2 Sheets—Sheet 1.

C. M. MILLER.

Traction-Engine.

No. 221,900. Patented Nov. 18, 1879.

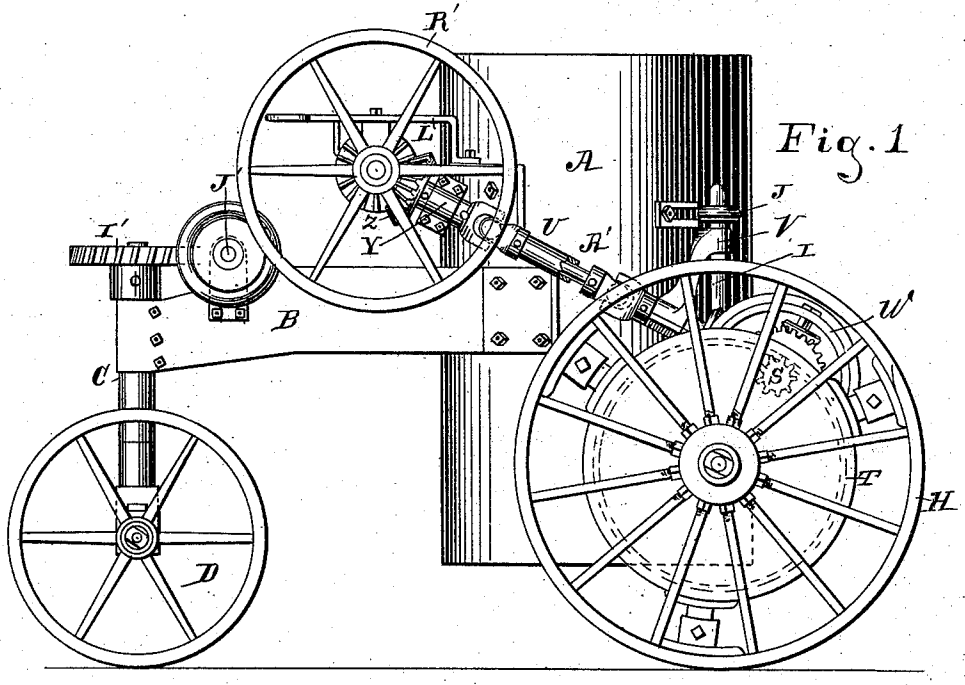

Fig. 1

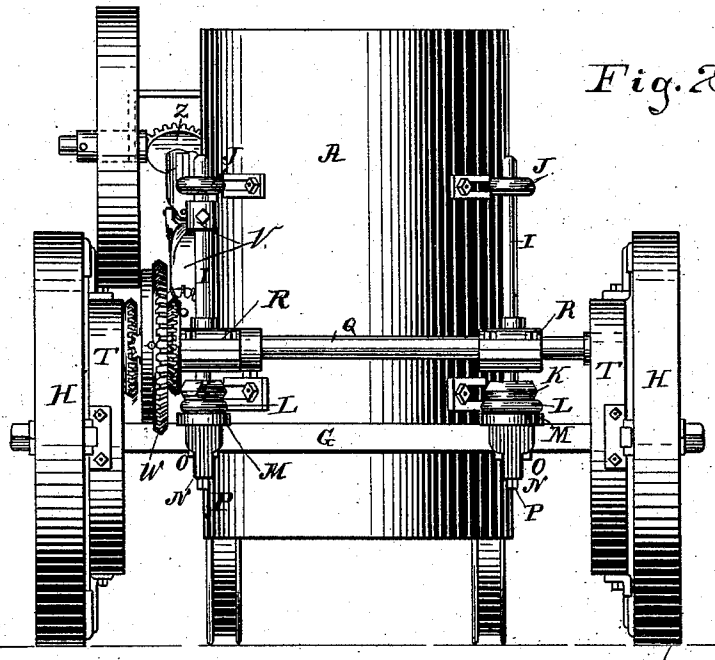

Fig. 2

Attest
W. H. H. Knight
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His Attorney.

