No. 744,304. PATENTED NOV. 17, 1903.

W. DALTON & F. J. COLE.

ELECTRIC LOCOMOTIVE.

APPLICATION FILED AUG. 20, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

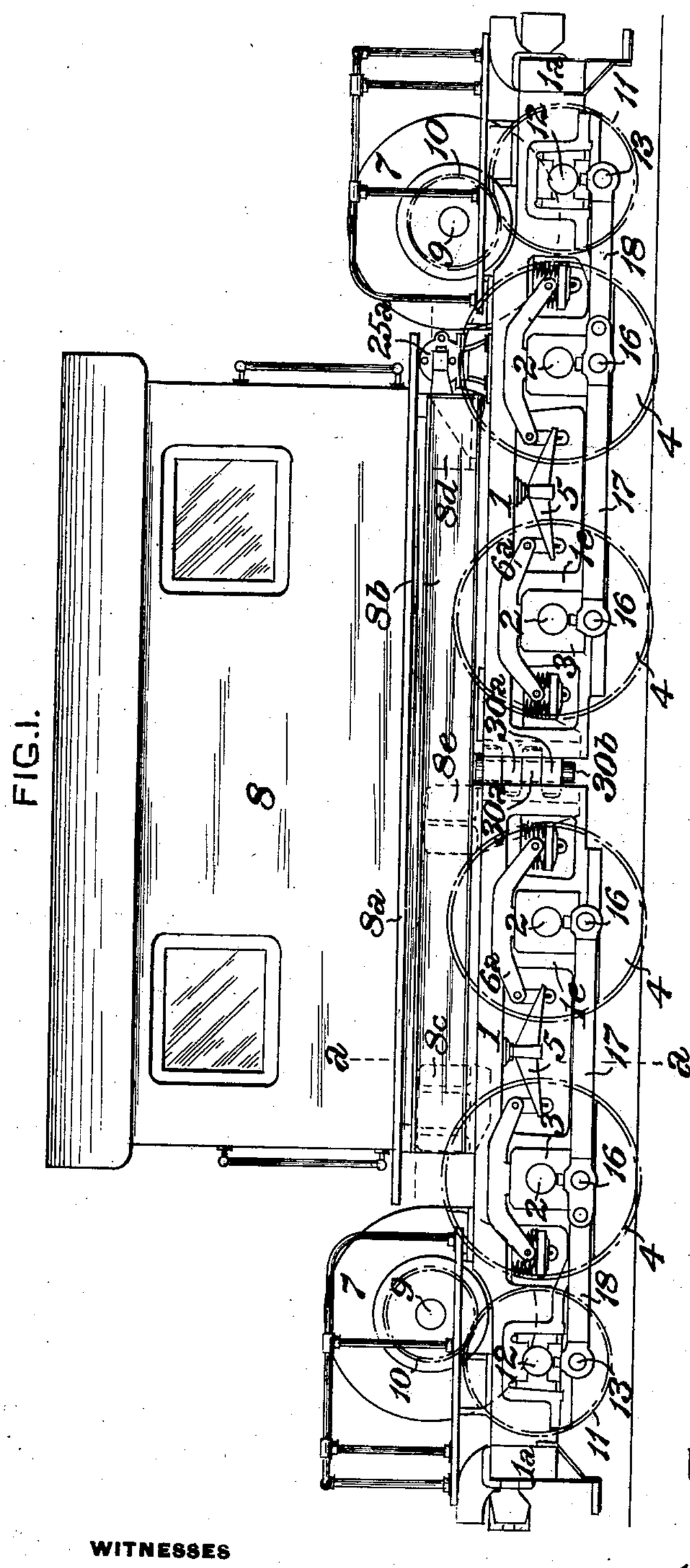

FIG. 1.

