

(No Model.)

3 Sheets—Sheet 1.

A. BOLLEE.
Traction Engine.

No. 239,432.

Patented March 29, 1881.

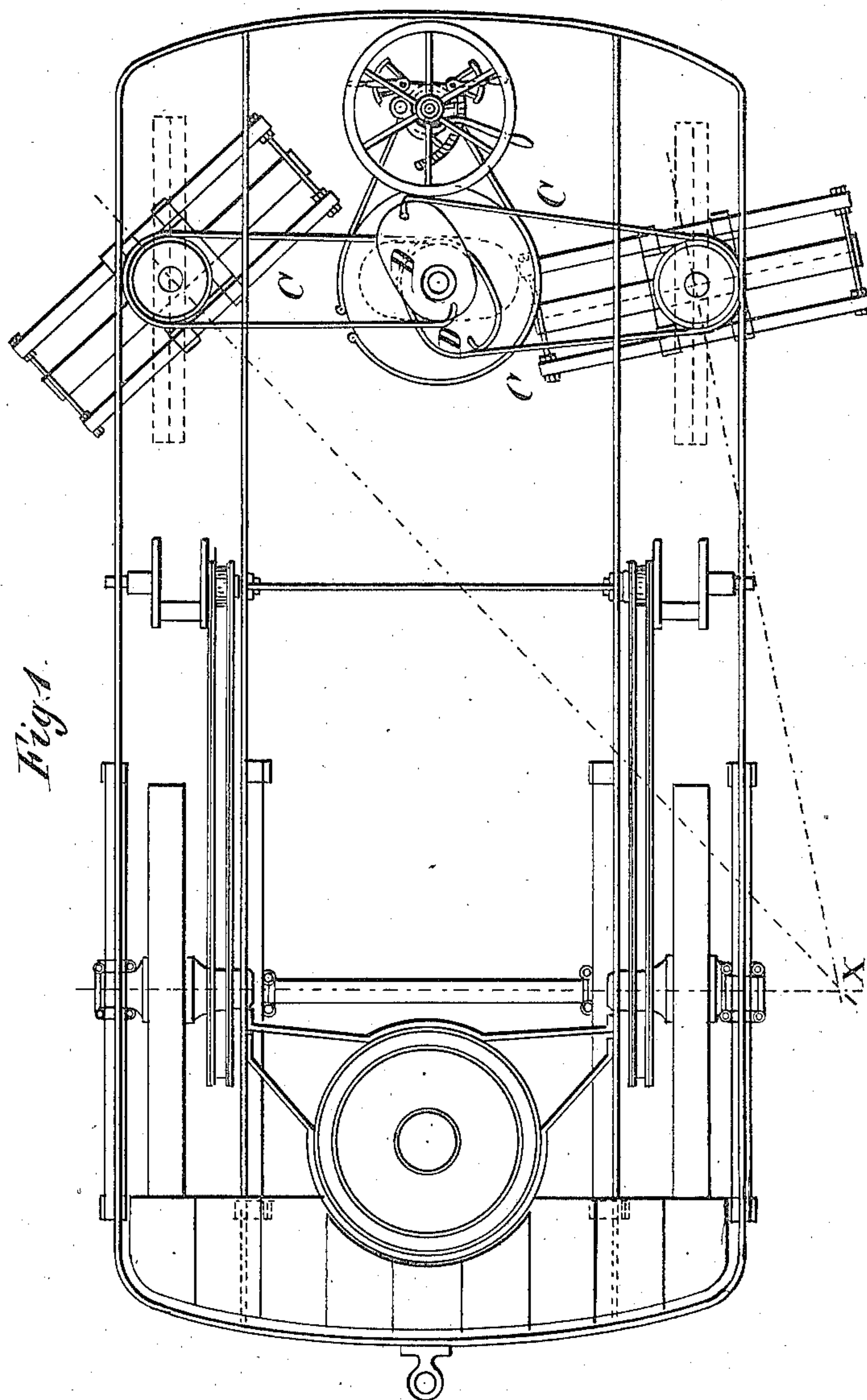


Fig. 1.

