2 Sheets—Sheet 1.

C. D. MONNOT.

Road-Engine.

No. 197,485. Patented Nov. 27, 1877.

Fig 1

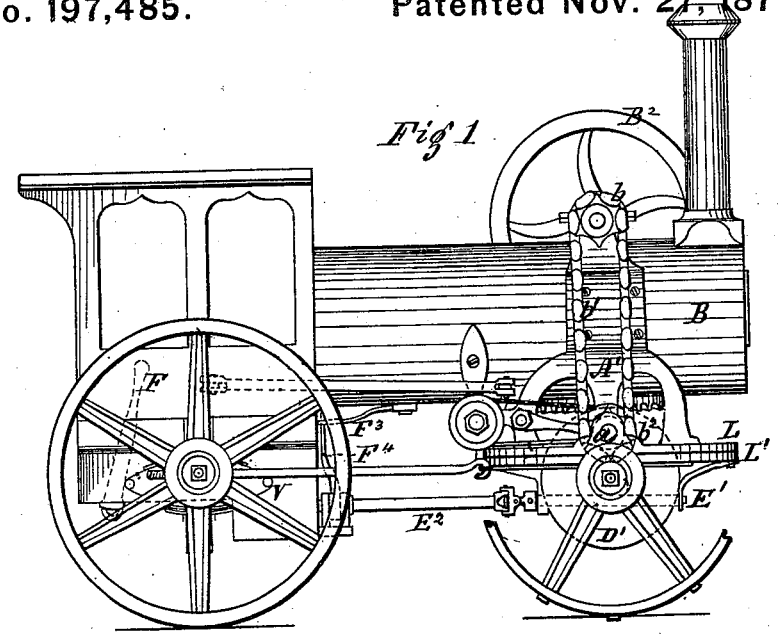


Fig. 2.

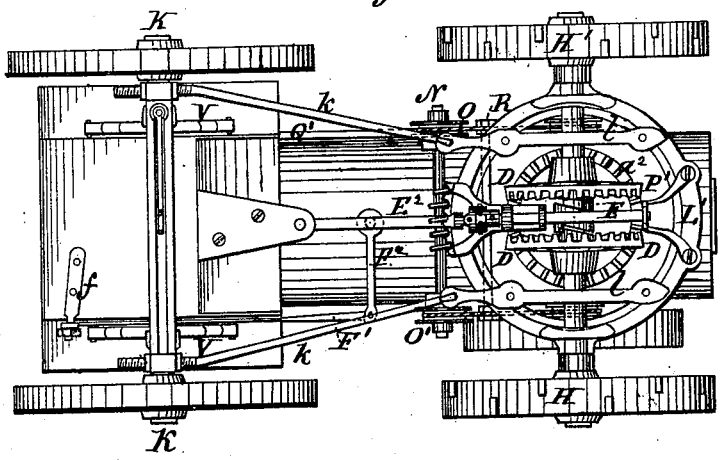
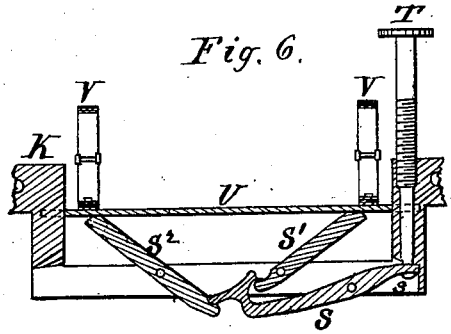


Fig. 6.



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2 Sheets—Sheet 2.

C. D. MONNOT.

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Fig. 3.