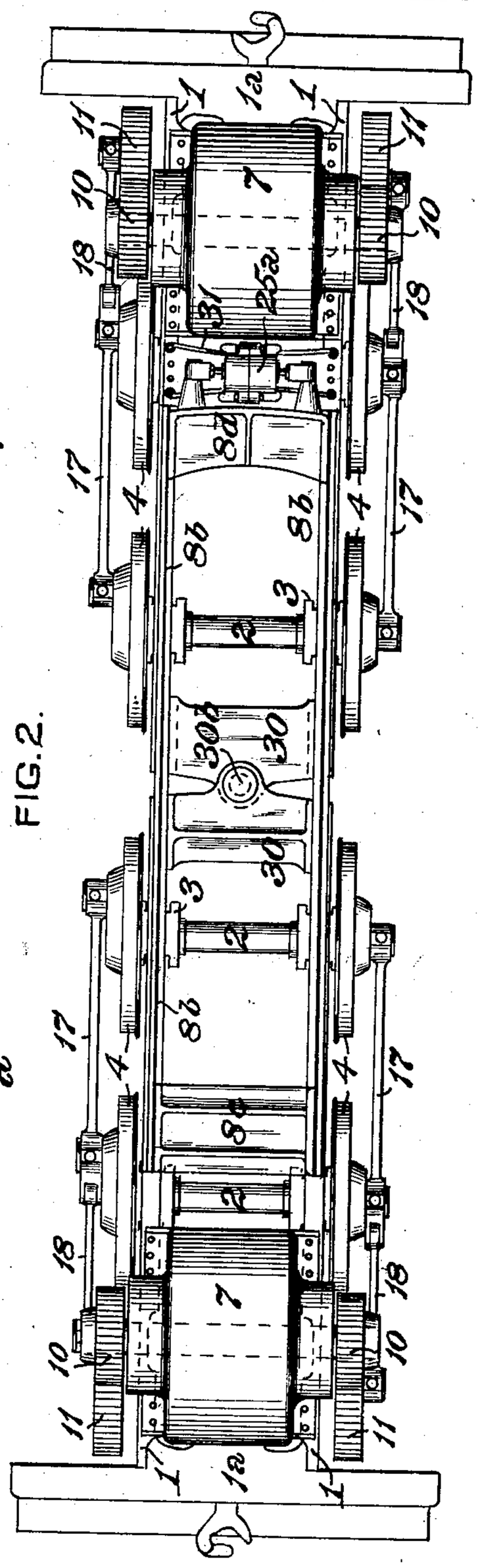

FIG. 2.

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NO MODEL. 3 SHEETS—SHEET 2.

FIG. 3.

