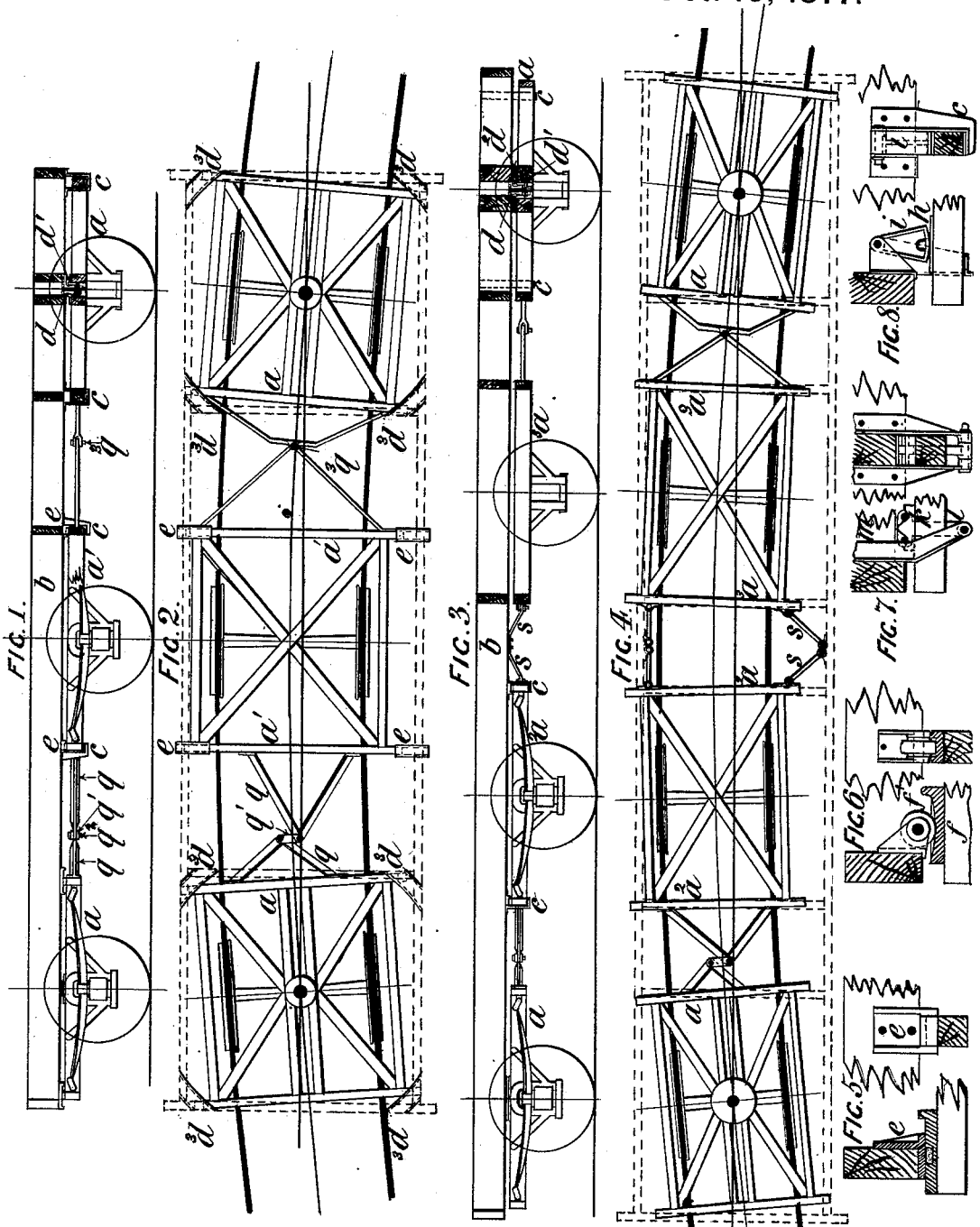
J. CLEMINSON.
Railway-Truck.

No. 196,138. Patented Oct. 16, 1877.



Witnesses.
W. Cooke
Jno. Wasteth

Jas. Cleminson

UNITED STATES PATENT OFFICE.

JAMES CLEMINSON, OF WESTMINSTER, ENGLAND.

IMPROVEMENT IN RAILWAY-TRUCKS.

Specification forming part of Letters Patent No. **196,138**, dated October 16, 1877; application filed July 3, 1877.

To all whom it may concern:

Be it known that I, JAMES CLEMINSON, of Westminster, county of Middlesex, England, have invented certain Improvements in Railway and Tramway Carriages, and in articulating and radiating the axles thereof, of which the following is a specification:

This invention has reference to an improved method of mounting and connecting the wheels and axles of railway and tramway carriages of all kinds, whereby I secure a more perfect mode of articulating and radiating the said axles with their wheels by means of the combined swiveling motion of the end axles and the transverse movement of the intermediate axle or axles when traversing railway-curves.