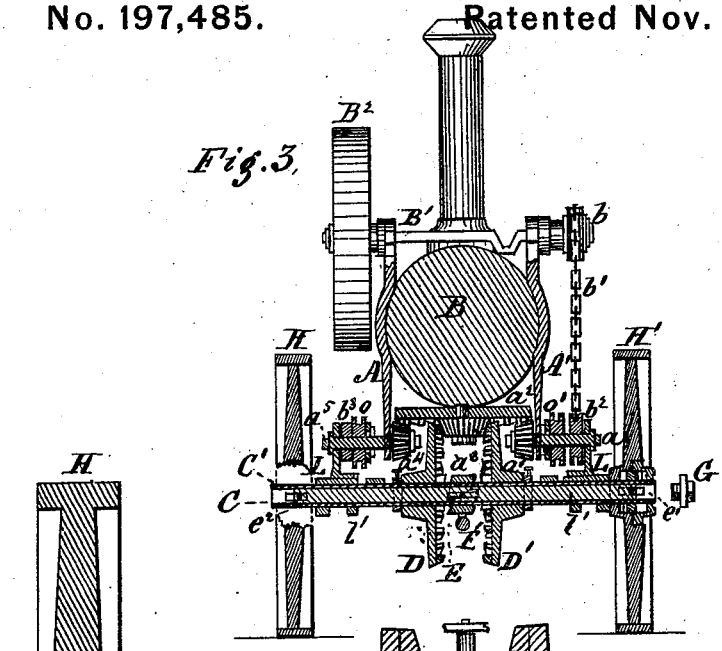


Fig. 4.

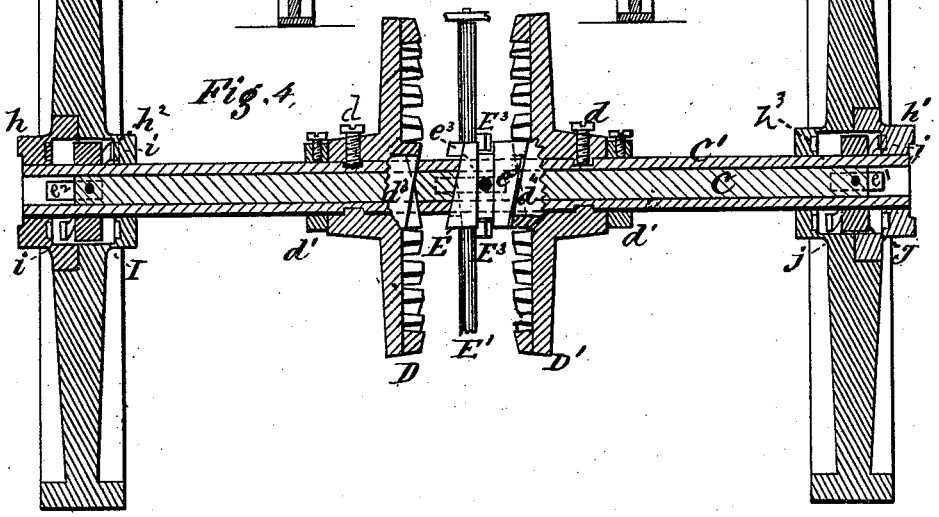
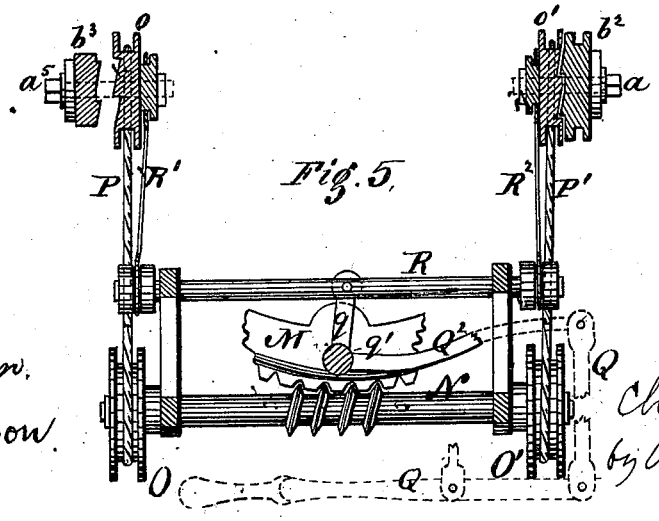


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES D. MONNOT, OF CANTON, OHIO.

IMPROVEMENT IN ROAD-ENGINES.