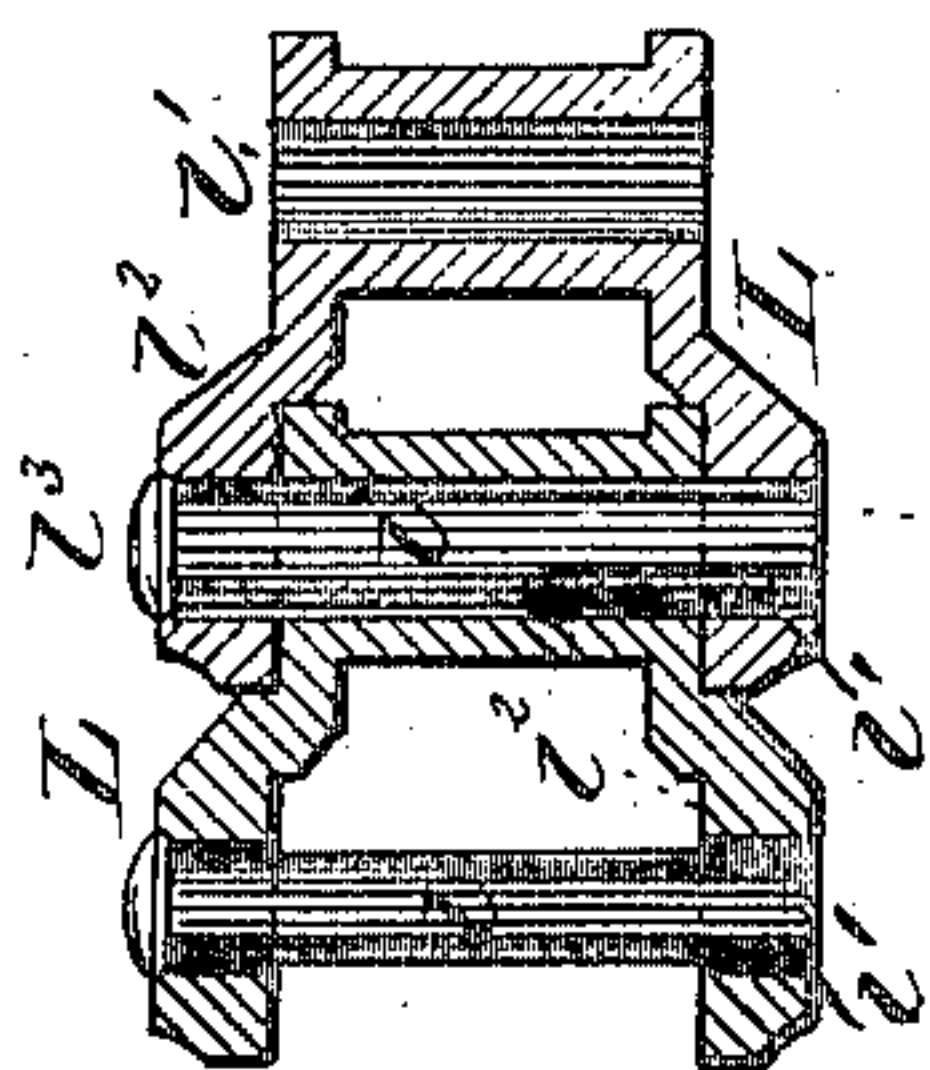
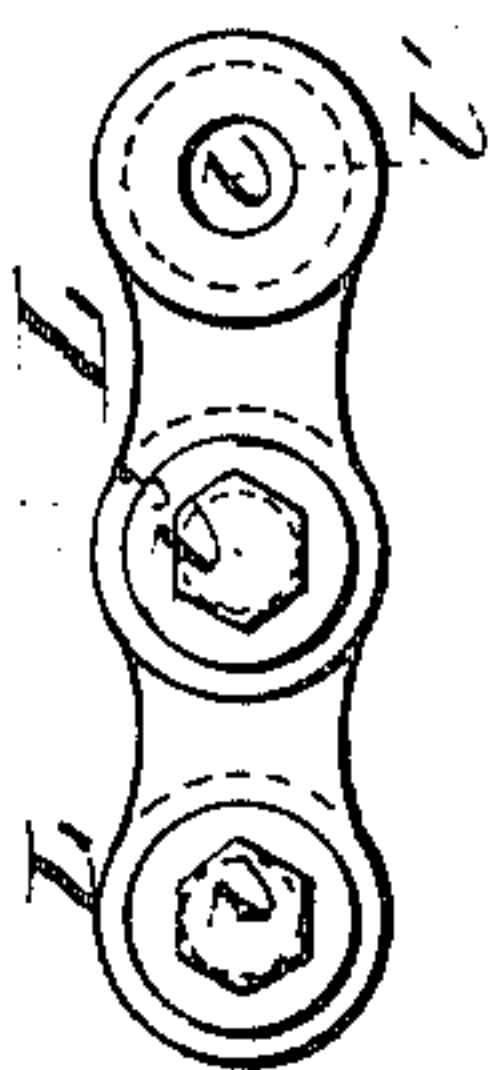


Fig. 5.