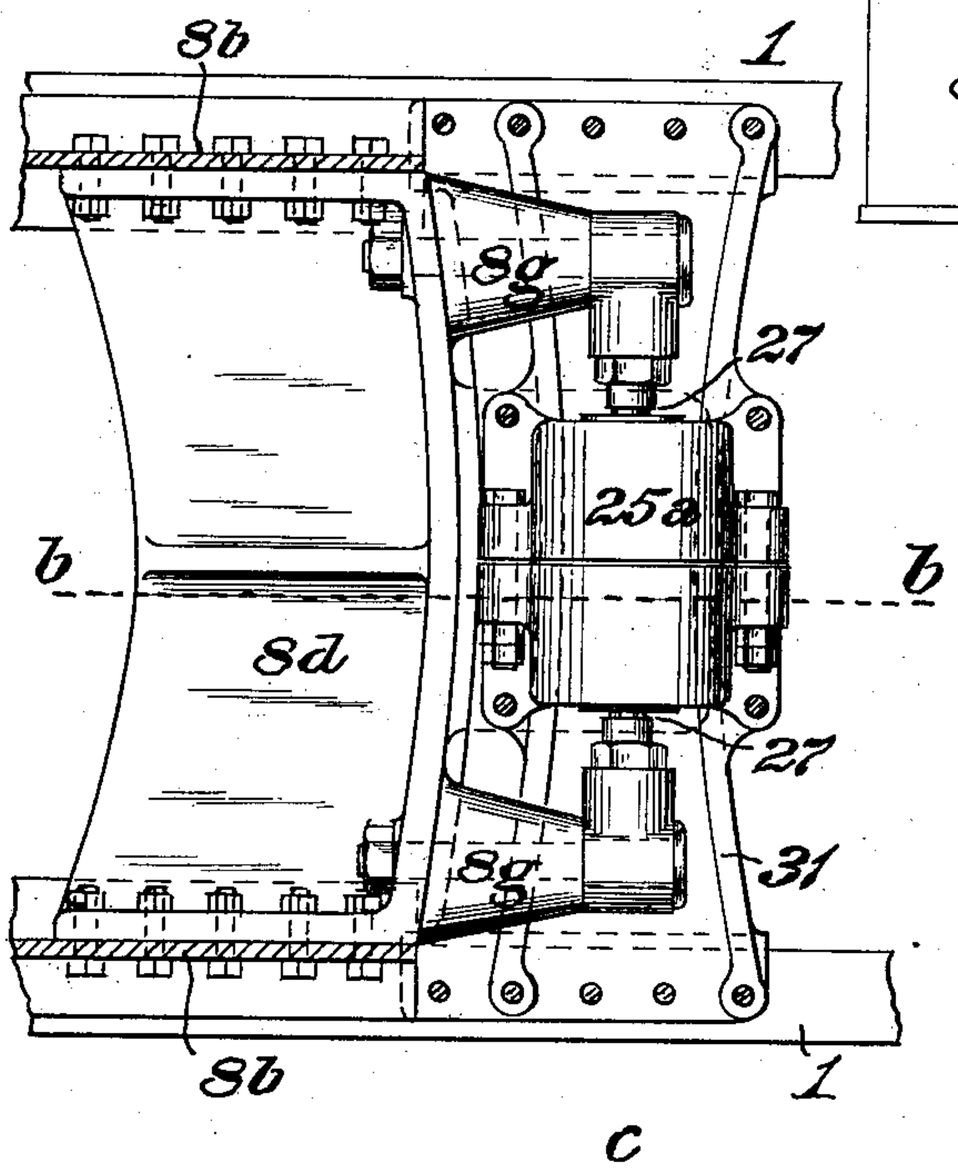


FIG. 4.

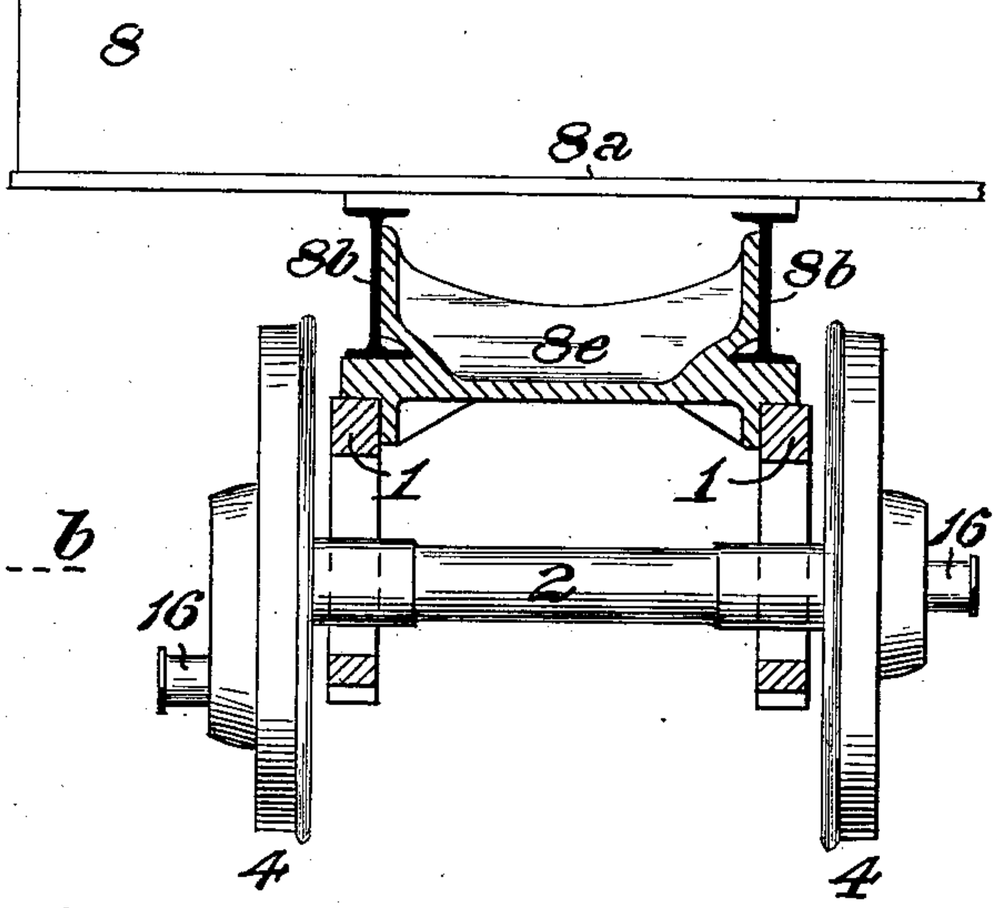


FIG. 5.

