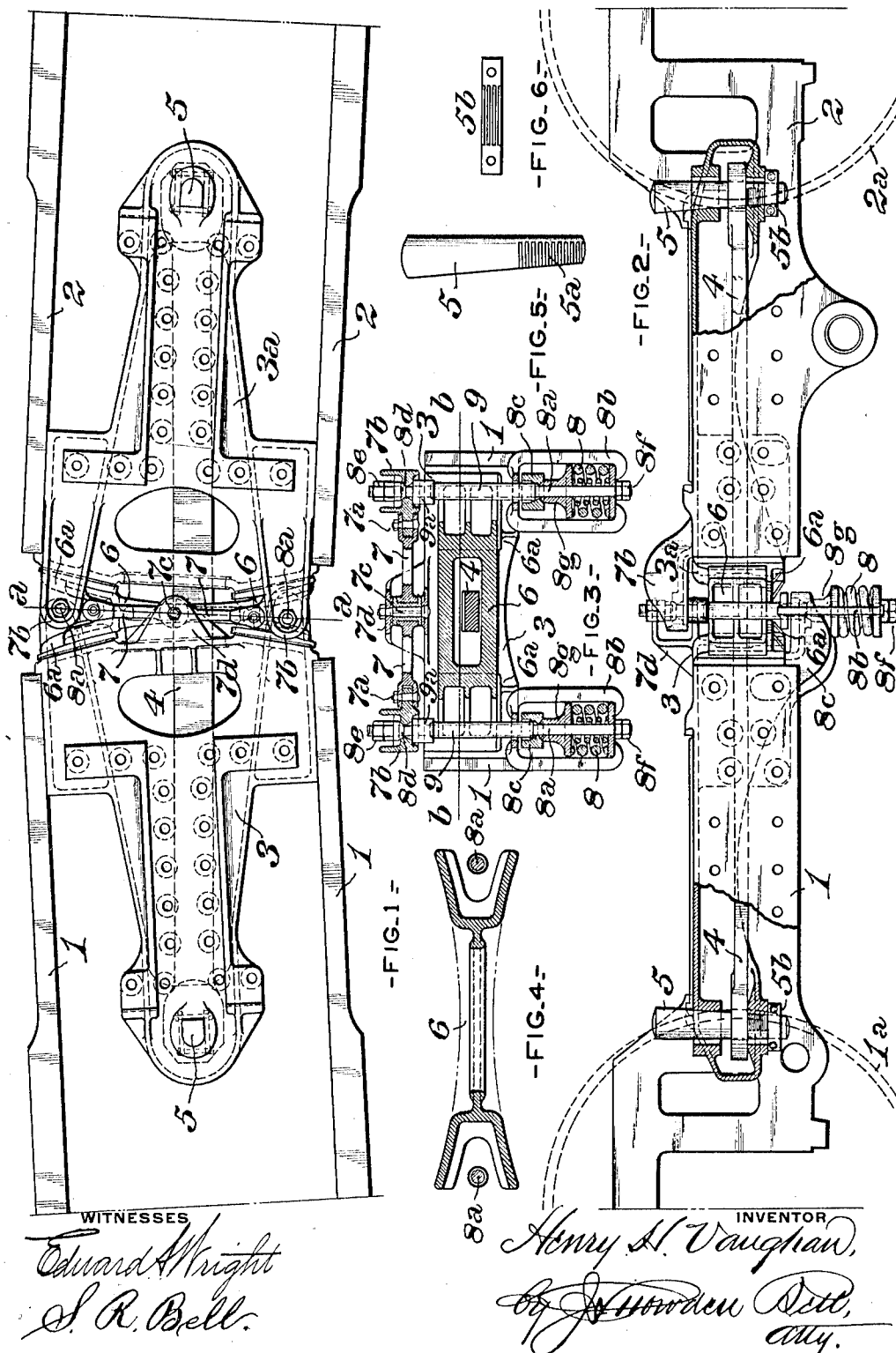


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 FRAME CONNECTION FOR ARTICULATED LOCOMOTIVES.
 APPLICATION FILED DEC. 5, 1912.

1,064,032.

Patented June 10, 1913.