In order that my said invention may be more easily and more clearly understood, and be more readily performed, I will explain the same with the aid of the accompanying drawing, which forms part of this specification, reference being made thereto by the numerals and letters marked thereon.

Figure 1 is a part side elevation and part longitudinal section of a carriage under-frame having three axles. Fig. 2 is a plan of the same. Fig. 3 is a side elevation and part longitudinal section of a portion of a carriage under-frame having four axles. Fig. 4 is a plan of the same. Fig. 5 shows a side section and a front view, respectively, of guides and bearing-pieces, with means for automatically lubricating their surfaces, and for supporting the carriage-body on the intermediate axle-frame. Fig. 6 shows a side and a front view, respectively, of similar bearing-pieces with friction-rollers. Fig. 7 shows a side view and a transverse section, respectively, of similar bearing-pieces with pendulous links. Fig. 8 shows a side view and a transverse section, respectively, of similar bearing-pieces with rockers.

I fit each pair of wheels and axles in a separate frame, *a*, of wood or iron, having the usual axle-guards, axle-boxes, and bearing-springs attached to such frames. For carriages having three axles I attach the two end axle-frames *a* to such carriage under-frame *b* by means of the center-pin *d*, fitted in the socket or bearing d^1, and I cushion such bearing with woolen cloth, felt, or other suitable elastic material, at d^2, (see Fig. 3,) so that such end axles and their frames shall have a swiveling motion only; or I may cause the said end axle-frames to radiate by placing segmental sliding guides at the four corners thereof, similar to those shown in Fig. 1. I attach metal safety-guards *c* to the carriage under-frame, as shown in Figs. 1, 3, and 8.

The intermediate axle-frame a^1 is connected at its four corners with the under-frame *b* by means of the combined bearing-pieces and sliding guides *e*, so that such axle-frame may have free transverse motion only, (see Figs. 1, 4, and 5;) or by the similar bearing-pieces and guides *f*, fitted with rollers *f'*, (see Fig. 6;) or by the similar bearing-pieces *h*, and rockers *i*, and guides *c*, (see Fig. 8;) or by the bearing-pieces *k*, and the pendulous links *l*, and the guide-brackets *m*. (See Fig. 7.) These several arrangements are for the purpose of permitting the easy and free transverse movement of the said intermediate axle-frame, and of guiding the same in such movement, and also to permit easy and free swiveling motion to the said end axle-frames, and to guide the same in such motion when entering and leaving a railway-curve. The safety-guards are for the purpose of preventing the said axle-frames leaving or becoming disconnected from the under-frame in the event of the failure or rupture of any part of my improved arrangements.

The said end and intermediate axle-frames are coupled together by the brackets *q*, which are jointed or articulated by the links q^1 and pins q^2, or by the simple pin q^3, (see Figs. 1 and 2;) or the said axle-frames and brackets may be made in one piece.

By the adoption of the said links q^1 and pins q^2 the slackness and insecurity of an elongated hole or slot at the connecting parts of the said brackets are avoided, and at the same time the radial motion of the end axle-frames as against the transverse movement of the intermediate axle frame or frames is compensated for. Such compensation is also provided for where the single-pin connection is used by the elasticity of the axle-frame *a*, where the connection is made, (see Figs. 1 and 2;) or by the yielding of an elastic washer encircling such pin, or by the springing of either of the said

brackets or some portion thereof; or by encircling the center pin or pivot *d* of the end axle-frames with an elastic envelope, or by lining the seat of such center pin or pivot with an elastic bush; or by interposing elastic cushions between the said brackets and their seats on the said axle-frames, or between the said brackets and their respective fastenings; or I make the said brackets of such a form as to lock into each other, and dispense with the said connecting-pin. The brackets of the said end axle-frames are curved at the part where they abut or bear against the brackets of the intermediate axle or axles, the said intermediate bracket or brackets being straight at the said part of abutment or bearing; and, if desired, I insert a guard-bolt to prevent such brackets becoming unlocked or disconnected.

For carriages having four axles, I attach the two end axle-frames *a* to such carriage under-frame *b*, by any of the methods already described for carriages having three axles, or by a center pivot working in a bearing, such pivot and bearing being prevented from becoming disconnected by a guard-pin. Safety-guards, as previously described, may also be applied in this case.

