2 Sheets—Sheet 1.

H. A. EDWARDS.

Locomotive Tram-Wagon.

No. 219,452. **Patented Sept. 9, 1879.**

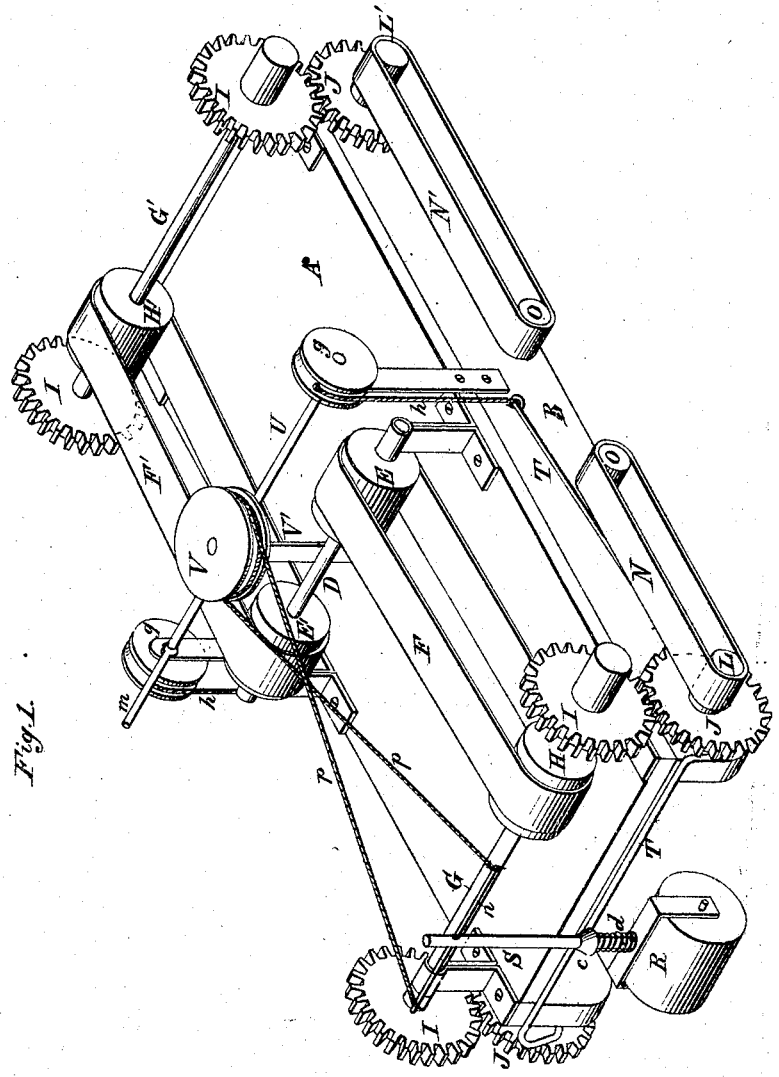

Fig. 1.

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Fig. 2.