2 SHEETS-SHEET 1.

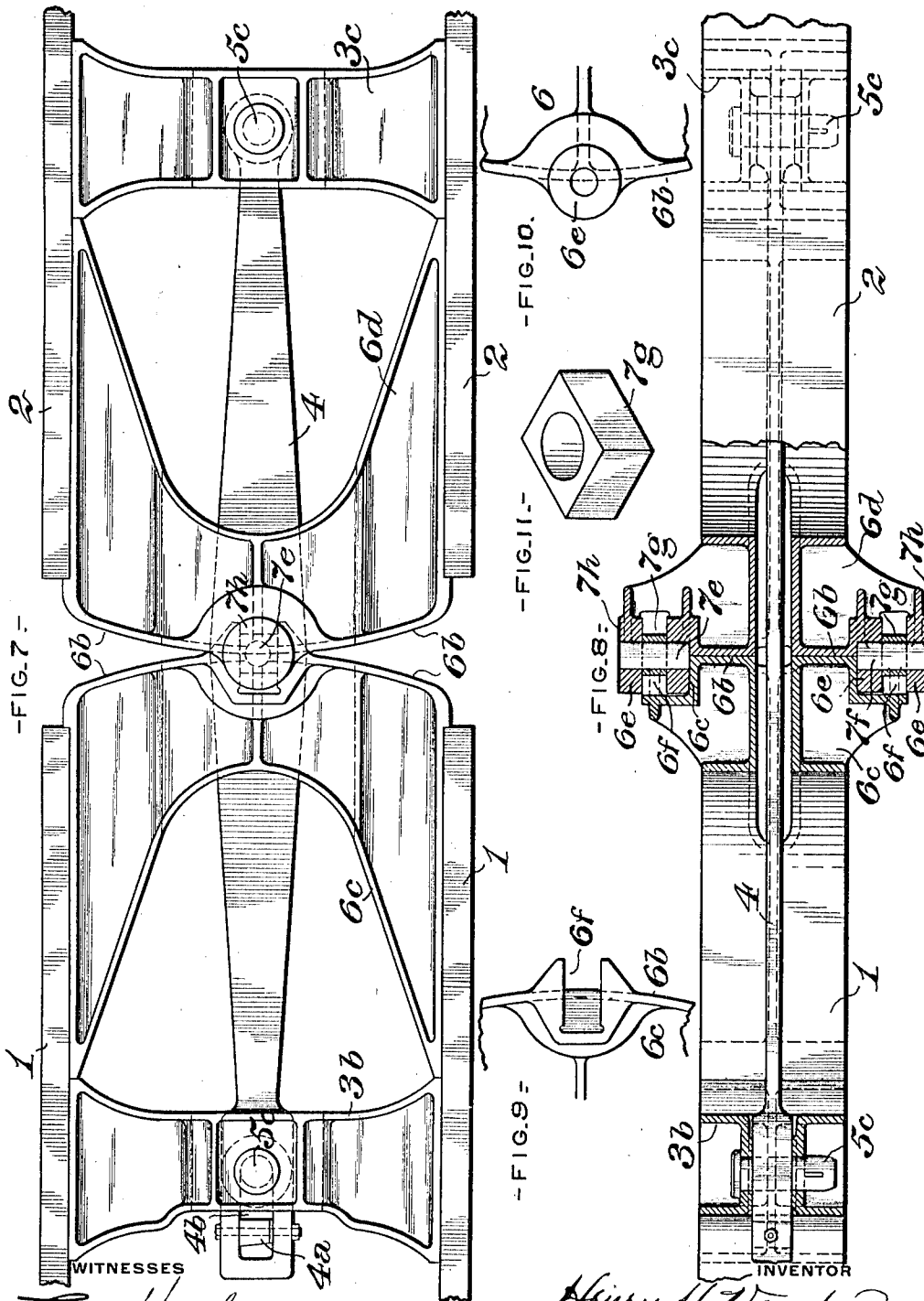


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UNITED STATES PATENT OFFICE.

HENRY H. VAUGHAN, OF MONTREAL, QUEBEC, CANADA.

FRAME CONNECTION FOR ARTICULATED LOCOMOTIVES.

1,064,032.

Specification of Letters Patent.

Patented June 10, 1913.

Application filed December 5, 1912. Serial No. 735,044.

To all whom it may concern:

Be it known that I, HENRY H. VAUGHAN, of Montreal, in the Province of Quebec and Dominion of Canada, have invented a certain new and useful Improvement in Frame Connections for Articulated Locomotives, of which improvement the following is a specification.

My invention relates to locomotives of the articulated or Mallet type, in which the boiler is carried upon a rear frame supported on a plurality of driving wheels, and a front frame similarly supported and articulated to the rear frame, so as to have the capacity of lateral movement relatively to the rear frame and the boiler mounted thereon.