Specification forming part of Letters Patent No. **197,485**, dated November 27, 1877; application filed June 18, 1877.

To all whom it may concern:

Be it known that I, CHARLES D. MONNOT, 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 that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a side view, a portion of one of the driving and steering wheels being broken away. Fig. 2 is a bottom view. Fig. 3 is a rear view, partly in section, taken longitudinally through the front axle. Fig. 4 is an enlarged horizontal section of the front axle, taken from the top. Fig. 5 is a top or plan view, partly in section, of mechanism by means of which the engine is steered. Fig. 6 is an elevation, partly in section, of the device for raising and lowering the boiler relative to the rear axle.

One part of the invention relates to the employment of the front wheels as drivers.

Another part relates to the mounting of the driving-wheels loosely upon their axle, and connecting them thereto by means of ratchet-pawls.

Another part of the invention relates to the application of the driving-power to the driving-wheels at a point or points concentric to the center about which the driving-wheels or their axle vibrate or oscillate for the purpose of guiding the machine.

Another part of the invention relates to rotating the driving-wheels alternately in opposite directions by means of wheels which are themselves driven from opposite sides of a wheel which revolves continuously in one direction, whereby the machine may be moved either forward or backward without changing the direction of revolution of its driving-engine.

Another part of the invention relates to steering the machine by means of a worm-segment and worm or screw, the screw being driven alternately in opposite directions from the driving-engine.

The invention further relates to certain details of construction, which will be explained.

In the drawings, B represents the boiler, B^1 the crank-shaft of the engine, and B^2 the fly-wheel, these parts, together with the driving-engine, being of any usual or approved construction.

Upon the projecting end of the crank-shaft is a pulley or sprocket wheel, *b*, which is connected by a belt or chain, b^1, and a corresponding wheel, b^2, or by a train of gearing, or otherwise, with a shaft, *a*, and drives said shaft *a* continuously in one direction. Shaft *a* is mounted at its outer end in a suitable bearing rising from a fifth-wheel, to be hereinafter described, and at the inner end in a bracket-standard, A′, which also rises from the fifth-wheel, and forms at the upper end a support for one end of the crank-shaft of the driving-engine.

a^1 is a bevel-pinion keyed to the inner end of the shaft *a*, and meshing with a horizontal bevel crown-wheel, a^2, which is mounted upon a pivot projecting downward from the lower side of the boiler or other suitable support.

a^3 is a bevel-pinion attached centrally to and carried by the crown-wheel a^2. a^4 is a bevel-pinion mounted upon a short shaft, a^5, which is mounted at the inner end in a bracket-standard, A, and at the outer end in a bearing rising from the fifth-wheel. The bevel-pinion a^3 also meshes with two vertical bevel-wheels, D D′, which revolve loosely upon the front axle, except when clutched thereto, as will be explained.

Lateral motion of these wheels D D′ on the axle is prevented by either set-screw *d*, projecting through their hubs and into circumferential grooves cut for their reception in the axle, or by means of set-collars d^1, as will be readily understood.

The front axle is composed of an inner solid shaft, C, arranged within an outer tubular part, C′. This tubular part C′ has a central longitudinal slot, *e*, and a similar slot, e^1 e^2, at each end. Strictly speaking, there are two slots diametrically opposite to each other at the points indicated by the letters *e* e^1 e^2.

E is a clutch mounted upon the axle between bevel-wheels D D^1, and connected with the axle by means of a pin or key, e^3, which passes through the diametrically-opposite slots *e*, and through a hole in the solid portion C, so that

the clutch can slide longitudinally upon the axle within certain limits, but is compelled to revolve with the axle.

E^1 E^2 is a jointed rock-shaft mounted in suitable bearings below the front axle and longitudinally of the boiler, and carrying a clutch-fork, E^3, (see Fig. 4,) the legs of which engage with a circumferential groove in the periphery of the clutch E.

