings the numeral 1 designates the main portion of the machine frame which is constructed of longitudinally arranged channel bar irons that are securely connected and braced both above and below by transverse straps or bars 2 arranged at suitable and convenient intervals. The upper and lower transverse straps or bars 2 may in turn be braced by vertically arranged sleeved bolts 3, where required, in order to combine the advantages of strength and rigidity with lightness of structure and enable the frame to withstand the strains to which it may be subjected.

By reference to Fig. 2 it will be seen that the parallel channel bar irons 1 constituting the main portion of the frame are contracted or bent toward each other at a point between the forward and rear ground wheels so as to make the forward portion of the frame comparatively narrow and thus afford ample room for the necessary movements of the forward wheels in guiding and turning the machine when employed as a traction engine.

At a suitable distance above the frame 1 and supported thereon is a steam boiler 4 of the ordinary locomotive type and which, therefore, need not be particularly described. The forward end, or smoke arch portion, of this boiler is supported above and connected to the forward end of the main frame by means of standards 5 that are connected to each other by diagonally arranged cross braces 6, Fig. 3. At or about its center the boiler rests in a saddle 7 carried by standards 8 secured to the channel iron frame, as shown in Fig. 1, and as also shown in this figure the rear end or fire box portion of the boiler is connected to the frame by lugs or braces 9 of suitable construction. If desired the boiler may be further connected to the frame 1 at other convenient points.

The engine cylinder 10 is located immedi-

ately beneath the forward portion of the boiler and is secured to the channel iron frame in any convenient manner. As shown in Fig. 3 the steam chest 11 projects from the side of the cylinder and in an upwardly and outwardly inclined direction and is provided with a removable plate or cover 12 to which easy access is thus afforded for the purpose of opening the steam chest to make any necessary adjustment or repairs to the slide valve. On one of the channel bar irons 1 is supported the usual valve operating mechanism 13, Fig. 1, having eccentric connections with the main shaft and connected in the ordinary manner with a reversing lever 14 located adjacent to the driver's cab or platform at the rear end of engine.

Between the main channel iron bars 1 at the rear of the engine cylinder 10 is a frame composed of parallel channel iron bars 15 that are securely bolted to the converged or contracted portions of the bars 1 and to transverse bars or straps 16 that are bolted to and supported by the main channel iron bars. The bars 15 support brackets 17 for attachment of the guides 18 of the engine crosshead 19, which is connected by the pitman 20 to the center crank disks 21 of the main shaft 22, as shown in Figs. 1 and 2.

The boiler is provided with the usual attachments, such as steam injector 23, feed water heating coil 24 located in the smoke arch, water gage 25, &c. The steam pipe 26 is extended from the steam dome 27 through the boiler and smoke arch to the steam chest 11, as shown, in such a manner as to avoid a multiplicity of angles and permit the governor 28 to be located on the smoke arch in such position as to control the supply of steam at a point close to the steam chest. The exhaust from the engine may be carried into the smoke arch through a pipe 29 as usual. A pipe 30 leading from the steam dome into the smoke stack and provided with a valve 31 controlled by a rod or lever 32 within reach of the engineer permits the blowing of steam into the smoke stack to accelerate the draft, when necessary. 33 is the usual throttle lever. As shown in Fig. 3 the forward end of the smoke arch may be provided with a hinged door 34 secured by buttons 35 and adapted to be opened to give ready access for cleaning the flues.

The main shaft or crank shaft 22 is journaled in suitable bearings above the main frame 1 and carries on one end a large belt pulley 36, Figs. 1, 2 and 3, for attachment of belting 37, Fig. 1, through which the engine may be connected with a thrasher or other machine to be operated by steam power. The other end of the shaft 22 carries a spur pinion 38 which is so mounted as to be capable of having imparted to it a lateral or longitudinal adjustment on said shaft by means of a lever 39, Fig. 1 connected to one end of a longitudinally movable rod 40 the other end of which connects with one arm of a bell crank 41 Figs. 2 and 3 that has its other arm forked and engaged in the circumferentially grooved hub of the pinion. By a movement of the lever 39 in the proper direction the pinion 38 can be made to mesh with or be disengaged from a large spur gear 42 forming part of a differential gearing through which the traction wheels 43 are driven when the engine is employed for traction purposes.