The object of my invention is to provide a connecting mechanism, of simple and inexpensive construction, whereby the rear and front frames of an articulated locomotive may be coupled one to the other, with the capacity of free articulation to permit the necessary swiveling movements of the front frame, without liability to undue flange wear or derailment; proper and ample resistance to strains of draft and buffing; and maintenance of normal vertical alinement of the frames.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a plan or top view of the adjoining portions of the frames of an articulated locomotive, when on a curved track, illustrating an application of my invention; Fig. 2, a view, partly in side elevation and partly in vertical central section, of the same; Fig. 3, a vertical transverse section, on the line *a a* of Fig. 1; Fig. 4, a horizontal section, on the line *b b* of Fig. 3; Fig. 5, a side view, in elevation, and on an enlarged scale, of one of the coupling pins; Fig. 6, a similar view of a coupling pin clamp; Fig. 7, a plan view, illustrating a structural modification; Fig. 8, a view, partly in vertical longitudinal central section and partly in elevation, of the same; Fig. 9, a plan view of the central outer end portion of the bumper casting of the front frame; Fig. 10, a similar view of the corresponding portion of the bumper casting of the rear frame; and, Fig. 11, an isometrical view, on an enlarged scale, of a hinge pin block.

Referring first to Figs. 1 to 6 inclusive,

my invention is herein illustrated as applied in the connection of the front or truck frame, 1, and the rear frame, 2, of an articulated locomotive, said frames being independently supported on sets of driving wheels, 1^a, 2^a, in the ordinary manner, and each of them embodying two parallel side members, spaced apart at the proper distance and connected by transverse braces and other intermediate members, which being familiar to those skilled in the art, and not forming any part of my present invention, are not herein shown. A connecting member or draw bar casting, 3, the primary function of which is to provide for the attachment of a draw bar, and which serves also as a transverse frame brace, is interposed between, and secured to, the side members of the front frame, 1, at the ends thereof which adjoin the rear frame, and a substantially similar draw bar casing, 3^a, is similarly interposed between, and secured to, the side members of the rear frame, 2. The draw bar castings are prolonged centrally and inwardly from the adjoining ends of the frames, and sockets are formed in them, adjacent to their inner ends, for the reception of coupling pins, 5, to which are pivotally connected, a draw bar, 4, by and through which strains of draft and buffing are transmitted from one frame to the other. Wear and lost motion of the draw bar and coupling pins can be taken up as required, by driving down the coupling pins, the faces of which, opposite those on which the draw bar is pivoted, are flat and inclined in the manner of a wedging key, and grooves, 5^a, are cut in one side of each of the coupling pins, said grooves being engaged by corresponding tongues on clamps, 5^b, bolted to the draw bar castings, to hold the coupling pins in adjusted positions.

In articulated locomotives in which the distance between the rear driving axle of the front frame and the front driving axle of the rear frame is comparatively long, as in those designs in which the cylinders of the front frame are located at the rear end thereof and adjoin the cylinders of the rear frame, flange wear has been found to be rapidly developed on the driving wheels next to the cylinders, when the frames are connected, as in ordinary practice, by a pivot pin at their adjoining ends, as said pin will stand at a considerable distance outside

the center line of the track when the locomotive is traversing a curve of comparatively short radius, and the resultant flange pressure further involves the risk of derailment. It will be seen that by the provision of a long draw bar, coupled to the front and rear frames at substantial distances from their adjoining ends, the coupling pins will not stand at any material distance outside the center line of the track, and therefore that the line of pull on curves will be straightened out and the undue flange wear and liability to derailment above indicated will be eliminated.

In the relative movements of the front and rear frames when the locomotive is passing curves in the track, as well as when on tangents, the front and rear frames bear one against the other, through transversely curved surfaces, the curvature of which, relatively to the length of the draw bar, is such that said curved bearing surfaces are maintained in constant contact in any and all positions assumed by the frames. To this end, the faces of the outer or adjoining ends of the draw bar castings, 3, 3^a, are curved, at and adjoining their sides, their curvation being upon radii, the centers of which substantially coincide with the axes of the coupling pins, 5, and an intermediate radial bumper casting, 6, the opposite sides of the end portions of which are concavely curved, in correspondence with the ends of the draw bar castings, is interposed between said castings. In passing curves, the bumper casting, which is supported on flanges, 6^a, on the ends of the draw bar castings, consecutively assumes position in each of which its transverse middle plane coincides substantially with the longitudinal middle plane of the draw bar, the curved faces of the bumper casting, 6, which is preferably of manganese steel, or other slow wearing material, remaining in contact, throughout their entire surfaces, with those of the draw bar castings.

