(No Model.) 6 Sheets—Sheet 1.

# A. ESTRADE.

## RAILWAY CAR.

No. 253,993. Patented Feb. 21, 1882.

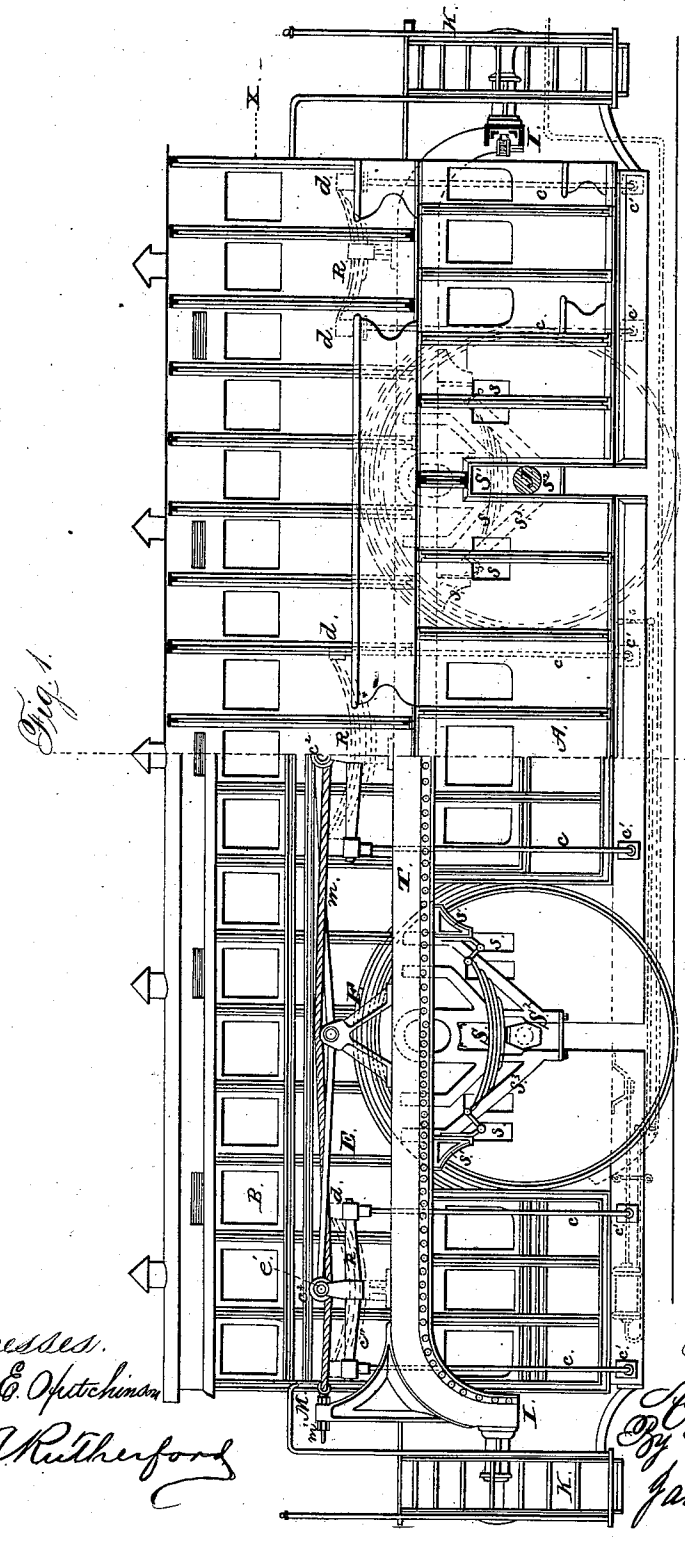


Fig. 1.

Witnesses.
Jas. E. Patchinan
J. A. Rutherford

Inventor.
Auguste Estrade.
By his Attorney
James L. Norris.

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 6 Sheets—Sheet 2.

