(No Model.) 2 Sheets—Sheet 1.

G. A. LONG.

STEAM ROAD VEHICLE.

No. 281,091. Patented July 10, 1883.

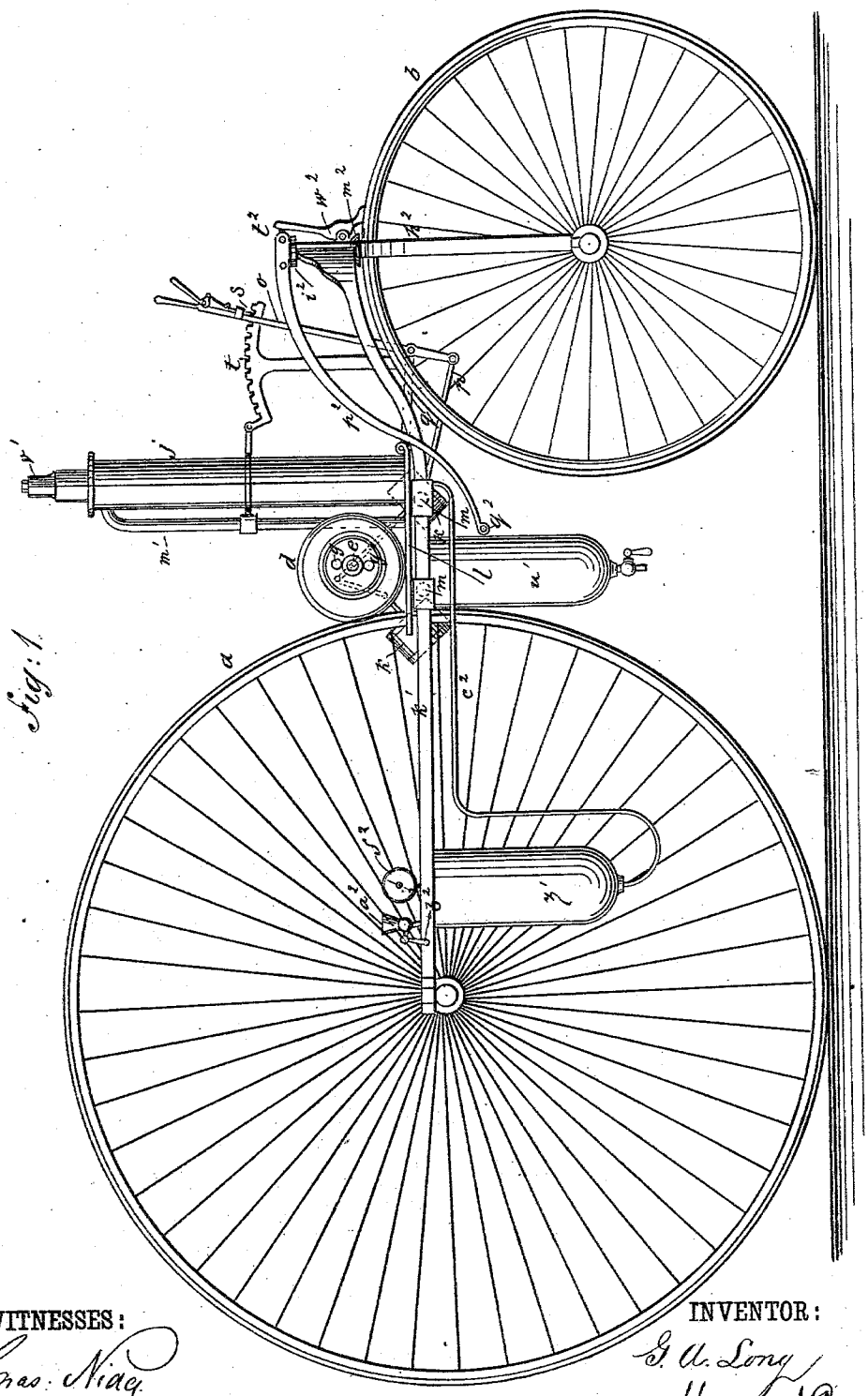

Fig. 1.