In order to prevent independent lateral movement of the front and rear frames, 1 and 2, and thereby to maintain a true hinge connection between them, they are coupled one to the other by a pair of links, 7, 7, the outer ends of which are connected, by pivots, 7^a, to brackets, 7^b, projecting forwardly from the front end of the rear draw bar casting, 3^a, on the opposite sides thereof, and which bear, by semi-cylindrical sockets on their inner ends, on a pivot, 7^c, fixed in a bracket, 7^d, which projects rearwardly from the rear end of the front draw bar casting, 3, at the center thereof. This construction prevents any lateral displacement of the pivot, 7^c, while permitting it to move slightly longitudinally.

The normal vertical alinement of the front and rear frames, 1 and 2, and the transfer

of weight and pressure from one of said frames to the other, is effected and maintained by a spring resistance mechanism comprising the following operative elements. The members of this mechanism are disposed in two sets on opposite sides of the frames, these sets being duplicates. The members of a pair of helical springs, 8, are located on opposite sides of the frames, substantially in the transverse plane of the pivots, 7^c, each spring being mounted on a vertical rod, 8^a, passing through a yoke, 8^b, which passes around a bracket, 8^c, projecting rearwardly from the bottom of the front draw bar casting, 3, at one side of the rear end thereof. The upper ends of the rods, 8^a, pass through the brackets, 7^b, of the rear draw bar casting, 3^a, on which they bear through ball joint rings, 8^d, to which they are held by nuts, 8^e, engaging threads on their upper ends, and they are drawn to a bearing on the lower sides of the yokes, 8^b, by nuts, 8^f, engaging threads on their lower ends. The springs, 8, bear at their lower ends, on the yokes, 8^b, and, at their upper ends, on washers, 8^g, which, in turn, bear, through ball joint faces, on the lower sides of the brackets, 8^c, of the front draw bar casting, 3. Thimbles, 9, of extra strong pipe, are fitted around the rods, 8, between the brackets, 8^c, and washers, 9^a, which bear on the bottoms of the brackets, 7^b, ball joints being provided at the ends of the thimbles. The openings in the draw bar castings through which the rods, 8^a, pass, are made sufficiently larger than the rods to permit the swiveling movements of the frames, and as above stated, ball joints are provided to admit of lateral motion.

Under the construction last above described, the action of the springs, 8, is such as to maintain the normal vertical relation of the front and rear frames, whether either of them moves upward or downward. If, for example, the front frame tends to move upward, it compresses the springs, 8, by raising the yoke, 8^b, through the action thereon of the brackets, 8^c, and if it tends to move downward, it compresses said springs by the downward pressure of said brackets on the washers, 8^g. The lower ends of the yokes are held in position to act as abutments for the springs, by the rods, 8^a. This capability of action in either direction, to maintain normal vertical alinement of the frames, by effecting the reciprocal transfer of weight and pressure from one frame to the other, as conditions may require, constitutes an improvement of substantial value relatively to the prior constructions, which only effect the transfer of weight from the front to the rear frame, or in other words, act only to hold up the front frame.

