W. H. MILLIKEN.

Traction-Engine.

No. 163,681. Patented May 25, 1875.

Fig. 1.

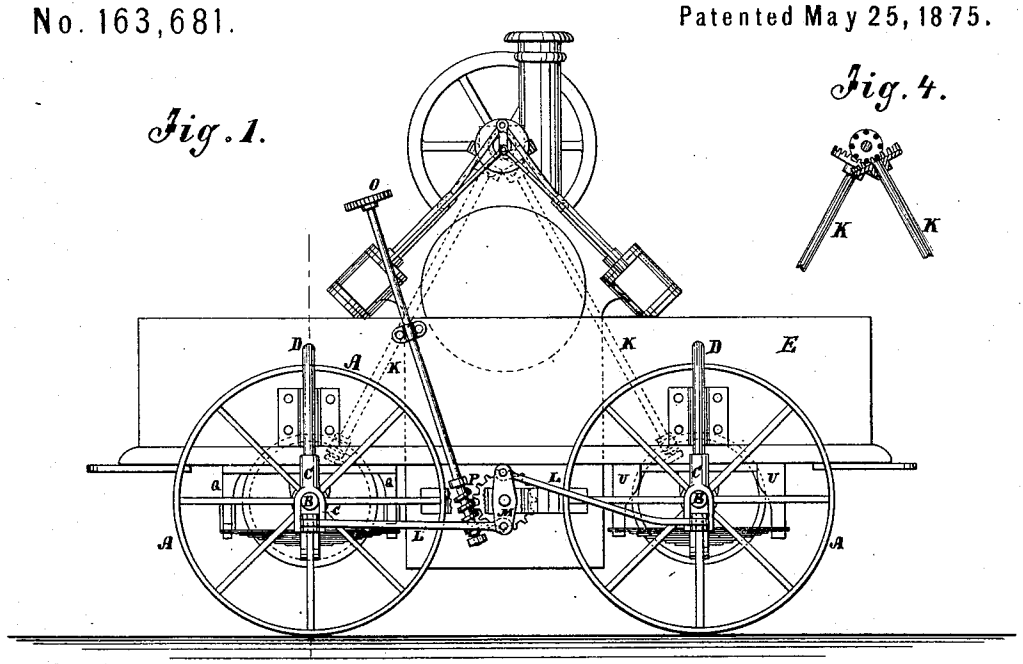


Fig. 4.

Fig. 2.

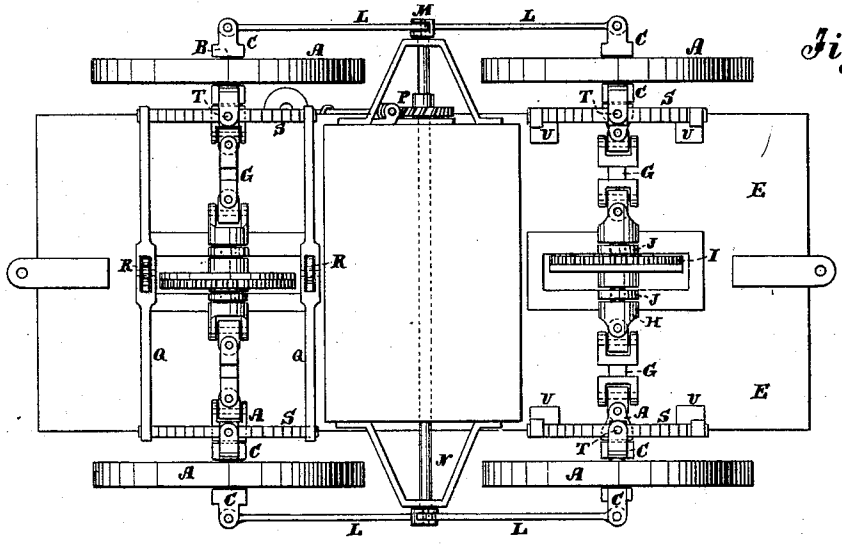
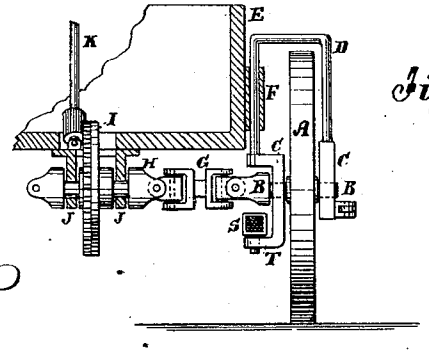


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM H. MILLIKEN, OF SACRAMENTO, CALIFORNIA.

IMPROVEMENT IN TRACTION-ENGINES.

Specification forming part of Letters Patent No. **163,681**, dated May 25, 1875; application filed April 10, 1875.