WITNESSES:

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G. A. Long

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(No Model.) 2 Sheets—Sheet 2.

G. A. LONG.

STEAM ROAD VEHICLE.

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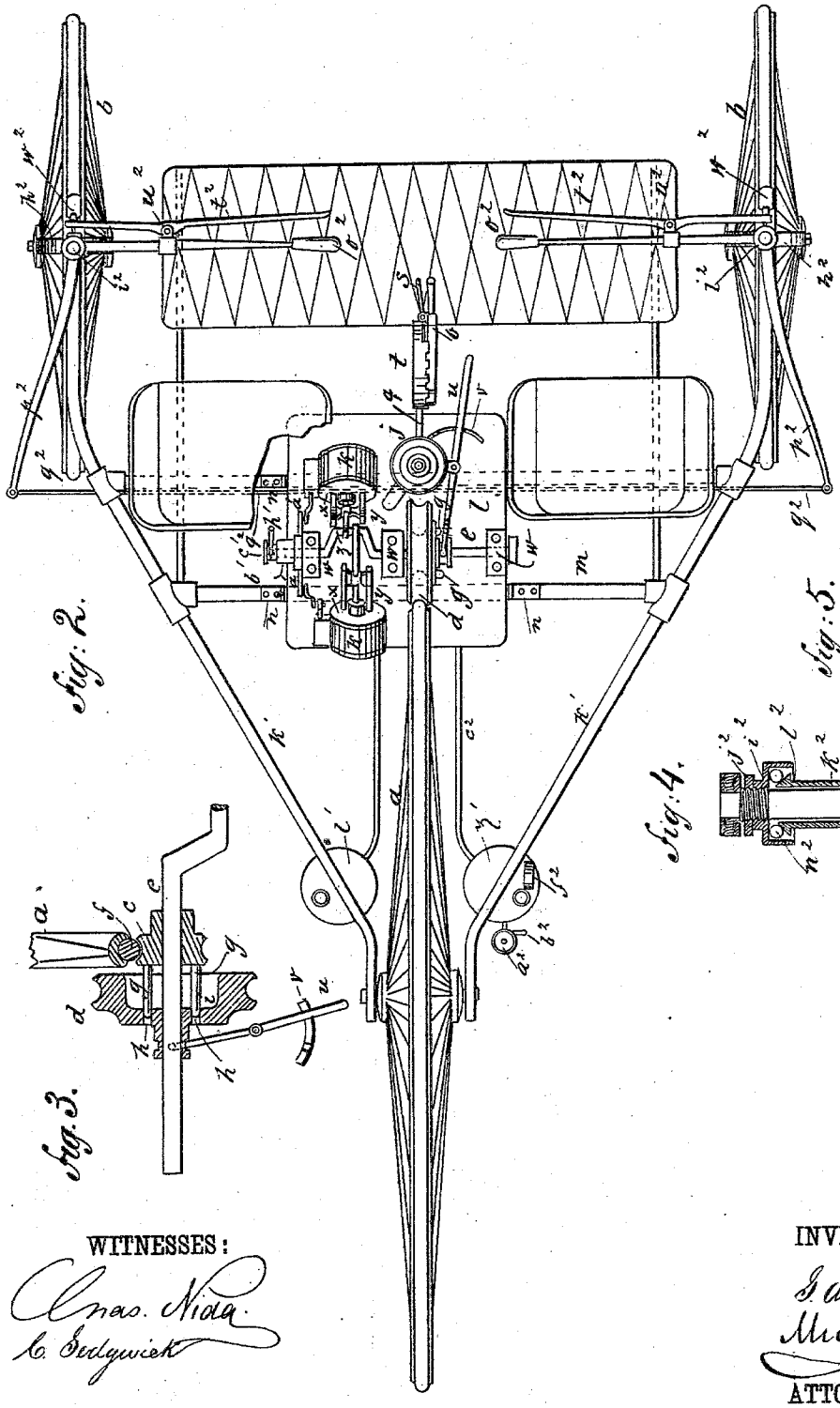

Fig. 2.

Fig. 3.