The spur gear 42 is loosely mounted on the hub of a bevel gear 44 that is keyed to a countershaft 45, as shown in Fig. 4. In the hub and rim of the spur gear 42 are mounted a series of spindles 46 that are arranged at suitable intervals between the spokes of said gear. On each of these spindles is a bevel pinion 47 meshing with the rigidly mounted bevel gear 44 and also with a loose bevel gear 48 that is arranged on the shaft 45 in contact with the hub of the gear 44. The outer face of the loose bevel gear 48 is provided with a series of concaved segmental recesses 49, Fig. 5, that register with similar recesses 50, Fig. 6, formed in a disk or plate 51 that constitutes part of a spur pinion 52 which is loosely mounted on one end of the countershaft 45 as shown in Fig. 4. The recesses 49 and 50 form pockets for reception of spiral springs 53 that serve to cushion the gearing and relieve it from the straining effects of shocks and jars. On the end of the countershaft opposite the attaching point of the differential gearing is secured a spur pinion 54. The countershaft 45 is journaled in bearings or boxes 55 secured to the under side of the main frame 1, as shown in Fig. 2, and from the pinions 52 and 54 on the opposite ends of this shaft power is transmitted to the traction wheels 43 through internal gears 56 with which said wheels are provided. The rear axle 57, to which the traction wheels 43 are attached, is also journaled to the under side of the frame 1, in bearings or boxes 58, as shown in Fig. 2. It is obvious that by means of the differential or compensating gearing interposed between the crank shaft 22 and traction wheels 43 and constructed and arranged in the manner hereinbefore described the application of power to the traction wheels is equalized especially in turning or steering the engine on rough or uneven ground, while the arrangement of the springs 53 in recessed portions of the gears provides a simple, durable and effective cushioning against all strains and shocks to which the gearing may be subjected.

The steering wheels 59 are loosely mounted on the ends of the forward axle 60 which is so divided or constructed as to provide a vertical slot or opening 61, Fig. 2, for reception of a box 62 having trunnions 63 that rest on the upper front and rear edges of the axle and are confined thereon by straps 64 as shown in Figs. 8 and 9. The vertically slotted or divided axle 60 may be braced by sleeved bolts 65 as shown in Fig. 2. The box 62 is provided internally in its opposite sides with vertical

grooves or recesses 66, Figs. 9 and 10 to receive check lugs 67 on the collar 68 of an internally threaded sleeve 69 that is passed vertically through said box, as shown in Figs. 8, 9 and 10. In the lower part of the box 62 is a spiral spring 70 on which the collar 68 of the sleeve 69 is adapted to rest and to the top of the box is secured a ring-shaped cover 71 that is sufficiently broad to overlap the collar 68 and prevent the sleeve 69 from being jolted out of the box. The sleeve or nut 69 engages a screw spindle 72 having its lower end stepped in a plate or bed 73 that is rigidly supported beneath the axle by means of braces 74 depending from and secured to the frame of the machine. At its upper end the screw spindle 72 is provided with a bearing in a cross-beam 75 of the main frame 1 as shown in Figs. 7 and 8. On the upper end of the screw spindle 72 is securely mounted a worm wheel 76 meshing with a worm 77 on a shaft 78 that is provided at one end with a bevel gear 79, Figs. 1 and 3, meshing with a similar gear 80 on a shaft or rod 81 that is extended to the rear of the engine and provided with an operating hand wheel 82 located within reach of the engineer. By means of this gearing for rotating the screw spindle 72 which is connected with the frame of the machine as described and engaged with the nut or sleeve 69 carried in the box 62 supported by the forward axle, the machine frame and the boiler and engine supported thereon can be quickly and accurately leveled at any moment to compensate for deviations from a horizontal position caused by uneven or sloping ground over or onto which the machine may be moved or brought to rest. It will be observed that the nut or sleeve 69 extends through the box 62 at top and bottom and is free to rise and fall therein under control of the spring 70 but cannot pass out of the box by reason of the ring-cover 71 at its upper end. The nut or sleeve 69 being of greater length than the inclosing box affords a long bearing for the screw spindle 72 and thus adds to its strength and durability and protects it from liability to breakage or injury. The check lugs 67 with which the said nut or sleeve is provided are so engaged in the vertical grooves or recesses 66 of the oscillatory box 62 as to permit any necessary vertical and lateral movement of the nut or sleeve 69 to compensate for vibrations of the parts of the machine when used for traction purposes and prevents jars and strains. When the machine is employed as a stationary engine the oscillatory box 62 may be clamped to the sleeve or nut 69 by means of a set screw 83 as shown in Fig. 9.