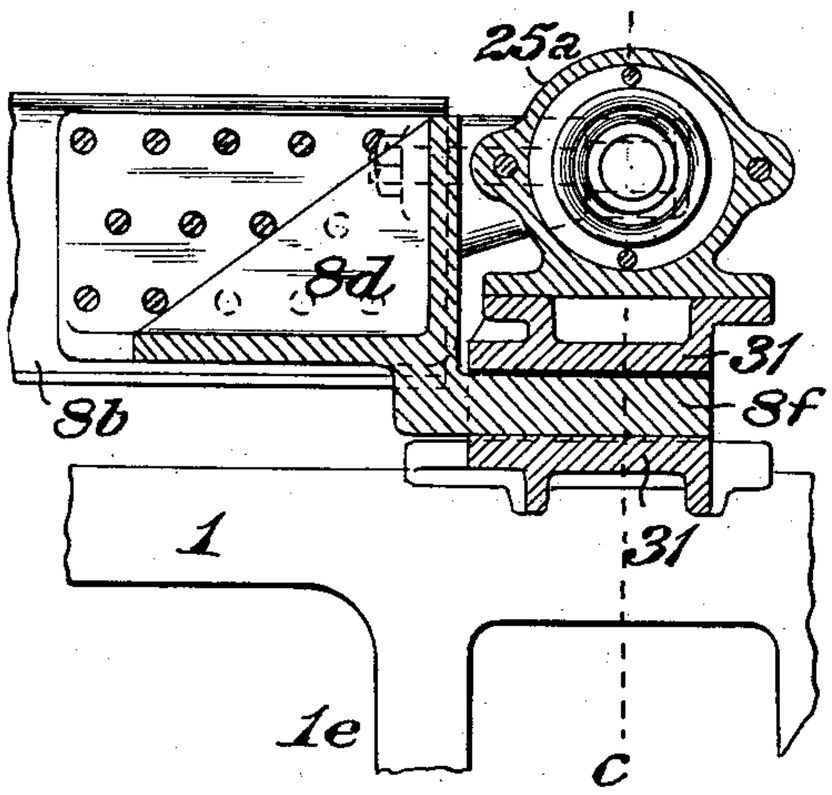
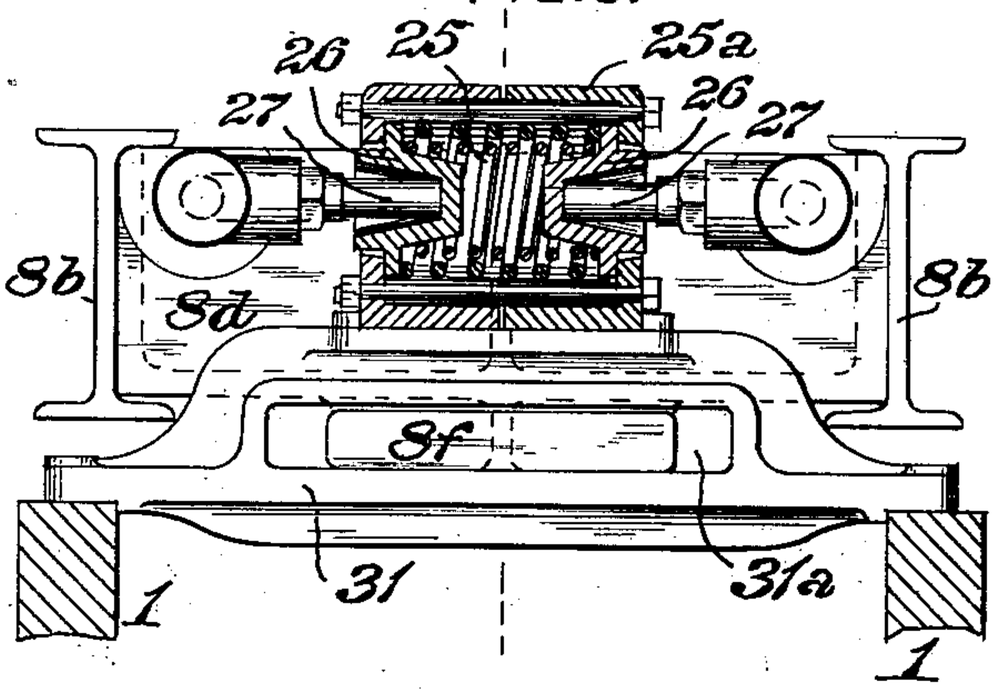