# A. ESTRADE.

## RAILWAY CAR.

No. 253,993. Patented Feb. 21, 1882.

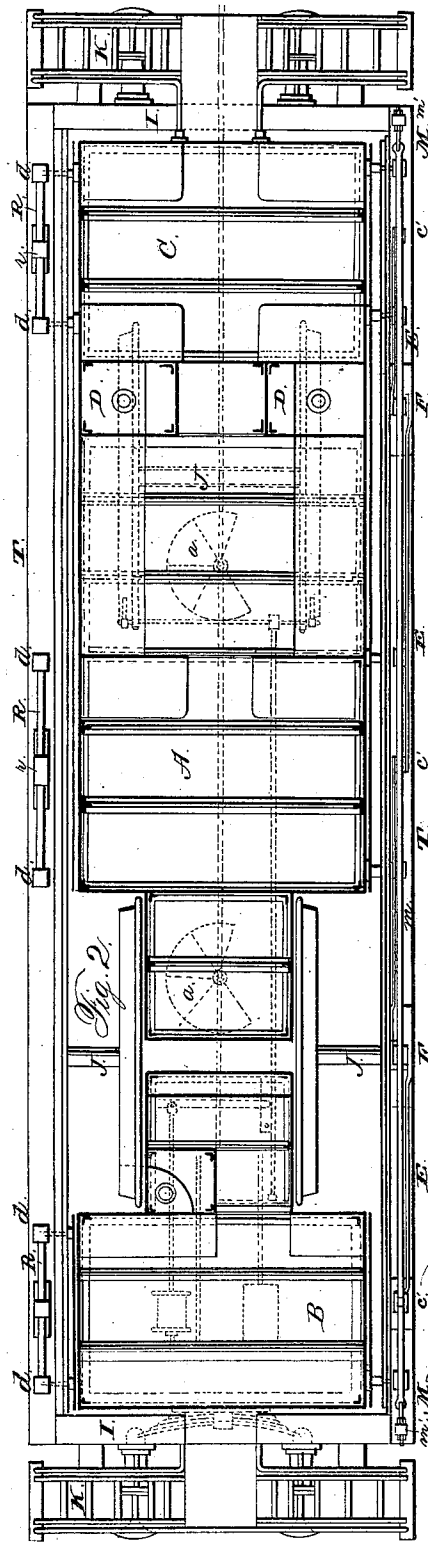


Fig. 2.

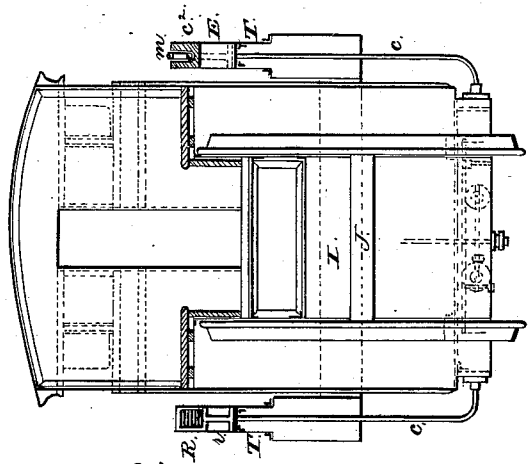


Fig. 3.

Witnesses:
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Inventor
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By his Attorney,
James L. Norris.

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(No Model.) 6 Sheets—Sheet 3.

# A. ESTRADE.

## RAILWAY CAR.

No. 253,993. Patented Feb. 21, 1882.