2 Sheets—Sheet 2.

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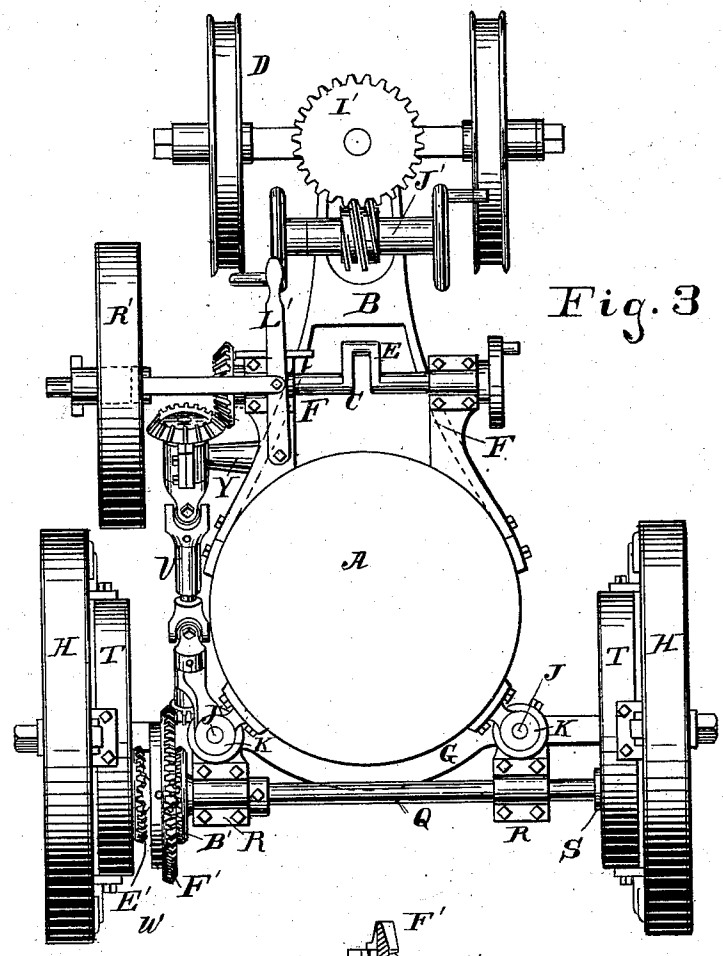

Fig. 3

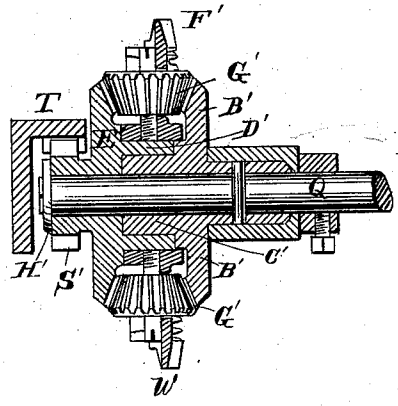

Fig. 4

Attest
W. H. H. Knight
W. Blackstock.

Inventor
Cassius M. Miller,
By A. Ellsworth,
His attorney.

UNITED STATES PATENT OFFICE.

CASSIUS M. MILLER, OF CANTON, OHIO.

IMPROVEMENT IN TRACTION-ENGINES.

Specification forming part of Letters Patent No. **221,900**, dated November 18, 1879; application filed July 22, 1879.

To all whom it may concern:

Be it known that I, CASSIUS M. MILLER, of Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Traction-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same, which will enable others skilled in the art to make and use it, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of a traction-engine with my improvements applied. Fig. 2 is a rear elevation of the same. Fig. 3 is a top-plan view; and Fig. 4 is a transverse section of the compensating-gearing, showing the counter-shaft in elevation.

Similar letters of reference denote the same parts in the several figures of the drawings.

My invention is designed to improve, in several important particulars, the construction and operation of portable engines used for thrashing and general farm purposes, and relates more especially to the engine heretofore invented and patented by me, the general features of which are an upright boiler carrying the cylinder, crank-shaft, and their connections, and mounted upon front and rear wheels.

The principal object of the present invention is to convert the engine into a traction-engine and mount it upon springs, for the purpose of relieving the strain caused by sudden shocks and jars in moving from place to place.

To this end it consists, first, in a traction-engine, consisting of the boiler and engine mounted upon a truck at the front end, and supported by springs upon the main axle at the rear end, a counter-shaft carrying compensating-gearing supported from the main axle, to move with it independently of the engine and boiler, and to communicate power to the driving-wheels, and a compensating tumbling-shaft for transmitting the motion of the crank-shaft on the engine to the gearing on the counter-shaft.

It also consists in the combination of a compensating tumbling-shaft with the crank-shaft on the boiler and the gearing on the counter-shaft, which is mounted upon and moves with the main axle independently of the boiler, for the purpose of transmitting the power of the engine from the crank-shaft to the counter-shaft, and at the same time accommodating the tumbling-shaft to the movements of the engine and boiler on their supporting-springs, while preserving its connection with the gearing on the counter-shaft.

It also consists in the compensating-gearing on the counter-shaft, combined with the driving-wheels, the independently-moving boiler carrying the mechanism for operating the gearing, and the swiveled truck at the front of the engine, for the purpose of transmitting the power from the tumbling-shaft to the driving-wheels, and adapting the latter to follow the direction of the truck in turning to the right or left without straining the driving mechanism.