Figs. 7 to 11 inclusive illustrate a struc-

tural modification of my invention, in which, as in the construction hereinbefore described, strains of draft and buffing are transmitted from one of the frames, 1, 2, to the other, through a draw bar, 4, the ends of which are pivotally connected to the frames, at substantial distances from their adjoining ends. The abutting surfaces of the contacting members are also curved on radii substantially concentric with the draw bar coupling pins. In this instance, however, the draw bar coupling pins, 5^c, instead of being formed with flat inclined sides opposite their surfaces on which the draw bar is pivoted, as in the former case, are cylindrical, and are fitted in sockets in draw bar castings, 3^b, 3^c, which are interposed between and secured to the side members of the front frame, 1, and rear frame, 2, at substantial distances from the adjoining ends thereof, the axes of the coupling pins being located at practically the same distance apart as in the instance first described. Wear of the coupling pins may be taken up by a wedge block, 4^a, fitting in a slot in one end of the draw bar, 4, and abutting against a block, 4^b, bearing on the adjacent coupling pin, 5^c. The relatively movable intermediate radial bumper casting, 6, before described, is not applied in the modified construction, curved surfaces, 6^b, which contact directly one with the other, being, in this case, formed on the adjoining ends of two radial bumper castings, 6^c, 6^d, which are interposed between and secured to the side members of the front frame, 1, and rear frame, 2, respectively, at and adjoining the ends thereof, in the manner of the draw bar castings, 3, 3^a, before described. The contact surfaces, 6^b, of the bumper castings, are curved upon radii, the centers of which substantially coincide with the axes of the coupling pins, and said contact surfaces are, as shown in Fig. 8, located above and below transverse webs in the bumper castings, between which webs the draw bar, 4, passes freely. The articulation of the front and rear frames is effected by upper and lower hinge pins, 7^e, 7^f, which are fitted, in line axially, in the vertical central planes of the contact surfaces, 6^b, of the bumper castings, 6^c, 6^d. The hinge pins are fixed in pairs of socketed jaws, 6^e, formed on one of the bumper castings, in this case that of the bumper casting, 6^d, of the rear frame, and a block, 7^g, is fitted freely on each of the hinge pins, said blocks fitting in longitudinal guide ways, 6^f, formed on the adjoining bumper casting, 6^c, in such position that the portions of said bumper casting at their sides, fit between the members of the pairs of jaws, 6^e, of the other bumper casting, 6^d. Accidental displacement of the hinge pins is prevented by caps, 7^h, attached to the outer members of the pairs of jaws, 6^e. It

will be seen that by this construction, articulation is effected by hinge pins which are permitted to have a limited degree of longitudinal movement, as provided by the blocks, 7^g, and guide ways, 6^f, while said hinge pins are not subjected to strains of draft and buffing, these being transmitted from one frame to the other through the draw bar, 4.

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

1. In an articulated locomotive, the combination of a front frame, a rear frame, driving wheels independently supporting said frames, connecting members interposed between and secured to the side members of said frames and having convexly curved bearing faces on their outer ends, a bumper block interposed between said bearing faces and having opposite concavely curved bearing faces abutting thereon, coupling pins fitted in the longitudinal central planes of the connecting members and spaced farther apart than the adjoining ends of the front and rear frames, and a draw bar pivotally connected to said coupling pins.

2. In an articulated locomotive, the combination of a front frame, a rear frame, driving wheels independently supporting said frames, a draw bar pivotally connected to said frames or axes located in their longitudinal central planes and at a greater distance apart than the adjoining ends of said frames, and a pivotal connection coupling said frames intermediate of the pivotal connections of the draw bar thereto.

3. In an articulated locomotive, the combination of a front frame, a rear frame, driving wheels independently supporting said frames, a draw bar pivotally connected to said frames on axes located in their longitudinal central planes and at a greater distance apart than the adjoining ends of said frames, a pivotal connection coupling said frames intermediate of the pivotal connections of the draw bar, and means for preventing independent lateral movement of the frames relatively to said pivotal connection.

4. In an articulated locomotive, the combination of a front frame, a rear frame, driving wheels independently supporting said frames, a draw bar pivotally connected to said frames on axes located in their longitudinal central planes and at a greater distance apart than the adjoining ends of said frames, a vertical pivot fixed to one of said frames at its end adjoining the other frame, and links coupled to the other frame and bearing, at their opposite ends, on said pivot.

5. In an articulated locomotive, the combination of a front frame, a rear frame, driving wheels independently supporting said frames, means for transmitting strains of draft and buffing from either of said frames to the other, and means actuated by

movements of said frames, for effecting reciprocal transfer of weight and pressure from one of them to the other.

6. In an articulated locomotive, the combination of a front frame, a rear frame, driving wheels independently supporting said frames, means for transmitting strains of draft and buffing from either of said frames to the other, and a spring resistance mechanism interposed between said frames in substantially the transverse plane of contact of their end members, and actuated by movements of the frames to effect reciprocal transfer of weight and pressure from one of them to the other.

7. In an articulated locomotive, the combination of a front frame, a rear frame, driving wheels independently supporting

said frames, means for transmitting strains of draft and buffing from either of said frames to the other, transverse connecting members interposed between and secured to the side members of said frames at their adjoining ends, vertical rods passing freely through upper brackets on each side of one of said frames and lower brackets on each side of the other, and springs abutting on bearings on said rods and subject to pressure in opposite directions from said brackets in the vertical movements of either of the frames.

HENRY H. VAUGHAN.

Witnesses:

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EDWARD A. WRIGHT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."