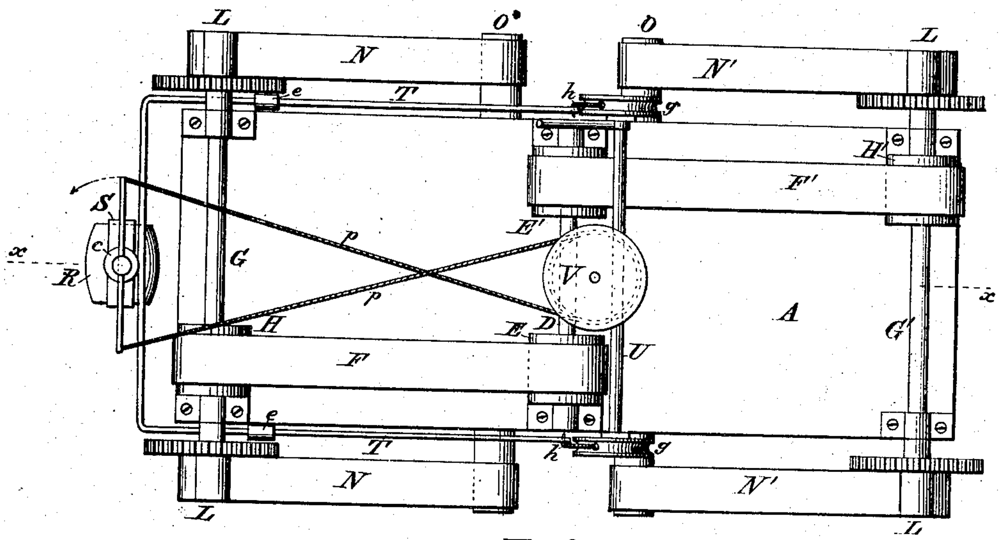


Fig. 3.

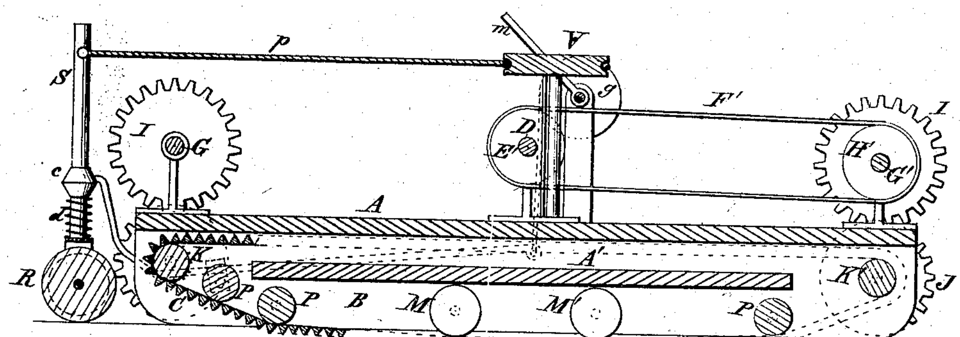


Fig. 4.

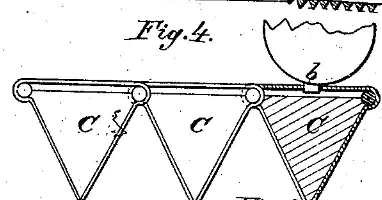


Fig. 5.

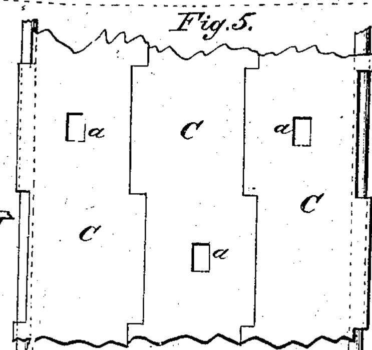
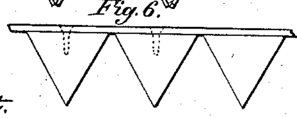


Fig. 6.



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UNITED STATES PATENT OFFICE.

HENRY A. EDWARDS, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN LOCOMOTIVE TRAM-WAGONS.

Specification forming part of Letters Patent No. **219,452**, dated September 9, 1879; application filed February 13, 1879.

To all whom it may concern:

Be it known that I, HENRY A. EDWARDS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Locomotive Tram-Wagons; and I do hereby declare that the following is a full, clear, and exact description of the invention, 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.