From the above description it will be seen that if the crank-shaft B^1 be driven continuously in one direction—say, with the sun—carrying with it bevel-pinion a^1 in the same direction, the bevel-pinion a^1, meshing with crown-wheel a^1, rotates it and bevel-pinion a^3 in an opposite direction—that is, against the sun; and as bevel-pinion a^3 meshes upon its opposite sides with bevel-wheels D and D^1, it is apparent that these wheels will be driven in opposite directions—that is, wheel D^1 will run with the sun, or forward, while wheel D will run against the sun, or backward.

Each wheel D D^1 is provided centrally upon its inner face with a projecting ring or flange, concentric with the axle C C′, and of about the same diameter as the clutch E, and provided with ratchet-teeth, which correspond to those of said clutch, as indicated at d^3 d^4, Fig. 4, the direction of the pitch of the teeth upon each wheel corresponding to the direction of the rotation of the wheel, so that when it (the clutch E) engages with wheel D^1 the clutch and the axle will be rotated with the sun, or forward, while if the clutch be engaged with the wheel D the axle will be rotated in a backward direction.

This shifting of the clutch E is effected as follows: F, Fig. 1, is a lever pivoted at *f*, Fig. 2, and connected by a link, F^1, with one arm, F^2, of a bell-crank lever, which is pivoted in a horizontal plane to the under side of the boiler. The other arm, F^3, of this bell-crank lever is connected with an upright arm, F^4, which is keyed to the rock-shaft E^1 E^2. Thus it will be seen that by moving lever F backward and forward the rock-shaft E^1 E^2 can be oscillated, and as this rock-shaft is arranged at right angles to the axle C C′, and has the clutch-fork E^3 keyed to it, the clutch can be moved longitudinally upon the axle.

Having thus described the device for imparting forward and backward rotations to the axle, I will now explain how these motions may be imparted to the driving-wheels H H′. The hub of each wheel is chambered, as is plainly shown in Figs. 3 and 4, one side of each chamber being formed by a removable plate, *h* or h^1, the inner face of the plate being ratcheted, as are the opposite walls h^2 h^3 of the chambers.

The ratchet-teeth upon the removable plate and the opposing wall of the chamber pitch in opposite directions in each of the wheels H H^1, in order that these wheels may be driven alternately in opposite directions, by mechanism to be described.

I J are clutch-rings, secured to opposite ends of the axle by pins which pass through both parts of the axle and slide in the slots e^1 e^2.

i i j j are elastic dogs or pawls connected with clutch-rings I J, and engaging with the ratcheted faces of the chambers in the hubs of the wheels H H′.

Thus it will be seen that the clutch E and clutch-rings I J are rigidly connected with the solid part C of the axle, and that whenever the clutch E is moved, by the rock-shaft E^1 E^2 and its attachments, so that the axle is rotated with bevel-wheel D or D′, the driving-wheels H H′ are rotated in the same direction, and the space between bevel-wheel D D′ is such that the clutch E may be withdrawn from both, when these wheels may revolve without carrying the axle.

In consequence of the dogs or pawls *i i j j* being elastic, one of the driving-wheels may rotate faster than the other.

I will now describe the mechanism for guiding the machine. L is the upper part and L′ is the lower part of a fifth-wheel similar in general construction to those in common use upon the front axles of various vehicles, the center of the wheel being coincident vertically with the center of the axle C, the crown-wheel a^2, and bevel-pinion a^3.

The fifth-wheel is connected with the rear crank-axle K by means of the bars *l* and jointed or hinged links *k*.

The axle C C′ is mounted and revolves in bearings *l′*, depending from the lower movable part L′ of the fifth-wheel.

M, Fig. 5, is a segment of a worm-wheel which projects rearward from the lower portion of the fifth-wheel. N is a worm mounted in bearings formed in arms projecting from the upper part of the fifth-wheel, and engaging with the worm-segment M. *o o′* are clutch-faced pulleys or sprocket-wheels mounted loosely on shafts *a* a^5, and made to engage with and be driven by the clutch-faced wheels b^2 b^3, whenever they are properly actuated by the sliding bar R and clutch-fork R^1 R^2. O O′ are pulleys or sprocket-wheels keyed to the worm-shaft N, and connected by belt or chain to the pulleys *o o′*; and from an examination of Figs. 3 and 5 it will be seen that, by means of this construction, the worm-shaft can be driven in opposite directions by causing either the clutch-faced wheel *o* to engage with wheel b^3, or the wheel *o′* to engage with b^2, as the desired movement of the worm-sector M shall indicate. Q is a lever pivoted in the cab, and connected with the bell-crank lever Q^2 *q* by link Q^1, this latter lever being pivoted at *q′* to a suitable support, (not shown,) and attached to the sliding bar R.