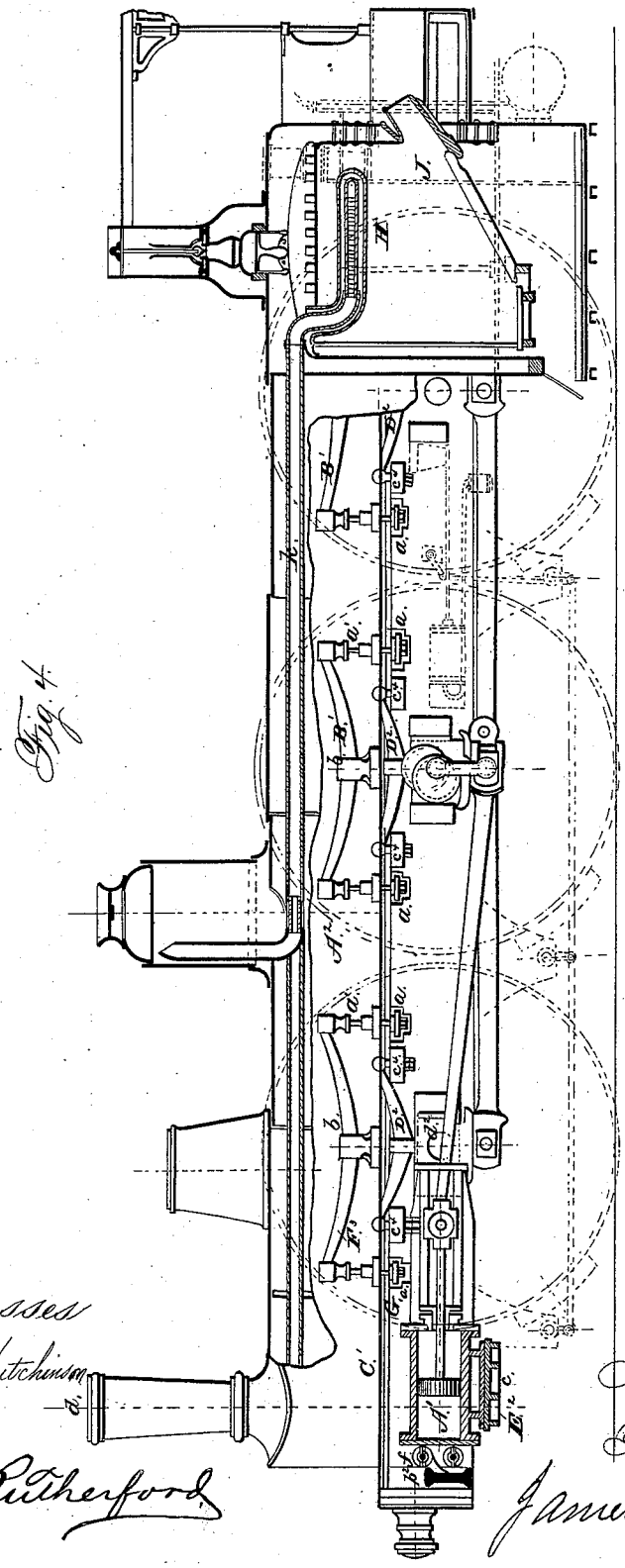


Fig. 4.

Witnesses
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(No Model.) 6 Sheets—Sheet 4.

# A. ESTRADE.

## RAILWAY CAR.

No. 253,993. Patented Feb. 21, 1882.

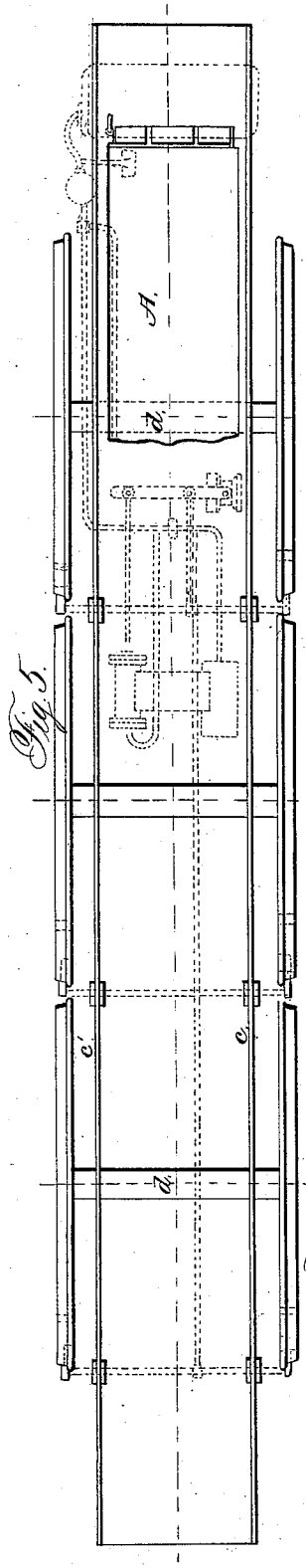



Fig. 5.