Witnesses:
Wm. A. McElroy.
H. A. Daniels.

Inventor:
Amédée Bollee
per Henry Orth
att'y

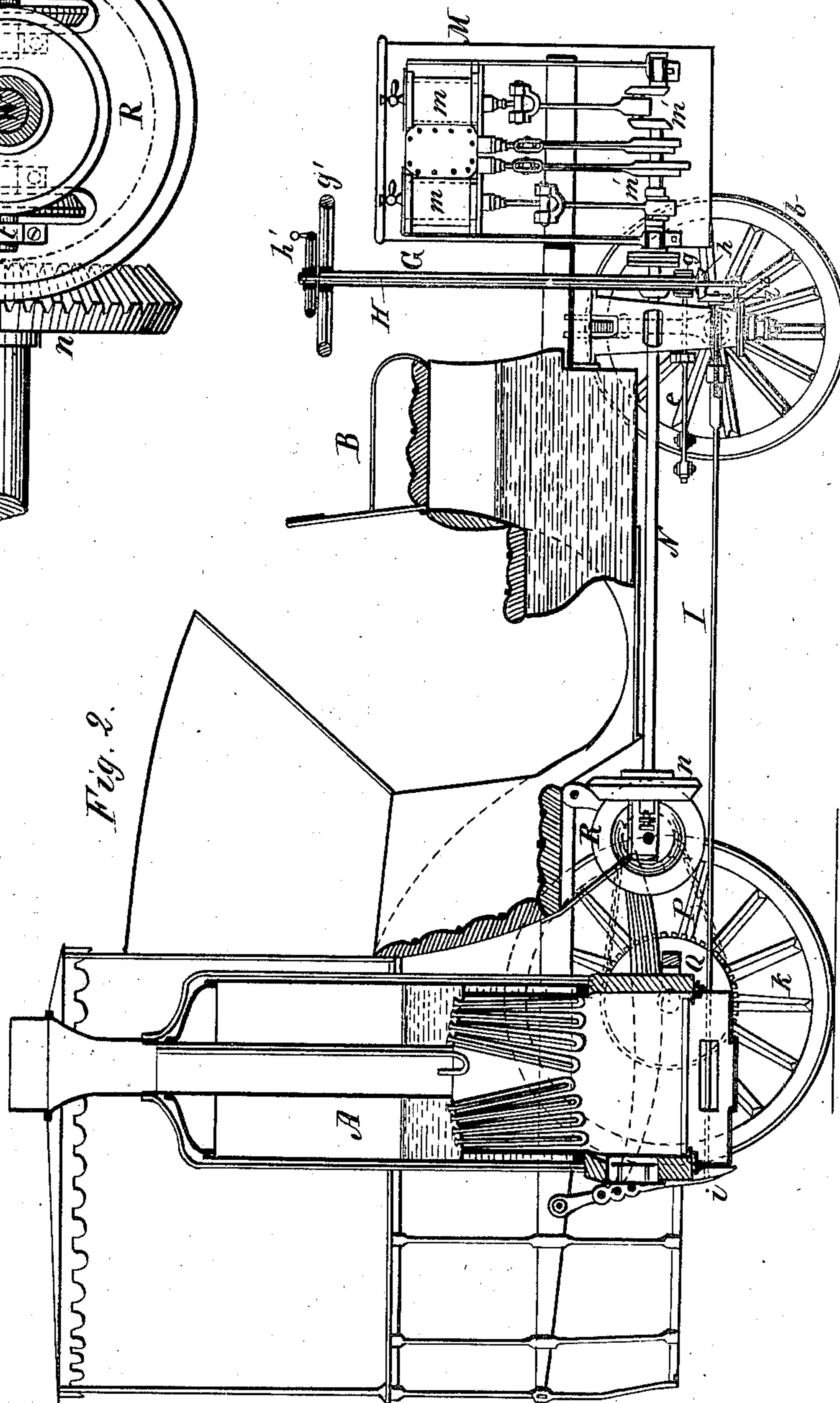
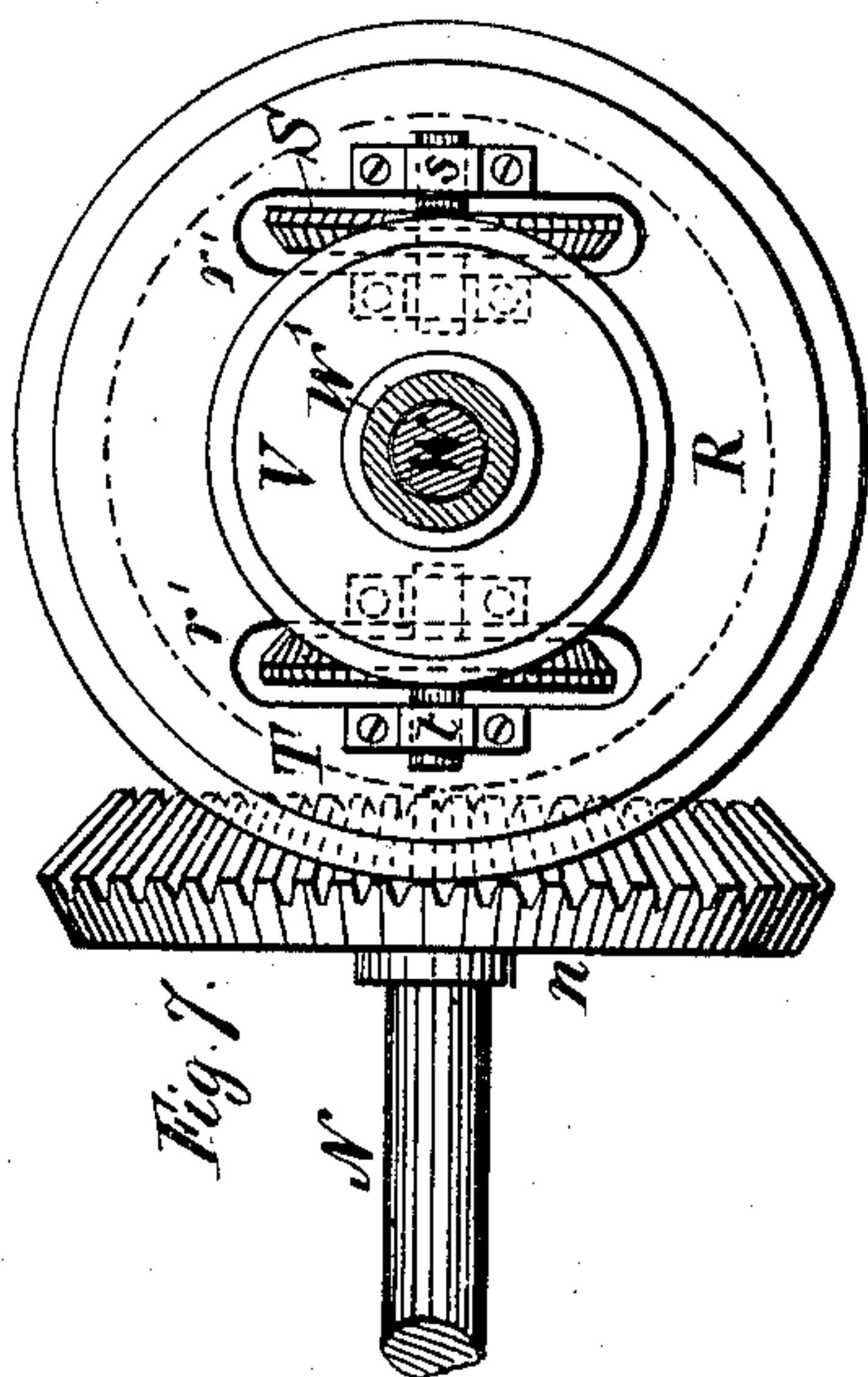
(No Model.)

3 Sheets—Sheet 2.

A. BOLLÉE.
Traction Engine.

No. 239,432.

Patented March 29, 1881.



Witnesses
Wm. A. McElwain.
H. A. Daniels.

Inventor
Amédée Bollée
per Henry Orth
att'y.