FIG. 6.



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NO MODEL. 3 SHEETS—SHEET 3.

FIG. 9.

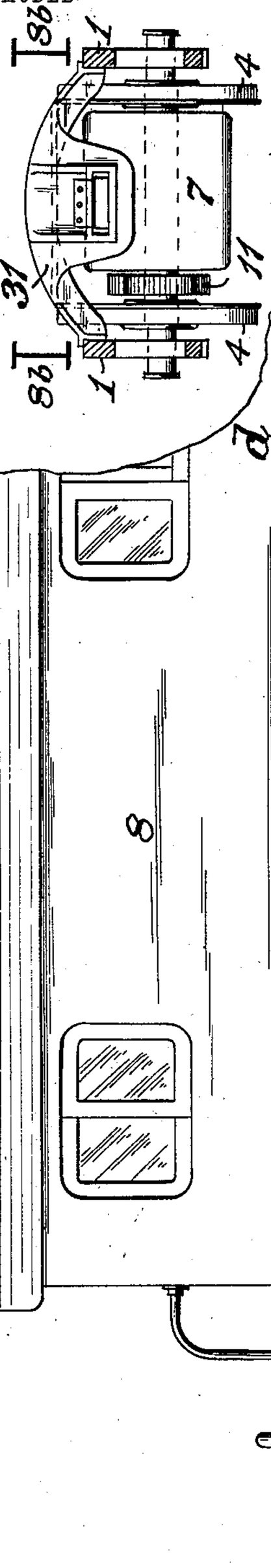
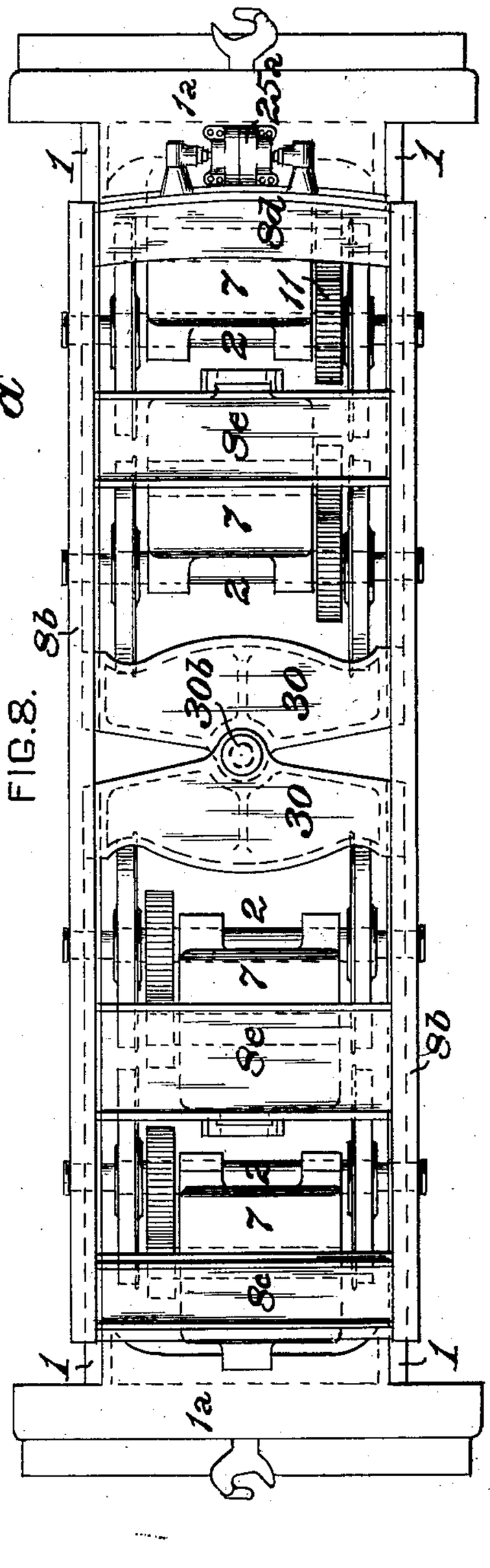