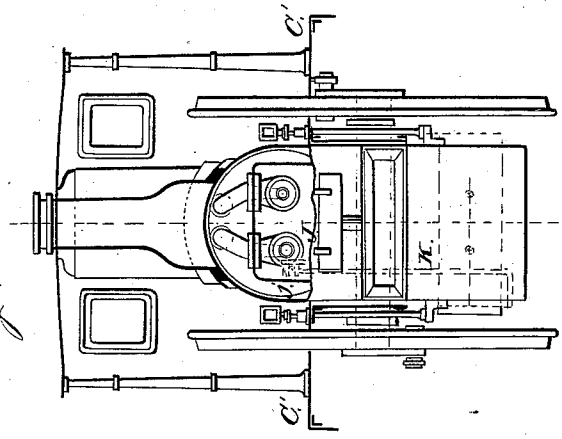



Fig. 4.

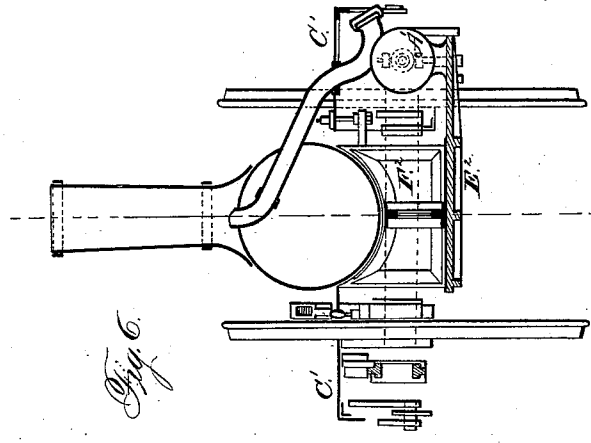



Fig. 6.

Witnesses.
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James L. Norris.

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(No Model.) 6 Sheets—Sheet 5.

# A. ESTRADE.

## RAILWAY CAR.

No. 253,993. Patented Feb. 21, 1882.

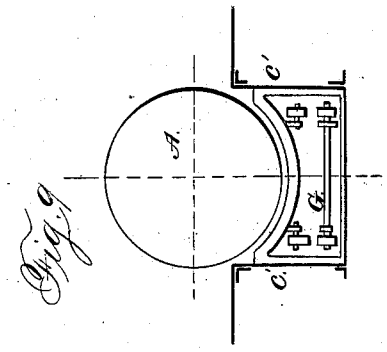


Fig. 9.

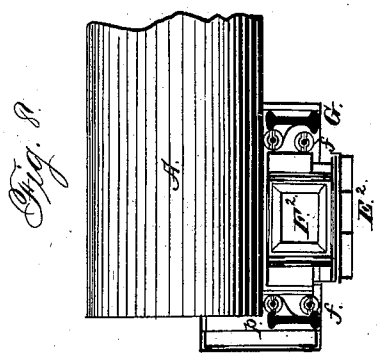


Fig. 8.

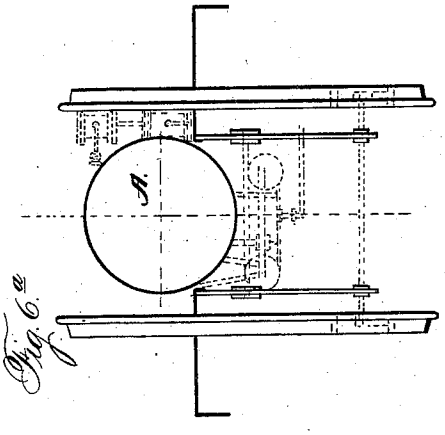


Fig. 6a.