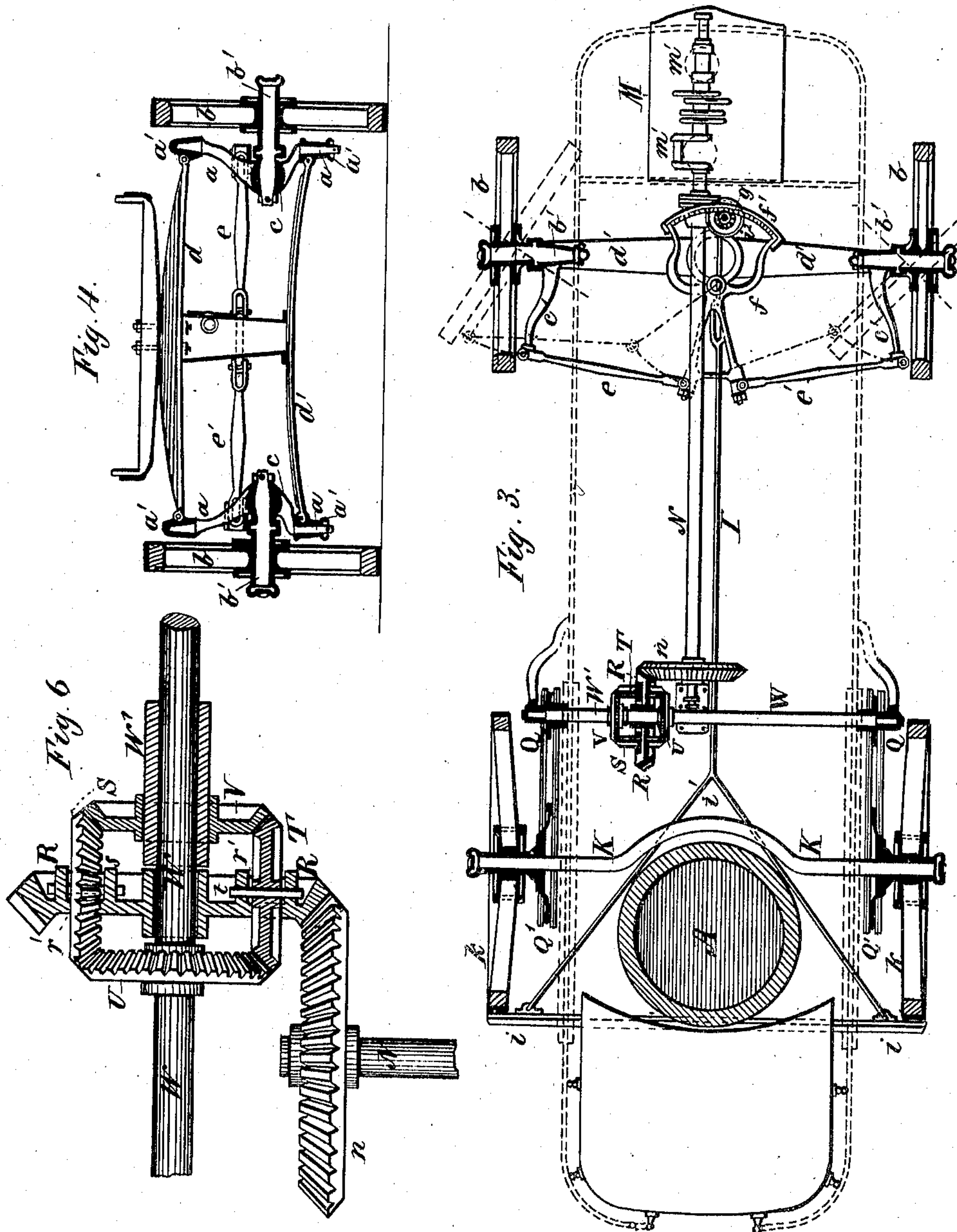
(No Model.)

3 Sheets—Sheet 3.

A. BOLLÉE.
Traction Engine.

No. 239,432.

Patented March 29, 1881.



Witnesses
Wm. A. McElroy.
H. A. Daniels.

Inventor:
Amédée Bollée
per Henry Orth
att'y.

UNITED STATES PATENT OFFICE.

AMÉDÉE BOLLÉE, OF LE MANS, FRANCE, ASSIGNOR TO BARTHOLD ARONS,
OF BERLIN, GERMANY.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 239,432, dated March 29, 1881.

Application filed December 7, 1880. (No model.) Patented in France April 28, 1873, and in Germany July 17, 1879.