To all whom it may concern:

Be it known that I, WILLIAM H. MILLIKEN, of Sacramento, in the county of Sacramento and State of California, have invented new and useful Improvements in Traction-Engines, of which the following is a specification:

The essential objects of this invention are, first, to contrive a machine whereby the power can be applied to all of the wheels, and they can at the same time be turned readily from right to left, and vice versa, for steering the machine, and for turning around; and, second, to mount the body so that the weight will be equally distributed, and at all times borne on the wheels alike, no matter what irregularities there may be in the surface, and at the same time make the connection by springs to obtain the necessary elastic support without the use of rubber.

The first part of the invention is effected by mounting each wheel on a short independent axle, which is supported in bearings each side of the wheel, in the lower end of a yoke extending up over the wheel, and pivoted vertically by its inner member to the body, so as to turn, and at the same time allow the body to rise and fall, and connecting the inner end of the axle, by a section having a joint at each end, with a middle section having the driving-wheel, and arranged in boxes attached to the body of the carriage, and geared with the driving-engines by mechanism also carried in the body, and therefore positively connected with it, while it is flexibly connected with the wheels, so as to rise and fall readily, and so that they can turn laterally for guiding and turning around. For turning the wheels and axles laterally to steer the machine and to turn around, the outer ends of the axles are connected by rods with a vertical rock-lever on a shaft between the fore and hind wheels, and extending from side to side to receive both rock-levers, and geared by worm-gears with the steering-wheel, to be worked by hand. The rock-levers draw the wheels together on one side, and force them apart on the other side, and thus direct the machine as desired.

The second part of the invention is effected by the use of equalizing-supports, arranged in pairs under the body, transversely on a pivot at the middle attached to the body, and carrying at the ends springs supported between the two equalizers of each pair by being connected to their ends, and these springs are supported by the yokes in which the wheels are mounted, and on which the body has vertical movements, allowing the necessary action to compensate for the unevenness of the ground.

Figure 1 is a side elevation of a traction-engine constructed and arranged according to my invention. Fig. 2 is a plan of the machine inverted. Fig. 3 is a transverse section on line *x x* of Fig. 1, and Fig. 4 is a detail of the driving-gear in side elevation.

Similar letters of reference indicate corresponding parts.

A represents the supporting and driving wheels, which are mounted on short independent axles B, having a bearing each side of the wheel, in the boxes C of a yoke, D, extending up over the wheel, and connected by its inner arm with the body E by a box, F, in which it can turn to allow the wheel to turn for steering and going around curves, and it can also slide up and down to allow one to vibrate vertically independently of the other, to accommodate the wheels to uneven ground, while the body remains level, or nearly so. The propelling force of the wheels is also applied to the body by means of this connection. The axles are jointed at the inner end to a section, G, which is itself jointed to the middle section H, carrying the driving-wheel I, and arranged in boxes J, rigidly attached to the truck-body. The joints of these sections are formed by universal couplings, which allow the wheels to turn sidewise and oscillate vertically, while the middle section receives and transmits the force without obstruction by such turning. The driving-wheel is geared to the crank-shaft of the engine by the counter-shaft K. The front and rear axles are constructed and arranged and geared with the engine alike. To turn the wheels laterally for guiding the machine, they are connected at the outside by a rod, L, with a rock-lever, M, of an oscillating shaft, N, which is turned forward and backward by a hand-wheel, O, geared to it by worm-wheels P. The rods of each side are connected to the opposite ends of the rock-lever and on opposite sides of the shaft, so that they draw the wheels together or pull them apart,

according to which way they are turned. The connections of one side are in reverse of the other, so that the wheels of one side will be drawn together, while those of the other side will be pushed away from each other, being the necessary arrangement for adjusting the wheels to direct the course of the machine. Q represents the equalizing-bars on which the body is supported, being pivoted to them at R. S represents the springs on which they rest at the ends, and T hangers from the yokes D and the wheels A, supporting the springs, and thereby suspending the body on the wheels, so as to have an easy and elastic support by oscillating on the pivots R, and rising and falling on the springs. The springs are pivoted on the hangers, so that the wheels can turn freely. The equalizers may be dispensed with, and the springs may be connected by hangers U, if preferred.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The wheels A, in combination with independent axles B, yokes D, pivots, and body, substantially as set forth.

2. The independent axles, in combination with jointed sections of the main axle, middle sections of the same, body provided with fixed bearings for the same, and the driving-wheel carried thereby, substantially as set forth.

3. The combination of the wheels, independent axles, horizontally-oscillating yokes D, and rock-shaft N, substantially as and for the purpose set forth.

4. The combination of equalizing-bars Q and springs S with the body and the horizontally-oscillating independent wheels, substantially as set forth.

5. The combination of pivoted yokes D with the body, each having vertical movements relatively to the other, substantially as set forth.

WILLIAM H. MILLIKEN.

Witnesses:

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