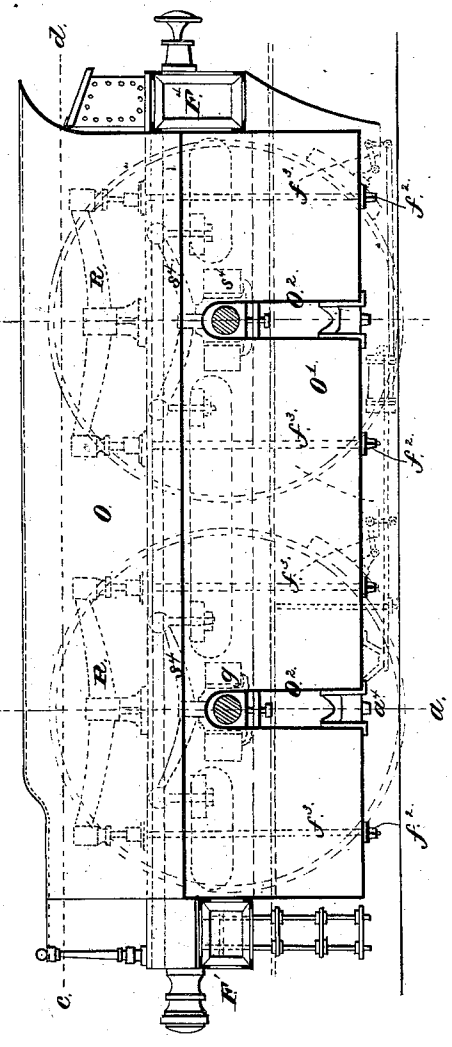


Fig. 10.

Witnesses.
Jas. E. Hutchinson.
J. A. Rutherford

Inventor.
Auguste Estrade,
By his Attorney.
James L. Norris.

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(No Model.) 6 Sheets—Sheet 6.

# A. ESTRADE.

## RAILWAY CAR.

No. 253,993. Patented Feb. 21, 1882.

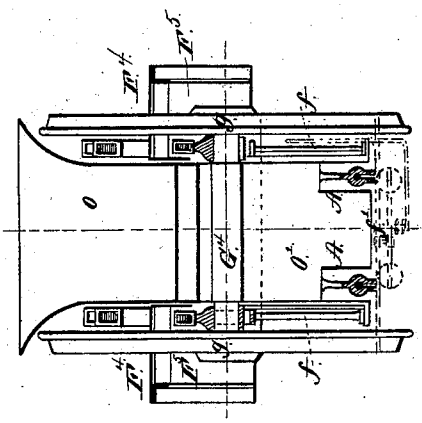


Fig. 12.

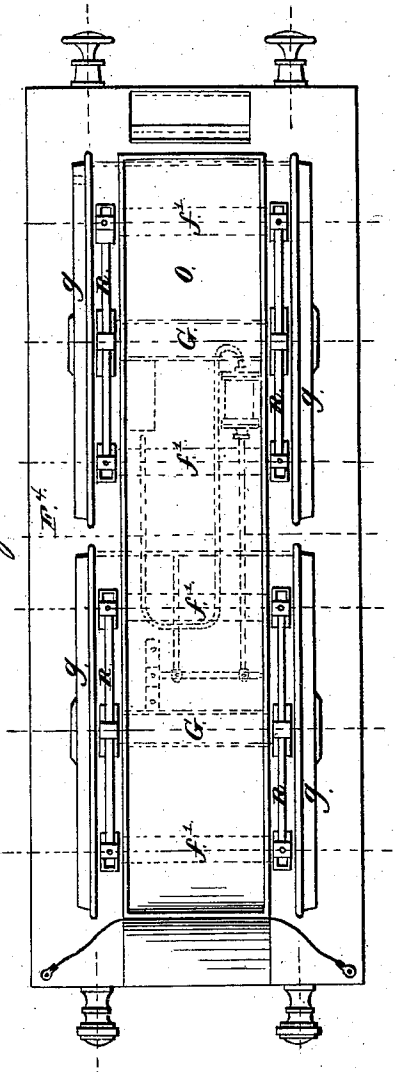


Fig. 11.