To all whom it may concern:

Be it known that I, AMÉDÉE BOLLÉE, a citizen of the French Republic, residing at the city of Le Mans, in the Department Sarthe, in the French Republic, have invented certain new and useful Improvements in Steam-Carriages, Traction-Engines, and Similar Locomotives; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as 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 or figures of reference marked thereon, which form a part of this specification.

My invention relates to certain improvements in steam-carriages; and it consists in an improved construction of the carriage; and it further consists of an improved steering-gear, in combination with driving mechanism, all substantially as hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 shows in plan a steering-gear as ordinarily constructed. Fig. 2 is a vertical longitudinal section of my improved steam-carriage. Fig. 3 is a horizontal longitudinal section of the same. Fig. 4 is a transverse section through the fore carriage, and Figs. 5, 6, and 7 are detail views.

The fore carriage, the wheels of which rotate around two separate gudgeons, like that patented in England in 1875, No. 3,520, is shown in Fig. 1 of the accompanying drawings. The displacement of the plane of the fore wheels through the medium of the driving-chains C, secured to ellipses D, will invariably bring the prolonged axis of the said wheels to a common point, X, intersecting the axis or the prolongation of the axis of the hind wheels, which results in the fact that the planes of all the four wheels are invariably vertical to the radius of the curves transversed.

In Figs. 2, 3, and 4 I have shown a construction of steering-gear by means of levers and rods to take the place of the ellipses and chains shown in Fig. 1. In this construction the vertical axes of rotation, *a a*, of the fore wheels *b b* do not lie in the plane itself of said wheels, but immediately on one side thereof.

As shown, these vertical axes form part of a strong piece or lever, *c*, with the arm *c'* of which are also connected the horizontal axes or short shafts *b'*, upon which the wheels *a a* rotate. To the boxes *a'* of the vertical axes *a* are connected the supporting-springs *d' d*, and the latter serve to support the fore part of the whole vehicle upon the fore wheels.

By means of connecting-rods *e e'* and the forked lever *f*, having the toothed section *f'*, the pinion *g*, gearing with said sector *f'*, and the hollow rod G, to which the pinion is attached, and which carries at its upper end a hand-wheel, *g'*, the conductor is enabled to steer the vehicle.

By means of the second wheel, *h'*, on the rod H, that passes through the hollow rod G, and that also carries at its opposite end a pinion, *h*, the brakes *i* for the hind wheels, *k*, are manipulated through the medium of the connecting-rod I, having its forked or diverging end *i'* connected with said brakes, and carrying a pinion, *i''*, that meshes with the pinion *h*.

With this new construction of fore train having two axes of rotation, the resistance of the roadway to the rotation or turning of the fore wheels has no momentum, for the reason that its lever-arm is practically null, which enables the conductor to steer the vehicle with great facility and rapidity.

In Fig. 5 I have shown an improvement on the Galle chains, in which *l* is the pivot-pin and L the links, both preferably made of steel. Each link consists of bearings *l'* for the pivot-pins and two cheeks, *l''*, by means of which construction the tension, as well as the friction, is equally distributed over the whole length of the bearings, thereby diminishing the wear and elongation of the chains, each pin being suitably riveted or otherwise secured in place, as shown at *l'''*.

In the steam-vehicle, as shown by Fig. 2, the driving-cylinders *m m* are arranged vertically within a sheet-metal housing, M, and rotate, through the medium of cranks *m'*, a longitudinal driving-shaft, N, which latter rotates the hind wheels, *k*, through the medium of the gear-wheels *n R*, a differential gear, and the driving-chain P and pulleys Q and Q'. This