It also consists in the employment of studs or equivalent devices mounted upon the main axle to receive the springs upon which the boiler is supported, and carrying the geared counter-shaft, so that it shall move with the axle while the boiler moves on the springs.

It also consists in combining an adjustable fly-wheel with the crank-shaft, the compensating gearing, and the compensating tumbling-shaft, and the driving-wheels, for the purpose of preventing the momentum of the fly-wheel from breaking or otherwise injuring the gearing and its connections when the driving-wheels meet an obstruction and the crank-shaft continues to rotate.

It, lastly, consists in the construction and combination of various parts of the traction-engine, as I will presently describe.

In the accompanying drawings, A represents the upright boiler, connected, by a reach, B, and vertical swivel-post C, with the forward truck, D.

E is the crank-shaft, mounted in brackets F at the front of the boiler, to connect with the piston of the cylinder, (not shown in the drawings;) and G is the rear axle of the supporting and driving wheels H, in front of which the boiler or engine is suspended in the following manner: I I are studs, rising from the axle near the wheels, and J K are upper and lower brackets, bolted to the boiler so as to

slip over the studs and move freely thereon. The lower brackets bear upon springs L L, which surround the studs and rest upon bearing-plates M M thereon at or near the axle. This construction supports the boiler upon the axle by a spring-connection, which allows it a free vertical movement, and thus prevents the shocks which would otherwise injure the mechanism when the machine moved from one point to another. The boiler is guided in its movements by the studs and brackets, while the axle of the truck D forms the pivot upon which it turns.

The bearing-plates M are each provided with yokes N, which embrace the axle and carry blocks O against its under side, where they are held by set-screws P.

By this means the studs can be firmly clamped and adjusted upon the axle, or loosened to admit of its withdrawal from the yokes.

I do not confine myself to any special means for mounting the engine upon the springs, as it may be done in many different ways without departing from my invention.

Q is the counter-shaft, held above and slightly in rear of the axle by bearings R, adjustably fastened to the vertical studs in order that the pinions S S′ upon its ends shall properly engage the internal gear-wheels T T, bolted or otherwise secured to the inner faces of the driving-wheels. The counter-shaft and axle necessarily move together when the motor is being transported, and independently of the boiler, in order to preserve the working contact of the gears.

U is the compensating tumbling-shaft for transmitting the power from the crank-shaft to the driving-gearing W on the counter-shaft. Its rear bearing is formed by a bracket-arm, V, secured by set-screws to one of the guide-studs, and its forward bearing, Y, is either connected directly to the boiler or to one of the brackets of the crank-shaft, in order that the two beveled pinions Z on these two shafts shall engage with each other.

The tumbling-shaft is constructed with ball-and-pin joints, and between the joints one part is made to slide longitudinally within the other, as shown at A′, Fig. 1, where a part of the hollow shaft is broken away. By this means the shaft is automatically lengthened and shortened, and its angle with respect to the gearing changed under the movements of the boiler on its springs without affecting the operation of the gearing. For as the boiler rises and falls the distance between the crank-shaft and driving-gear is lengthened and shortened and the crank-shaft raised and lowered with respect to the ground. The tumbling-shaft compensates for these unequal movements, and transmits the power of the engine unaffected by them.

The driving-gear is also constructed to compensate for the unequal travel of the driving-wheels when the machine is turned to one side or the other, and its construction is as follows: The inner gear-wheel, B′, is made fast to the counter-shaft, and carries on one side a long hub, C′, over which the projecting hub D′ of a similar gear-wheel, E′, is fitted to turn freely. The opposite face of the second gear-wheel, E′, is provided with a hub, which fits and turns loosely upon the counter-shaft and carries the pinion S′, to engage the gear-rim on the driving-wheel next adjoining, the gear-wheel and pinion being prevented from running off the shaft by a washer, H′, bolted or secured to the end thereof. On the hub D′, between the gears B′ E′, a larger crown-gear, F′, is mounted to engage the pinion on the lower end of the tumbling-shaft, and it carries two radial pinions, G′, in slots upon opposite sides of its hub to engage the bevel-gear B′ E′, as shown.