The two intermediate axle-frames a^2 a^3 may be connected to the under-frame *b* by any of the methods previously described for the intermediate axle-frames of carriages having three axles. The combined radial and lateral motions which are required for the intermediate frames a^2 a^3 are obtained by means of the jointed links *s*, which are attached to the under-frame *b* at one end, and to the said axle-frames at the opposite end, and are placed at an angle with the center line of the carriage suited to the curve of minimum radius on the railway; or radial and lateral motions may be attained by the said intermediate frames being fitted with the combined bearing-pieces and segmental sliding guides before described. In this case the end axle-frames *a* are coupled to their next intermediate axle-frame a^2 or a^3 by the same methods as already described for the three-axle-frame arrangement, or by brackets and a simple pin encircled by an elastic washer fitted into a suitable hole formed in a boss at the end of one of the said brackets, while the said pin is securely attached to the end of the other or adjoining bracket, thus forming an elastic joint without slackness; or I mount the wheels and axles, axle-boxes, and guards only in such frames, the bearing-springs, which rest upon the axle-boxes, being attached to the carriage under-frame by links or shackles of sufficient length to permit the said axles and frames to perform their respective movements. The said links or shackles may have cushions interposed between them and the scroll-irons dependent from the said under-frame. The said frames may be attached to the carriage under-frame, and may be connected together or articulated by any of the means described; or I rigidly connect the said axle-frames to the said axle-boxes, and invert the bearing-springs, which rest at their ends on the said axle-frames, while their buckles or hoops are fitted with rockers, for the purpose of permitting the said axles, frames, and bearing-springs to perform simultaneously their respective movements. The said axle-frames are attached to the carriage under-frame, and may be connected together and radiated by any of the methods previously described.

By the arrangements already described, when a carriage enters a railway-curve, and the flanges of the wheels thereof come in contact with the rails of the curve, the intermediate wheels and axle of the three-axle arrangement are caused to move transversely only, while the two end axles, with their wheels, are caused to swivel or turn to their respective radial lines of such curve. Also, by the arrangements already described for carriages having four axles, the two intermediate axles and their wheels are caused to move transversely and radially, while the end axles thereof are caused to swivel to their respective radial lines of the railway-curve.

It is usual, in practice, to allow clearance between the railway-rails and the flanges of the wheels running thereon; and whereas the flanges of all such wheels placed at or near the ends of a carriage run against the outer rail of a curve, while the flanges of the intermediate wheel or wheels bear against the inner rail of such curve, if the radiating gear or the axle-frames be connected together midway between the centers of the end axles and the center of the next or intermediate axle, the radial movement of the end axles will not be sufficient to enable such axles to take up truly radial positions when passing along a curve. In order that the said end axles shall assume truly radial positions on a curve, I connect the said radiating gear or the axle-frames at a point or points nearer to the center of the end axle than to the center of the intermediate axle, (see Figs. 1, 2, 3, 4,) the positions of such points of connection being determined by the amount of clearance between the flanges of the said wheels and the rails, by the distance apart of the centers of the end axles of the carriage, and by the minimum radius of curve on the railway over which my said improved radiating axles have to run.

For preventing or reducing the jarring effects of irregularities and defects of the railway on the movements of the said radiating axles, I place steel springs, woolen, india-rubber, or other elastic cushions, between the said bearing-pieces and their respective seats on the said axle-frames, and between the said bearing-pieces and the said under-frame.

In order to prevent undue oscillation either of the carriages or the intermediate axle-frame, or the radiation of the said axles being too abruptly effected, and for the further purpose of aiding or impelling the said wheels and axles and their frames to recover their normal positions when passing from a railway-curve

onto a straight line, I use bearing-pieces with inclined planes, or the bearing-pieces *f*, with curved seats for the rollers *f'*, as shown in Fig. 6, or the pendulous links *l*, Fig. 7.

By preference I support the superincumbent load upon the central bearings of the end axle-frames, and upon the sides or the corners of the intermediate axle-frames, or I may support the said load upon the sides or corners of all the said axle-frames.

The arrangements previously herein described for three and four axles, respectively, may be advantageously used in the construction or fitting of bogie-trucks.

Having thus fully described the nature of my said invention and the method of performing the same, I desire it to be understood that I do not restrict myself to the precise details now illustrated, as they may be considerably modified or varied without departing from the main characteristics of the invention and the leading features of the general arrangements; but

I claim as my invention and desire to secure by Letters Patent—

1. The combination, in a railway or tramway carriage, of a pivotal axle-frame, *a*, an axle-frame, a^1, capable of moving bodily sidewise, to adjust itself into position relatively to the frame *a* in passing around a curve, and independent brackets *q*, extending from said axle-frames *a* a^1, and connected with each other at a point nearer to the center of the pivotal axle-frame *a* than to the center of the axle-frame a^1, substantially as set forth, whereby adequate radiation of the pivoted axle-frame *a* in passing over a curve is provided for.

2. The combination, in a railway or tramway carriage, of a pivotal axle-frame, *a*, an axle-frame, a^1, capable of moving bodily sidewise, and rigid and independent brackets *q*, extending from said axle-frames, and connected by an intermediate link, q^1, substantially as set forth, whereby play between the axle-frames *a* a^1 is provided for, and ruptures and breakages incident to a too rigid connection are avoided.

JAS. CLEMINSON.

Witnesses:
W. COOKE,
HY. JNO. WASTELL.