Witnesses.
Jas. E. Hutchinson.
J. A. Rutherford

Inventor.
Auguste Estrade,
By his Attorney,
James L. Norris.

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# UNITED STATES PATENT OFFICE.

AUGUSTE ESTRADE, OF PERPIGNAN, FRANCE.

## RAILWAY-CAR.

SPECIFICATION forming part of Letters Patent No. 253,993, dated February 21, 1882.

Application filed November 21, 1881. (No model.) Patented in France September 16, 1875, and June 18, 1881, and in England August 23, 1881.

*To all whom it may concern:*

Be it known that I, AUGUSTE ESTRADE, a citizen of France, residing at Perpignan, in the Republic of France, have invented an Improved Construction of Rolling Stock for Railways, (for which I have obtained patents in France, bearing date 16th September, 1875, and 18th June, 1881, and in Great Britain, No. 3,674, dated 23d August, 1881,) of which the following is a specification.

My invention has for its object to improve generally the construction of the rolling stock of railways; and it consists mainly in applying to carriages, locomotives, and tenders a system of double suspension for the body, so as to obtain easier motion and consequently decreased wear and tear; and, further, in employing such a construction as will enable wheels of very large diameter to be employed while keeping the center of gravity as low as possible, thereby enabling greater speeds to be obtained with increased stability against running off the rails or upsetting. The construction of the rolling stock for these purposes will be readily understood on reference to the accompanying drawings, in which—

Figures 1 to 3 show the improvements applied to a carriage. Fig. 1 shows a part side elevation and part longitudinal section. Fig. 2 shows a sectional plan on line X X, and Fig. 3 shows a cross-section.

The body of the carriage is constructed entirely of sheet and angle T or ⊔ iron, as shown. It is formed with an upper and lower story or floor. The lower story is divided into three compartments, of which the middle one, A, may be employed as a buffet or restaurant, from which access is gained to the upper floor by the staircase *a*, arranged in the space between the wheels. The two compartments B and C communicate with the buffet by a passage formed in the spaces between the wheels, in which spaces are also situated the water-closets and lavatories. On the upper floor the water-closets are also arranged between the central compartment and the end ones on each side of the communicating passages D D.

Surrounding the body is a suspension-frame, T, upon which the body is suspended either by means of wire ropes or by springs, and which in its turn is supported upon the wheels by other springs. For suspending the body by means of a wire rope, the rope *m* is attached at its ends to strong brackets M on the frame T by means of adjustable eyebolts *m'*. This rope rests on rollers $c^2$, attached to brackets *c'* on the middle of cross-heads R, the ends of which are connected to rods *c*, whose lower ends are fixed to the bottom frame of the body; or, when springs are employed, the rods *c* are connected by loops at their upper ends to the ends of springs R, that are supported at their middle by brackets *r* from the frame T. This frame is in its turn supported on the axle-boxes $S^2$ of the wheel-axles J by means of springs S, the ends of which are attached by links to brackets S' on the frame, which also carries the horn plates $S^3$.

For preventing longitudinal motion of the body when this is supported upon wire ropes, the axes of the suspension-pulleys $c^2$ are connected by rods E to brackets F on the frame.

The frame is constructed of box shape, and its ends are curved downward, as shown, so that the part I thereof forming the buffer-beam is at a lower level. By this construction the frame possesses considerable elasticity against concussion in the case of collision, and the fracture thereof and consequently of the body will in most cases be prevented.

Access is gained to the upper floor by means of external staircases, K, at the top of which a platform is constructed on the same level as the floor, and there is also provided a hinged extension to the platform, that can be let down so as to establish a communication with the platform of the next carriage.