FIG. 7.

FIG. 8.



WITNESSES

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No. 744,304. Patented November 17, 1903.

UNITED STATES PATENT OFFICE.

WILLIAM DALTON AND FRANCIS J. COLE, OF SCHENECTADY, NEW YORK, ASSIGNORS TO AMERICAN LOCOMOTIVE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ELECTRIC LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 744,304, dated November 17, 1903.

Application filed August 20, 1903. Serial No. 170,115. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM DALTON and FRANCIS J. COLE, both of Schenectady, in the county of Schenectady and State of New York, have jointly invented a certain new and useful Improvement in Electric Locomotives, of which improvement the following is a specification.

Our invention more particularly relates to electric locomotives having a plurality of driving-axles, and consequently a comparatively long wheel-base; and its object is to provide a construction which will attain the advantages as to easy riding of a long frame and wheel base, together with those of sufficient flexibility to take curves easily and without liability to derailment at high speeds, and of the provision of a rigid structure for the housing of the electrical controlling equipment.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a side view in elevation of an electric locomotive, illustrating an application of our invention, the gearing being indicated by broken circles; Fig. 2, a plan or top view with the cab removed and the cab-frame members in section; Fig. 3, a plan view, on an enlarged scale, of the sliding connecting mechanism of the main and cab-supporting frames; Fig. 4, a transverse section on the line *a a* of Fig. 1; Fig. 5, a longitudinal section on the line *b b* of Fig. 3; Fig. 6, a transverse section on the line *c c* of Fig. 5; Fig. 7, a view, partly in elevation and partly in vertical longitudinal section, illustrating our invention as applied on an electric locomotive having its motors supported on the driving-axles; Fig. 8, a plan or top view of the same with the cab removed, and Fig. 9 a transverse section on the line *d d* of Fig. 7.

Referring first to Figs. 1 to 6, inclusive, our invention is herein exemplified as applied in an electric locomotive having a plurality of driving-axles 2, in this instance four in number, upon which the driving-wheels 4 are secured. The journal-boxes 3 of the driving-axles are fitted in jaws or pedestals 1^e, which are formed or fixed upon a main supporting-frame, which comprises two pivotally-connected sections or pairs of side frame members 1, each of which main-frame sections or pairs in the instance exemplified carries the journal-boxes of two of the four driving-axles. It is not, however, essential that an equal number of driving-axles should be apportioned to each of the two pairs of frames, and different numbers of axles may be employed in the respective pairs in the discretion of the constructor. The frame members 1 of each pair are supported upon the driving-axles through the intermediation of springs 5, which are connected to equalizers 6^a, resting upon the journal-boxes 3, as in ordinary steam-locomotive practice. The detailed construction of the spring arrangement does not form part of our present invention, and the same is not, therefore, herein at length set forth. Power for the rotation of the driving-axles of each of the sections of the main supporting-frame is applied thereto from an electric motor 7 of any suitable and preferred construction, one of which is located between and above the side members 1 of each of the frame-sections and as close as practicable to the buffer-beam 1^a at the adjacent end of the locomotive. The motor is suitably secured to the side frame members, and an unobstructed space is left above the motor, the cab 8, within which the usual electrical controlling equipment is placed, being located between and entirely clear of the motors at the opposite ends of the locomotive. The shaft 9 of the motor of each of the frame-sections has fixed upon its outer ends spur-pinions 10, which engage corresponding gears 11, fixed upon a crank-shaft 12, journaled in the horizontal plane of the driving-axles 2. The gears 11 also act as crank-disks, there being secured in them crank-pins 13, which are coupled by main rods 18 to crank-pins 16 upon the adjacent pair of driving-wheels 4. The crank-pins 16 of the several pairs of driving-wheels of each frame-section are coupled by side or coupling rods 17 in the ordinary manner in order to effect the coincident rotation of all the driving-axles of said frame-section.