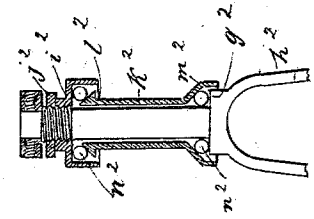

Fig. 4.

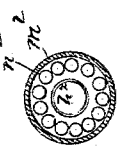

Fig. 5.

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UNITED STATES PATENT OFFICE.

GEORGE A. LONG, OF NORTHFIELD, MASSACHUSETTS.

STEAM ROAD-VEHICLE.

SPECIFICATION forming part of Letters Patent No. 281,091, dated July 10, 1883.

Application filed August 29, 1882. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. LONG, of Northfield, in the county of Franklin and State of Massachusetts, have invented a new and Improved Steam Road-Vehicle, of which the following is a full, clear, and exact description.

My invention relates to improvements in steam road-vehicles; and it consists in the peculiar construction and arrangement of parts, all as hereinafter described.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of a tricycle, which is one form of vehicle to which I propose to apply steam driving-power according to my invention. Fig. 2 is a plan view of the vehicle and steam-power driving mechanism. Fig. 3 is a detail of the transmitting-gears in section, showing a method which I propose for differential gear. Fig. 4 is a sectional elevation of the steering-post. Fig. 5 is a transverse section of the steering-post.

For this example of my improvements in steam driving-gear for road-vehicles I have chosen a tricycle, of which the large wheel *a* is the driver, and *b* the guiding-wheels. I propose to apply the power directly to the periphery of the wheel *a*, in order to obtain the greatest radius for its application by the greatest attainable leverage, and will employ friction-wheels *c d* on the crank-shaft, adapted to work on the face of the wheel *a* by friction, making the wheels *c d* with grooved faces to work on the rubber tire of the wheel *a*, but may, of course, employ any other desired form for the faces of the respective wheels. I employ friction-wheels because it enables me to thus gear with the face of the vehicle-wheel; also because the engines can be connected and disconnected at will while in motion for changing from one speed to another; also for utilizing the momentum of the engine when excessive strain is required for starting or passing great obstructions, and also because it is simpler in construction and more durable in this kind of service. In this case the small wheel *c* is keyed to the shaft, and the larger one, *d*, connects therewith by the stud-pins *g* and holes *h*, the said wheel *d* being chambered at *i* in one side to overlap wheel *c*, for being set with its working-face in the plane of wheel *a*, which it is to be employed for driving. The boiler *j*, engines *k*, and the crank-shaft *e* are mounted on a base-plate, *l*, that is mounted on the cross-bars *m* of the frame, so that it can be shifted forward and backward between the brackets *n* by the lever *o* to set the crank-shaft with relation to wheel *a*, for using either the large or small drivers *c* or *d*, also for starting and stopping the vehicle when the engines are in motion, and also for causing the drivers to press on the wheel *a* with the requisite force to produce the required friction, the said lever being pivoted to the end of a bar, *p*, attached to the frame, for its fulcrum, and connected to the plate *l* by the rod *q*, and also being provided with the latch *s* and notched bar *t* for holding it in position. The wheel *d* is provided with a shifting-lever, *u*, which drops into the notches of a stop-bar, *v*, according to the way it is set. In this contrivance for controlling the frictional contact of the driving-gear a very simple method is provided for effecting the changes of the transmitting-gears to vary the application of the power for high speed on levels and slower speed and greater labor on hills, and it affords the means of connecting the power when the engines are at full speed, so as to have great effect at times when the vehicle-wheels are lodged in deep ruts, and by other obstructions.