This invention relates to improvements in that class of road or traction engines propelled by steam or other power acting upon the carriage, and in which the whole apparatus moves upon an endless traveling tramway laid down at one end of the machine and taken up at the other as the carriage progresses in either direction, the object being to furnish a broad and firm base for the support of the apparatus while passing over soft ground with such adhesion as will prevent all slipping, and at the same time furnish a means by which the carriage can be readily turned to the right or left—a desideratum not hitherto fully accomplished by other machines of this nature, as in the engines heretofore constructed in which a movable tramway was employed, if the bearings upon the earth were of sufficient length to fully support the apparatus while moving over soft ground, it was found almost impossible to turn them from a direct line without the aid of some device of the nature of a turn-table, or by the use of skids, upon which they are run, and then slid by levers to the right or left, as may be desired; and to this end the invention consists, first, in the application of certain levers which throw the weight of the front end of the machine upon the steering-wheel, substantially supporting the apparatus upon two points—namely, the steering-wheel and the rear bearing-roller—thus giving the steering-wheel a firm hold upon the ground, and placing it at the long end of a lever the fulcrum of which is the middle of the rear bearing-roller above named; and, secondly, the invention consists in the peculiar construction of the tram-plates, by which a firm hold upon the ground is secured, as well as great durability, while the whole device, when its several parts are hinged together, is sufficiently flexible to meet the requirements of the machine; and, thirdly, the invention consists in certain details of construction and arrangement of parts, which will be hereinafter fully described, and then specifically stated in the claims.

In the accompanying drawings, Figure 1 is a perspective view of the machine, showing the general arrangement of the driving mechanism. Fig. 2 is a plan view. Fig. 3 is a longitudinal section on the line *x x* of Fig. 2. Figs. 4 and 5 are enlarged detail views of the tramway. Fig. 6 represents a modification of the tramway, showing the use of a rubber belt to form the top side in place of metallic plates.

In constructing this machine a strong floor or deck, A, is placed upon the longitudinal side timbers, B, which may be of such depth as to nearly rest upon the ground, their lower corners being rounded, so as to easily surmount obstructions.

In addition to the deck A, the side timbers are connected by the flooring or apron A′, placed below the deck, sufficient space being left between them for the free passage of the tram-plates C, the construction and mode of operating which will be hereinafter described.

Mounted in suitable journal-bearings upon the deck A is the engine-shaft D, provided with pulleys E and E′. The pulley E carries a belt, F, by which the rotation of the engine-shaft is imparted to the shaft G through the pulley H, mounted thereon. From the pulley E′ another belt, F′, carries the shaft G′ through the pulley H′, secured thereon.

It will thus be seen that the motion of the engine-shaft is communicated through the belts to the shafts G G′, supported in journal-boxes attached to the deck A, near each of its ends. These shafts overhang their bearings and carry the spur-gears I I, which engage with similar gear-wheels J J upon the ends of the driving-rolls K and K′, placed at opposite ends of the machine. Upon the outer ends of these driving-roll shafts or to the gear-wheels J are secured the pulleys L L, from which motion is imparted to the driving and bearing rolls M M′ through the belts N and N′ and pulleys O, secured to the outer ends of the rolls M and M′. It will thus be appa-

rent that the power applied to the engine-shaft is conveyed through the system of belts and gearing to the two driving and the two driving and bearing rolls simultaneously, causing them all to revolve in unison and carry them, together with the apparatus which they support, along the tramway.

Instead of the belts and gearing hereinbefore described, the power of the engine may be transmitted directly from the engine-shaft to the central bearing and driving wheels M M′ by means of suitable gearing, and from them to the other rolls by belts or shafting provided with proper bevel-gears, the essential point being to transmit the power to the rolls in the most direct manner, so as to avoid loss by friction.

The tramway is composed of tram-plates C, each of which is of triangular cross-section, and preferably constructed by bending a sheet of metal into the triangular form shown in Fig. 4, the space within the triangle being filled with wood, if desired. Each of these tram-plates is of a length nearly equal to the entire width of the machine, so as to give a firm support by covering a large surface of ground, and they are articulated or hinged together, as is clearly shown in Figs. 4 and 5 of the drawings. These tram-plates when united form a broad belt, which passes under the driving and bearing rollers and over the apron A′. The side of this belt next to the rollers is smooth, while the opposite side, which comes in contact with the ground, is sharply corrugated. These corrugations sink into the earth, thus insuring permanency in the position of each tram-plate while the machine is passing over it.