It is well recognized in railroad practice that in locomotives having a comparatively

long rigid wheel-base there is a tendency of the flanges of the leading driving-wheels to mount the rails in passing curves of short radius and to thereby cause derailment, and independent leading-trucks of either two or four wheels are generally employed in present standard practice to guide the locomotive around curves. In order to attain the necessary flexibility for safely taking curves without the employment of independent leading and trailing trucks we provide a main supporting-frame of such construction as, while retaining a long driving-wheel base, to be horizontally flexible and rigid vertically. To this end the main supporting-frame is, as before generally stated, composed of two independent and pivotally-connected sections, each of which comprises a pair of side frame members 1, having jaws or pedestals 1^e for the reception of the journal-boxes 3 of two or more driving-axles 2, upon which the driving-wheels 4 are secured and which are rotated by an electric motor 7, as before described. The side frame members of each pair are firmly connected at their inner ends or those toward the center of the locomotive by interposed coupling-transoms or transverse tie-braces 30 and are similarly connected at their outer ends by the buffer-beams 1^a. Perforated lugs or eyes 30^a are formed centrally on the coupling-transoms 30 for the reception of a vertical coupling-pin 30^b, by which the two frame-sections are pivotally connected at their inner ends, one to the other, said frame-sections having, therefore, the capability of relative longitudinal movement.

The cab 8 and the inclosed electrical controlling equipment (which latter, as it does not in and of itself constitute part of our present invention, is not herein shown) are fixed to a suitable floor or deck 8^a, which is mounted upon a cab-supporting frame comprising two longitudinal side members 8^b, which may be, as shown, in the form of I-beams, and are rigidly connected by transoms or cross-ties 8^c 8^d at their ends and also, if desired, by one or more intermediate transoms or cross-ties 8^e. A stout horizontal tongue or slide plate 8^f is formed or secured centrally upon one of the end transoms, in the instance shown the transom 8^d, and projects therefrom outwardly—that is to say, toward the adjacent end of the locomotive. The tongue 8^f is fitted freely in a horizontal slot or guideway 31^a, formed in a centering-spring transom or cross-tie 31, which is firmly secured at its ends to the side frame members 1 of the main-frame section, above which the cab-supporting-frame transom 8^d is located. The transom 8^c at the opposite end of the cab-supporting frame is rigidly secured to the side frame members of the main-frame section, above which it is located, and it will therefore be seen that the opposite main-frame section, to which the centering-spring transom 31 is secured, will be free to traverse laterally within the range of movement permitted by the guideway relatively to the cab-supporting frame and the connected tongue S^f, the adjacent end of the cab-supporting frame being supported by the transom 31, and the opposite end of said frame being supported by and incapable of movement independently of the other main-frame section.

In order to return the two main-frame sections or pairs of main-frame side members to their normal position in line longitudinally of the locomotive after they have been diverted therefrom by movement of the sections about the axial line of their coupling-pin 30^b in passing a curve, a transverse centering-spring 25 is fitted in a box or case 25^a, which is secured centrally to the top of the centering-spring transom 31. The spring 25 abuts at its ends against followers 26, which in turn abut against the ends of the case 25^a. Thrust-rods 27, which are coupled to lugs 8^g, fixed on the outer side of the transom 8^d, abut against the followers 26, with the result that the relative movement of the coupled main-frame sections in either direction about the axial line of their coupling-pin in traversing curves is resisted by the centering-spring 25, which will be compressed thereby and will return the two main-frame sections to their normal position in line one with the other and with the cab-supporting frame when the locomotive passes from a curve to a straight portion of the track. It will be obvious that, if preferred, the relation of the centering-spring case and the thrust-rods to the main and cab-supporting frames, respectively, may be reversed without departure from the spirit and operative principle of our invention—that is to say, the centering-spring case may be fixed to the cab-supporting frame and the thrust-rods coupled to the subjacent main supporting-frame section, the centering operation being similarly effected in such case.