For simplicity in the construction I propose to construct the shifting plate *l* with the bearings *w* for the crank-shaft *e*, also the top cylinder-covers, *x*, and cross-head guides *y*, all cast together in one piece, and to connect the engines onto one crank, *z*, by placing them at right angles to each other, whereby both of the valve-rods *a'* are worked by one eccentric, *b'*, which is adapted to be shifted to reverse the engine by the lever *h'* engaging with a sleeve, *c'*, fitted loosely on the shaft. I propose to make the frame-bars *k'*, as well as the cross-bars *m*, of tubing, connecting them together steam-tight, and to exhaust the steam first into a fine coil of thin copper pipe, (not shown,) thence into said frame-tubes, and thence into a condenser, *l'*, to be suspended from the frame at any approved place—say at one side of the large wheel *a*—from which the water will be

pumped back into the boiler *j*. Should the water not all be expanded into steam, it will escape into receiver *u'*, located underneath the engines, from which it is to be discharged from time to time into said condenser, or into any tank where it will meet the water of condensation, to be pumped into the boiler again when sufficiently cooled. Thus much of the waste steam will be economized and the discharge of steam into the air will be avoided, the quantity of water to be carried will be diminished, and a material lessening of the load will be effected. The fuel will be gasoline, to be delivered under the boiler from a holder, *z'*, located opposite the condenser, in which it is to be supplied through the funnel a^2, provided with a cock, b^2, for closing it, and compressed air is to be employed for delivering the gasoline to the burner through pipe c^2, the air being pumped into the holder by hand with a pump, (not shown,) to be worked from time to time by the driver as required.

My improvement in the steering-post consists of the shoulder g^2, above the crotch h^2, cap i^2 at the upper end, secured by check-nut j^2, sleeve k^2, with head l^2 and shoulder m^2, and the balls n^2, the arrangement being such that the cap i^2 and check-nut j^2 may be set down readily from time to time whenever the parts may wear slack; and in practice the cap i^2 will fit over head l^2, and the flange of shoulder m^2 will fit over the shoulder of the crotch so tightly as to exclude the dust, and thus insure the most lasting and easy-working contrivance. A steering-post of this contrivance will be employed with each of the leading-wheels *b*, and be provided with a handle, o^2, for working it, and the two posts will be connected together by the arms p^2 and rod q^2, so that both wheels may be shifted alike and by one hand, and the driver may change hands from time to time for rest. To each lever o^2 a brake-lever, t^2, is pivoted at w^2, and so arranged with reference to it that the driver can manipulate it by the same hand by which he works the steering-post, the said lever being connected to the brakes w^2, pivoted to the steering-post.

Although I have represented a tricycle in this case as the vehicle to be driven by the improved steam-power mechanism herein described, I do not mean to limit myself to any particular form of vehicle, but will apply the same to other forms of road-vehicles, also to street-cars and other carriages. The construction and application of the engines, and also the construction of the boiler, form no part of the present invention; but I reserve to myself the right to make separate applications hereafter for the same.

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

1. The combination, with the driving-wheel of a tricycle or other vehicle, of differential friction-wheels adapted to work interchangeably on the periphery of the said driving-wheel, substantially as shown and described.

2. A differential driving-gear for road-vehicles, consisting of the wheels *c* and *d*, and driving-shaft *e*, the wheel *d* being laterally adjustable with respect to wheel *c*, and the driving-shaft being adjustable with respect to the wheel *a* to be driven, substantially as described.

3. The wheel *d*, having cavity *i* in the side, in combination with wheel *c* and shaft *e*, and being adjustable along said shaft, substantially as described.

4. The combination, with the driving-wheel *a*, of driving-engines *k k*, crank-shaft *e*, differential wheels *c d*, and a boiler, *j*, located on a base-plate, *l*, adjustable toward and from said wheel *a*, and wheel *d* being adjustable along shaft *e*, substantially as described.

5. The improved steering-head for road-vehicles, consisting of shoulder g^2, cap i^2, check-nut j^2, sleeve k^2, and balls n^2, in combination with the stem of the crotch h^2, substantially as described.

6. The combination, with the frame and driving-wheel of a tricycle or other vehicle, of a sliding plate, differential friction-wheels mounted thereon, and means for sliding said plate, substantially as herein shown and described, whereby provision is made for operating the drive-wheel from either of the friction-wheels, as set forth.

7. The combination, with the steering-wheels and their posts, of arms p^2, connecting-rod q^2, operating-levers o^2, and brake-levers t^2, pivoted to said operating-levers, and provided with the brakes w^2, substantially as and for the purpose set forth.

GEORGE A. LONG.

Witnesses:
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WILLIAM E. WEBSTER.