The operation of the gearing is as follows: If the motor is moving forward in a direct line, the power transmitted through the tumbling-shaft turns the central gear, F′, and as the driving-wheels are rotated equally the pinions G′ do not turn on their axis, but lock the two gears B′ E′ together and rotate with them on the shaft. As the wheel B′ is keyed to the counter-shaft it follows that the latter must be turned to drive the pinion S and its supporting-wheel, and as the two wheels B′ E′ are locked together by the pinion G′ it also follows that the wheel E′ will turn the pinion S′, and so drive the other supporting-wheel. When, however, the truck is set to turn the machine, say to the right, then the rotation of the large gear F′ causes the pinions G′ to turn the gear E′ and its pinion S′, and ride upon the gear B′ without turning it or the counter-shaft, or only turning them in proportion to the arcs described by the two wheels. If the truck is swung to the left, then the gear B′ is turned with the counter-shaft, the gear E′ standing still with shaft rotating within it and its pinion S′. The gearing thus compensates for the unequal travel of the driving-wheels, and adjusts them to move in arcs parallel with the arcs in which the truck-wheels move and about the same center, thereby relieving the wheels of strain without obstructing the movements of the driving mechanism. The compensating-gearing is, therefore, combined with the truck as well as the driving-wheels.

The swivel part of the truck carries a worm-wheel, I′, upon its upper end to receive the action of a worm-shaft, J′, having its bearings on the reach, and adapted to be turned by crank-arms or other devices, for the purpose of changing the direction and guiding the truck. The swivel-post is also pivoted to the axle of the truck, so that the wheels can rise and fall in moving over uneven ground.

R′ is the fly-wheel, mounted and turning freely on the end of the crank-shaft, and adapted to be moved longitudinally thereof by the clutch and shipping-lever L′, to engage or disengage a clutch or pin on the end of the shaft. When so engaged it turns with the shaft, and

may also act as a band-wheel. If, however, the machine in moving over the ground is suddenly arrested, the fly-wheel is instantly unclutched by the shipping-lever and allowed to rotate on the shaft, thereby preventing the momentum of the wheel from straining or breaking the gearing and its connections.

When a double-crank shaft driven from two cylinders is employed on the engine, the wheel may be used only as a band-wheel for driving detached machinery, as there is no necessity for the force of its momentum to carry the cranks past their centers.

If desired, the hubs of the fly-wheel may be joined to the pinion on the crank-shaft, in order that both may move together in one direction to engage the shaft and fly-wheel and the shaft-pinion with the pinion on the tumbling-shaft, and in the opposite direction to disengage them, as will be readily understood.

I do not claim the following in this application, to wit, the independent main gear-wheels connected with the truck-wheels, in combination with the counter-shaft, having two pinions, one fast and the other loose, to engage said main gears, the compensating-gears on the counter-shaft, and inclined connecting-shaft gearing therewith, as the same is the subject of a former application, of which this is a division, now in interference.

Having thus described my invention, what I claim is—

1. The farm or traction engine consisting of the engine and boiler supported at the forward end upon a swiveled truck and at the rear end by springs upon the main axle, a counter-shaft supported from the axle to move therewith independently of the engine and boiler, compensating-gearing on the counter-shaft to receive and transmit the power of the engine to the driving-wheels, and a compensating tumbling-shaft for transmitting the motion of the crank-shaft on the boiler to the gearing on the counter-shaft, substantially as described.

2. In a traction-engine mounted upon springs, the combination of a compensating tumbling-shaft with the crank-shaft carried on the boiler and with the gearing on the counter-shaft, which moves with the main axle of the engine independently of the boiler, substantially as described, for the purpose specified.

3. In a traction-engine mounted upon springs, the combination of the compensating-gearing on the counter-shaft with the driving-wheels, the independently-moving boiler carrying the mechanism for operating the gearing, and the swiveled truck at the front of the boiler and engine, substantially as described, for the purposes specified.

4. The studs I, carrying the springs on the main axle, combined with geared counter-shaft moving with the axles, and the engine and boiler moving on the studs, substantially as described, for the purpose specified.

5. The adjustable fly-wheel, when combined with the crank-shaft, the compensating tumbling-shaft, the compensating-gearing, and the supporting and driving wheels, for the purpose of preventing the momentum of the fly-wheel from breaking or otherwise injuring the gearing and its connections when the driving-wheels meet an obstruction and the crank-shaft continues to rotate, substantially as described.

6. The counter-shaft carrying the compensating-gearing, supported upon the main axle, so that its pinions S S′ shall engage with the gears on the driving-wheels, by means of the studs I and bracket-bearings R, substantially as described, for the purpose specified.

7. The combination of the bracket-bearing V with one of the studs I, and with the compensating tumbling-shaft, for engaging the pinion on the rear end of such shaft with the compensating-gearing on the counter-shaft, substantially as described.

In testimony of which invention I have hereunto set my hand this 27th day of June, A. D. 1879.

CASSIUS M. MILLER.

Witnesses:
CHAS. J. GOTSHALL,
HENRY C. FOGLE.