Figs. 7 to 9, inclusive, illustrate our invention as applied in an electric locomotive which is similar in all material and substantial particulars with that above described, differing therefrom only as to the number and manner of suspension and application of the electric motors employed. In this exemplification of our invention the crank-shafts 12 and coupling-rods 17, before described, are dispensed with, and each of the driving-axles 2 is rotated by an independent electric motor 7, the motors being located between the side members of the main-frame sections and the frame of each motor being journaled at one end upon the driving-axle which it rotates and supported at the other end upon the side frame members. Each of the motor-shafts 9 has fixed upon it a spur-pinion 10, the teeth of which engage those of a corresponding gear 11 on the shaft which is driven by the motor, said shaft being in this case, as above stated, one of the driving-axles instead of an interposed shaft, as in the former case. The ends of the motor-

frames which are farther from their respective driving-axles are provided with noses or bearing-pieces 7^a, which are supported in any suitable manner, as by brackets or hangers 7^g, on the side members of the main frames. In all other respects the construction shown in Figs. 7 to 9, inclusive, accords substantially, both as to structure and mode of operation, with that first above described.

It will be seen that the means afforded by our invention for enabling an electric locomotive to readily and safely pass around curves are conveniently applicable in the type to which the invention relates and provide the substantial equivalent of a guiding-truck and attain its advantages without involving the additional expense and complication of a special structure independent of the driving-wheels.

We claim as our invention and desire to secure by Letters Patent—

1. In an electric locomotive, the combination of two main supporting-frame sections, driving-axles journaled in bearings in said sections, two electric motors, each supported on one of said sections and adapted to rotate one or more of the driving-axles thereof, a vertical coupling-pin by which said sections are connected with the capability of relative horizontal movement, and a cab-supporting frame secured rigidly to one of said sections and supported, with the capability of relative horizontal movement, upon the other section.

2. In an electric locomotive, the combination of two pivotally-connected main supporting-frame sections, driving-axles journaled in bearings in said sections, two electric motors, each supported on one of said sections and adapted to rotate one or more of the driving-axles thereof, a cab-supporting frame secured rigidly to one of said sections and supported, with the capability of relative horizontal movement, upon the other section, and means for returning the main supporting-frame sections to normal position after displacement therefrom.

3. In an electric locomotive, the combination of two main supporting-frame sections, driving-axles journaled in bearings in said sections, two electric motors, each supported on one of said sections, and adapted to rotate one or more of the driving-axles thereof, a vertical coupling-pin by which said sections are connected with the capacity of relative horizontal movement, a transom fixed to one of said sections and provided with a horizontal slot or guideway, a cab-supporting frame secured rigidly to the other section, and a tongue or guide-plate fixed to the cab-supporting frame and supported and fitted to traverse laterally in the guideway of the first-specified main supporting-frame section.

4. In an electric locomotive, the combination of two pivotally-connected main supporting-frame sections, driving-axles journaled in bearings in said sections, two electric motors, each supported on one of said sections and adapted to rotate one or more of the driving-axles thereof, a cab-supporting frame secured rigidly to one of said sections and supported, with the capability of relative horizontal movement, upon the other section, a box or case fixed upon said last-named section, a centering-spring in said case, transversely-movable followers interposed between said spring and the ends of the case, and thrust-rods connected to the cab-supporting frame and abutting on said followers.

5. In an electric locomotive, the combination of two main supporting-frame sections, each comprising two side members having jaws or pedestals, driving-axles journaled in boxes fitting in said pedestals, two electric motors, each supported on one of the main supporting-frame sections and adapted to rotate one or more of the driving-axles thereof, coupling transoms, each connecting the side members of one of the main supporting-frame sections at its end adjoining the other section and provided with relatively overlapping perforated lugs, a coupling-pin passing through said lugs and pivotally connecting the sections, a transom connecting the side members of one of said sections and provided with a horizontal slot or guideway, a cab-supporting frame comprising two side members secured rigidly at one end to the other main supporting-frame section, a transom connecting the opposite end of said members, and a tongue or guide-plate fixed to said transom and supported and fitted to traverse laterally in the guideway of the first-specified main supporting-frame section.

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EUGENE H. REESE.