Thus it will be seen that the power of the driving-engine can be applied to the fifth-wheel at a point about as far from the center of rotation as are the wheels H H′; hence a great leverage can be applied to those wheels when necessary, and they can be advantageously used in extricating the engine from soft or muddy

ground, in substantially the same manner as the front wheels of an ordinary vehicle are used by a skillful teamster—an advantage which is not possessed by any other traction-engine of which I am aware, and which will enable me to use my engine under circumstances when others are impracticable.

I mount the rear end of the boiler upon a crank-axle, K, the lower horizontal portion of which is slotted, as shown in Figs. 2 and 6. In this slot I pivot three levers, S S^1 S^2.

T is a hand-screw engaging with a thread in the upper end of a socket in one of the vertical arms of the crank-axle K. An extended shank of this hand-screw passes through the outer end of lever S, in which it is retained by a head, *s*, so that as the screw is elevated it carries up with it the outer end of lever S, thus depressing the inner end of said lever, and also the inner ends of levers S^1 S^2, and, of course, elevating their outer ends and the bearing-plate U, whose forked ends clasp the vertical arms of the crank-shaft K.

V V are elliptical or other springs, resting upon the bearing-plate U, and sustaining the rear end of the boiler. By means of the elevating device the weight of the boiler may be, to quite an extent, shifted from the front wheels to the rear ones, either upon level or inclined ground. This feature, when taken in connection with applying the traction-power to the steering-wheels, is of decided advantage under some circumstances, as follows: Suppose the engine is crossing a wet dead furrow, in which the rear wheels become mired and set. It is obvious that by turning the front or steering axle at as great an angle as possible, so as to change the line of draft, and then elevating the rear end of the boiler, so as to throw the weight upon the front wheels, the engine may be extricated from its position by drawing out one rear wheel at a time, under circumstances in which it would be impossible to move it if constructed in the ordinary manner.

I do not wish to be limited to the employment of belts or chains for connecting the various shafts, as under some circumstances a train of gearing or other method may be substituted therefor, and other means may be adopted for moving the clutches than those shown, or other devices may be used in place of the clutches; but I have shown and described what I believe to be the means best adapted for carrying out my invention.

I do not claim, broadly, the driving of a traction-engine by means of two bevel-wheels connected alternately with the main axle; but I believe that my construction and arrangement of gearing under the boiler are superior to any now in use.

What I claim is—

1. The combination of the bevel-gears D D′, mounted on the main axle, and connected therewith by means of a clutch, the bevel-pinion a^3, the crown-wheel a^2, the bevel-pinion a^1, and shaft *a*, arranged below the boiler, and driven from the crank-shaft B^1, substantially as set forth.

2. In a traction-engine, a worm-segment connected with the steering-axle, and operated by a worm which is connected with, and rotated in opposite directions by, the motive power of the engine.

3. In a traction-engine, a driving-wheel having its hub chambered and provided with two ratcheted faces, and adapted to be driven alternately in opposite directions by an elastic pawl or clutch.

4. In a traction-engine, an axle composed of an outer tubular part, upon which the driving-wheels are mounted, and an inner shaft, which actuates the pawls or clutches in the hubs of the driving-wheels.

5. The combination, with the axle K, of the levers S S^1 S^2, hand-wheel T, and bearing-plate U, substantially as set forth.

6. In a traction-engine, the combination of driving-wheels mounted upon the steering-axle and device for elevating one end of the boiler, and thereby increasing the weight which is supported upon the driving-wheels.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

CHARLES D. MONNOT.

Witnesses:

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PERCY T. TOWERS.