At the front of the machine, on one side, is fulcrumed a vertically arranged lever or arm 84 that supports at its lower end a belt tightening and carrying pulley 85 over which is carried the belt 37 for driving a thrasher or other machine. By a proper adjustment of the arm or lever 84 the belt 37 can be tightened or slackened at any time without changing the position of the engine with relation to the thrasher and without any interruption to the work, and then by means of a bolt and thumb nut 86, or other suitable fastening, at the upper end of the lever 84 the said lever can be securely clamped to a slotted quadrant 87 supported on the forward portion of the machine frame. The location of the pulley 85 is such as to prevent any wearing or cutting of the belt edges by rubbing contact with exposed portions of the machine frame.

To the opposite ends of the forward axle 60 are secured eye-bolts 88 for attachment of the forward ends of steering chains 89 that have their rear ends attached to a drum or reel 90 which is arranged to be actuated through worm-gearing, not shown, from a shaft 91 provided with a hand wheel 92 adjacent to the engineer's cab or platform.

For the purpose of supporting the engineer's cab or platform at a convenient height the rear ends of the channel bar irons 1 may be dropped or curved downward as shown in Fig. 1. The platform 93 is secured to the rear ends of the bars 1 in any suitable manner and may have a cab built thereon or be provided with a canopy, as preferred. On the platform 93 may be carried tanks 94 from which the boiler may be provided with water through a pipe 95 to the injector.

As will be seen, the construction of the machine is such that though the greater part of the weight is on the traction wheels 43 at the rear, which greatly facilitates movement of the machine, especially in steering and in ascending hilly roads, the engineer's platform is entirely free from gearing or shafting and, therefore, affords ample room for managing the apparatus. By mounting the boiler and engine independently of each other on a light, compact and durable frame as described, with the engine located intermediate said boiler and frame, the boiler is relieved from the weight and injurious strains incident to employing it as a support or point of attachment for the engine and gearing, as in many machines of this character. The direct gearing of the engine shaft to the spur gear of a system of differential or compensating gearing mounted on a countershaft carried directly by the machine frame, and geared directly with the traction wheels equalizes the application of power without injurious shocks and strains, while the peculiar construction of the leveling mechanism, as described, and the location of the water tanks on the engineer's platform enables the weight of the machine to be so distributed as to give the best results in the operation of the engine both for traction purposes and for the driving of machinery.

What I claim as my invention is—

1. In a traction engine, the combination of a frame composed of parallel channel bar irons having their forward portions converged at a point between the traction wheels and steering wheels to afford room for operating

said steering wheels and having the rear portions of said channel bar irons dropped down to support the engineer's platform, cross-bars, straps or braces connecting said channel bar irons, an engine supported on the forward portion of said frame and having a crank shaft provided at one end with a belt pulley and at its other end with a spur pinion, means for shifting said pinion, a countershaft mounted on the frame and having pinions at each end geared with the traction wheels, differential or compensating gearing supported on the countershaft and comprising a spur gear with which the pinion on the engine shaft is adapted to be directly engaged, and a boiler supported above and independent of the engine on standards carried by the machine frame, substantially as described.

2. In a traction engine, the combination with the traction wheels having internal gears, and a frame composed of channel bar irons and provided with bearings or boxes for the axle of the traction wheels, of an engine having a crank shaft provided with a belt pulley at one end and having a spur pinion mounted on its other end, a countershaft supported in bearings or boxes carried by the frame, spur pinions mounted on the opposite ends of said countershaft and meshing with the internal gears of the traction wheels, and differential or compensating gearing mounted on the countershaft and comprising a spur gear with which the pinion on the engine crank shaft is adapted to be engaged, substantially as described.