In order to carry the machine forward over tram-plates each of the latter is provided with mortises *a* in the side next the rollers, into which the cogs *b* upon the periphery of the bearing and driving rollers penetrate, thus causing a positive forward movement without slip of the machine upon the tram-plates. As the machine passes over the plates they are lifted from the ground and passed forward over the apron, to be deposited in front of the bearing-rolls, and so on as long as the machine is in motion.

The triangular shape of the tram-plates prevents them from sticking in mud or catching on obstacles, for should a small stone or stick be forced into the space between two of them, the moment they began to rise after passing the last bearing-roller it would be released and fall out.

Additional bearing-rollers P, journaled in the side timbers, B, are placed at such points and in such numbers as may be required to give a proper bearing-surface upon the tram-plates. In the drawings this surface is shown presenting a slightly curved line for the greater length of the machine, then rising rather abruptly to the driving-rollers K and K′; but this line may be varied as experience and the nature of the ground upon which the machine is to work may dictate.

In order to guide the machine a guiding wheel, R, is placed in front and revolves in the bifurcated lower end of the standard S. This standard rotates in the bearing *c*, attached to the cross-bar which connects the front ends of the levers T.

A spring, *d*, is placed between the bearing *c* and the bifurcated portion of the standard, to receive and absorb any shocks which may be imparted to the latter by coming in contact with obstacles that would not in any way interfere with the general progress of the machine.

The levers T are pivoted to the side timbers, B, at the point *e*, their rearward ends being connected with pulleys *g g* upon the shaft U by the ropes or chains *h*.

A hand-lever, *m*, is attached to the shaft U in such a manner that by its operation the chains *h* are wound upon the pulleys *g g*, thus raising the rear ends of the levers T, and, consequently, depressing their front ends and the bearing *c*. This, by using the standard S and guiding-wheel as a fulcrum, raises the front end of the machine from the ground, thus allowing the guiding-wheel to have sufficient control over the machine to turn it from a direct course to either side, as may be desired. In order to operate this guiding-wheel a cross-bar, *n*, is passed through the top of the standard S. To the opposite ends of this cross-bar is attached the two ends of a chain or rope, *p*, the bight of which is crossed and encircles the steering-wheel V, mounted upon the top of the vertical shaft V′.

It is evident that by rotating this steering-wheel the standard S will also be turned in the same direction, carrying with it the guiding-wheel R, and enabling the operator to direct the course of the machine.

In operating this apparatus on steep grades its movement may be regulated by a rope, one end of which is secured at the top of the grade and taken up or paid out from a windlass put in motion by the engine used for propelling the apparatus.

If desired, a device may be attached to the front end of the machine similar in shape to a low snow-plow, which will be found very serviceable in some localities, by removing ant-hills and other obstructions from the path of the machine.

This engine will be found of great use upon the prairies of the northwest, especially in the cultivation of the soil. Its capability of passing over the softest ground and at the same time exerting a great tractive force eminently fits it for the purposes of steam-plowing and such other agricultural operations as require an engine of this character for their successful performance.

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

1. In a traction-engine moving upon an endless tramway, the combination, with the guiding-wheel, of means, substantially as described, for raising one end of the engine and tramway, for the purpose of facilitating the turning and guiding of the same, as set forth.

2. The tram-plates C, of triangular section, hinged together and provided with an internal wood-filling, and mortises *a*, in combination with the driving and bearing rollers, the whole forming an endless tramway with a corrugated bearing-surface, as and for the purpose specified.

3. The engine-shaft D, provided with two driving-pulleys, and connected with the shafts G and G′ at opposite ends of the machine by suitable belts, in combination with the spur-gears, driving-rollers K K′, bearing-rollers M M′, and endless tramway, all constructed and operating in the manner and for the purpose described.

4. The bearing-plate or apron A′, in combination with the endless corrugated tramway and driving and bearing rolls, substantially as and for the purpose specified.

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

HENRY A. EDWARDS.

Witnesses:

J. J. NOAH,

J. J. HINDS.