differential gearing performs an important function, inasmuch as in turning it enables the wheel that has to describe the greatest arc of the circle to rotate with increased speed, although never disconnected from the prime motor, and said gearing is constructed to operate as follows: The bevel-wheel n is rigidly mounted upon the driving-shaft N , and rotates the shaft W , carrying the driving-pulley Q through the medium of the disk-wheel R , loosely mounted thereon. The latter wheel has two slots, r' , opposite each other, and equidistant from its center, within which rotate two bevel-pinions, S and T , mounted in bearings s and t formed upon the face of said disk-wheel R , the arrangement of said wheel being such that the center of their axis will intersect the shaft W . These two bevel-pinions, S and T , mesh with a bevel-wheel, U , rigidly mounted upon shaft W , and a bevel-wheel, V , rigidly mounted on the hollow axle or sleeve W' within which the shaft W rotates, as shown in Fig. 3, and on an enlarged scale in Figs. 6 and 7, thus rotating the two driving-wheels k independently of each other through the medium of the pulleys C , rigidly connected with the axle-boxes K' , that themselves turn freely upon the wheel-axle K^2 and the pulleys Q upon shaft W and sleeve or hollow shaft W' ; and to better understand this independent driving of the two hind wheels suppose the shaft W held stationary while the driving-shaft N is in motion, which results in the rotation of the disk-wheel O , loosely mounted on shaft W ; and as the two pinions S and T are capable of rotation on said wheel and mesh with the wheel U rigidly mounted upon shaft W , it follows that said wheels will freely rotate without imparting that motion to shaft W ; but as they also mesh with wheel V on the hollow axle W' , a rotation of said wheel and its sleeve carrying one of the pulleys Q necessarily follows, while the opposite pulley remains stationary. If, now, the shaft W is released, the rotation of pinions S and T is communicated to said shaft also through the medium of the wheel U , said pinion S and T acting as idlers.

It will thus be readily understood that the rotation of the drive-wheels k is an independent one, and that either wheel is adapted to accommodate its speed to the increased distance to be traversed in turning while one of said wheels is either practically stationary or turning upon a lesser arc of a circle. It is evident, therefore, that according to the position and consequent direction of motion of the fore or guide wheels, which govern the corresponding position and direction of motion of the hind wheels to rotate the vehicle on one of said wheels, the other will move correspondingly faster without thereby affecting the normal speed of the vehicle, except it be by slight frictional resistance.

In practice the driving-shaft N is extended

under the boiler A and made of such a length as to serve as driving-shaft and in a manner similar to that just described for an auxiliary or second vehicle.

When using the above-described arrangement of extended driving-shaft the two vehicles are coupled together by a hinged or a universal coupling, the drafting being thereby adapted to rotate independently of the shaft, which is provided with an extension-sleeve and also with a double system of vertically-superposed pivots, or what is called a "Cardan joint or coupling." The boiler, either of the Field or other suitable pattern with very high steam-space, is mounted upon the rear part of the vehicle and attended by a machinist, while the conductor is seated upon the elevated seat B on the forward train of the vehicle, in proximity to the steering devices.

The vehicle is adapted to run either upon ordinary roads, paved streets, or upon rails, and its form and dimensions may be varied according to the work it is to perform.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a vehicle, the combination, with a pair of wheels, each arranged to rotate around independent horizontal and vertical pivots, of a supporting spring or springs for the body, or part of the body, of said vehicle, arranged to couple together the vertical pivots of the wheels, for the purposes specified.

2. The steering-gear hereinbefore described, consisting of the forked lever f , having toothed sector f' , the connecting-rods $e e'$, and the operating-pinion g , in combination with the vertical pivots $a a$ of a pair of wheels, each arranged to rotate around one of said vertical pivots, as described.

3. The combination, with a pair of wheels arranged to rotate around independent horizontal and vertical axes, the latter being provided with lever-arms e' , of the connecting-rods $e e'$, having toothed sector f , the pinion g , and the hollow rod G , carrying the hand-wheel g' , all arranged and operating substantially as and for the purpose specified.

4. In a vehicle, the combination of steering-gear and brake mechanism, operated and constructed as described, with the hollow rod G , its pinion g , and hand-wheel g' , and the rod H , its pinion h , and hand-wheel h' , as and for the purpose specified.

5. In a steam-carriage, the fore wheels rotating upon independent horizontal and vertical axes, a spring-connection between said vertical axes, an engine supported by said spring-connection, and drive-wheels supporting the boiler for said engine, a single driving-shaft located centrally and in the plane of the wheel-axes, and operating to transmit the power of the engine directly to said drive-wheels, all constructed and operating substantially as and for the purpose specified.

6. In a steam-carriage, the combination,
with a pair of drive-wheels and a pair of
steering-wheels, the latter rotating around
horizontal and vertical pivots, said vertical
5 pivots lying outside of the plane of horizon-
tal rotation of said wheels, of steering-gear,
substantially as described, connected with said
vertical pivots of the steering-wheels, all ar-

ranged and operating substantially as and for
the purpose specified.

In testimony whereof I affix my signature in
presence of two witnesses.

AMÉDÉE BOLLEE.

Witnesses:

A. GARAND, Fils,
C. FORESTE.