3. In a traction engine, the combination with the traction wheels having internal gears, and an engine having a crank provided with a belt pulley at one end and having a spur pinion mounted on its other end, of a countershaft intermediate the said traction wheels and engine crank shaft, a spur pinion rigidly mounted on one end of said countershaft to mesh with the internal gear of one of the traction wheels, a spur pinion loosely mounted on the other end of said countershaft to mesh with the internal gear of the other traction wheel, said loosely mounted pinion being provided on one side with a disk having a series of recesses, a bevel gear loosely mounted on the countershaft and provided with a series of recesses registering with the recesses in said disk, springs located in said recesses, a bevel gear rigidly mounted on the countershaft, a spur gear loosely mounted on the hub of said rigidly mounted bevel gear and meshing with the pinion on the engine crank shaft, and a series of bevel pinions carried by said spur gear and meshing with the bevel gears on the countershaft, substantially as described.

4. In a traction engine, the combination with the traction wheels and the engine crank shaft having a spur pinion on one end, of a countershaft geared with the traction wheels, and a differential or compensating gearing mounted on said countershaft and comprising a spur gear meshed with the pinion on the engine crank shaft and springs located in recessed portions of the differential gearing, substantially as described.

5. In a traction engine, the combination of a frame composed of channel bar irons, a boiler supported on standards carried by said frame, braces depending from the forward portion of said frame, a bed or plate supported by said braces below the forward axle, a vertical screw spindle having its lower end stepped in said plate and its upper end journaled in a cross-bar of the frame, means for rotating said screw spindle, a box suspended in the central slotted portion of the forward axle and provided in its opposite sides with vertical recesses, an elongated nut or internally threaded sleeve located in said box surrounding the screw spindle and provided with a collar having check lugs engaged in the recesses of the box, a spring located in the box and surrounding the sleeve below its collar, and a ring cover for said box, substantially as described.

6. In a traction engine, the combination of a forward vertically slotted or divided axle, a frame having braces depending from its forward portion, a bed or plate supported by said braces, a vertical screw spindle stepped in said plate and having its upper end journaled in a cross bar of the frame, an oscillatory box suspended in the slotted portion of the axle and provided with internal vertical grooves or recesses, an elongated nut or internally threaded sleeve located in said box, surrounding the screw spindle and provided with a collar having check lugs engaged in the recesses of the box, a spring located in the box below the collar of the sleeve, a worm wheel secured to the screw spindle, a worm shaft, and bevel gearing for actuating said worm shaft from the rear end of the machine, substantially as described.

7. In a traction engine, the combination of a frame composed of parallel longitudinally arranged channel bar irons connected by cross bars or braces and having their forward ends contracted or converging, traction wheels secured to an axle journaled in bearings or boxes on the rear portion of said frame, a vertically slotted forward axle provided with steering wheels, braces depending from the forward portion of the frame, a bed or plate supported by said braces below the forward axle, a vertical screw spindle stepped in said plate and having its upper end journaled in a cross bar of the frame, a nut or threaded sleeve for said spindle said sleeve having a collar provided with check lugs, a box surrounding said sleeve and provided with recesses to engage the said check lugs, a set screw to clamp the sleeve and box, means for rotating the screw spindle, and a boiler and an engine supported on the frame independently of each other, substantially as described.

8. In a traction engine, the combination with a frame and an engine supported on the

forward portion of the frame, of a boiler supported above the engine on standards carried by said frame, and a governor located on the forward end of the boiler and controlling a valve in the steam pipe leading to the steam chest, whereby the supply of steam is controlled close to the cylinder and a multiplicity of angles avoided in the steam pipe, substantially as described.

9. In a traction engine, the combination of a frame composed of parallel longitudinally arranged channel bar irons connected by cross-bars or braces and having their forward ends converged and their rear ends curved or dropped downward, a platform or cab supported on the rear ends of said bars or channel irons, water tanks located on said platform, an engine supported on the forward portion of the frame and having a crank shaft provided with a spur pinion geared directly to the spur wheel of differential gearing mounted on a countershaft that is carried by the frame and geared with the traction wheels, a boiler supported above the engine on standards carried by the frame, and leveling mechanism supported by braces and a bed plate depending from the forward portion of the frame below the axle of the steering wheels, substantially as described.

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

GEO. D. LOWRY. [L. S.]

Witnesses:
ALBERT H. NORRIS,
JNO. B. HOPPER.