As will be seen, this construction of carriages allows of wheels of very large diameter being employed, the body being recessed at the respective points to receive them, as shown at Figs. 2 and 3.

Figs. 4 to 9 show my improved construction as applied to a locomotive-engine. Fig. 4 shows a longitudinal section. Fig. 5 shows a sectional plan; Figs. 6 and $6^a$, cross-sections; Fig. 7, a front view, partly in section. Figs. 8 and 9 show detached details.

The cylindrical body $A^2$ of the engine, together with the whole of the driving mechan-

ism, is suspended by transverse bearers *a* and suspension-rods *a'* to the ends of the springs B', carried at their middles by brackets *b*, fixed to the frame C', which in its turn is suspended by bearers $e^4$ and suspension-bolts from the ends of the springs D, carried on the axle-boxes of the wheel-axles.

The cylinders A' are mounted beyond the frame on a plate, $E^2$, fixed to the boiler by means of a bracket, F, as shown at Figs. 6 and 8. On each side of this bracket are vertical rails or ribs $e^2$ $e^2$ $e^2$, that are in contact with rollers *f f*, carried on the transverse beams G of the frame C', so that the boiler has a firm abutment against the frame, preventing any relative longitudinal movement between the two, while at the same time the former can oscillate freely up and down within the latter upon its springs $F^3$. The wheels of the engine are also of large diameter.

Figs. 10, 11, and 12 show respectively a longitudinal section, a sectional plan, and a transverse section of a tender constructed according to the present invention.

The body O of the tender is supported on transverse bearers $f^2$, the ends of which are suspended by rods $f^3$ from the ends of springs R, carried by the framing $F^4$, which in its turn is supported by the springs S upon the axle-boxes *s* of the axles G, which are of large diameter.

The lower part, O', of the tender constitutes the water-tank, and as this is divided transversely into three separate compartments by the hollow partitions $O^2$, through which the axles G pass, a communication is established between them by the castings A, having passages through which the water can flow from one compartment to the other, and which are provided with cocks at $a^4$ for running off the water.

The transverse part $F^5$ of the frame $F^4$ next the engine is lowered so as to be on the same level as the foot-plate of the latter.

In all three constructions of the rolling stock above described the Westinghouse pneumatic brake can be applied as indicated in dotted lines.

Having thus described the nature of my invention and in what manner the same is to be performed, I claim—

1. The combination, with an exterior frame sustained above the axles of the vehicle through the medium of springs, of the vehicle-body arranged over the said surrounding frame and extending downward below the same, thereby inclosing it, and springs or their described equivalent suspending the exterior body from the upper portion of the interior surrounding frame, substantially in the manner and for the purpose described.

2. The combination of an interior surrounding frame, T, sustained above the axle through the medium of interposed springs, the exterior body arranged over the interior frame and extending downward to inclose the same, and springs or their described equivalents suspending the exterior body from the upper portion of the interior frame, said body being vertically recessed at its sides to receive the supporting or driving wheels, substantially in the manner and for the purpose described.

3. The combination of the interior frame having the downward curved ends I, and supported on the axles through the medium of springs, with the exterior body arranged over said frame and extended downward to inclose the same, and devices, substantially as described, suspending the body from supports on the interior frame, substantially in the manner and for the purpose described.

4. In a locomotive-engine having its body suspended by springs within a frame that is carried by other springs upon the wheels, the rollers *f*, carried by the said frame and bearing against rails or ribs $e^2$ on the body, substantially as and for the purposes set forth.

5. In a locomotive-engine having its body suspended by springs within a frame that is carried by other springs upon the wheels, the connection of the cylinders A' with the body $A^2$ by means of the plate $E^2$ and frame $F^2$, substantially as herein described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 2d day of November, A. D. 1881.

AUGUSTE ESTRADE.

Witnesses:
JULES DUPREZ,
J. JULES DIGEON.