No. 630,356. Patented Aug. 8, 1899.

T. J. JOHNSTON & A. H. ABELL.

MOTOR TRUCK.

(Application filed Feb. 16, 1899.)

(No Model.)

Fig. 1.

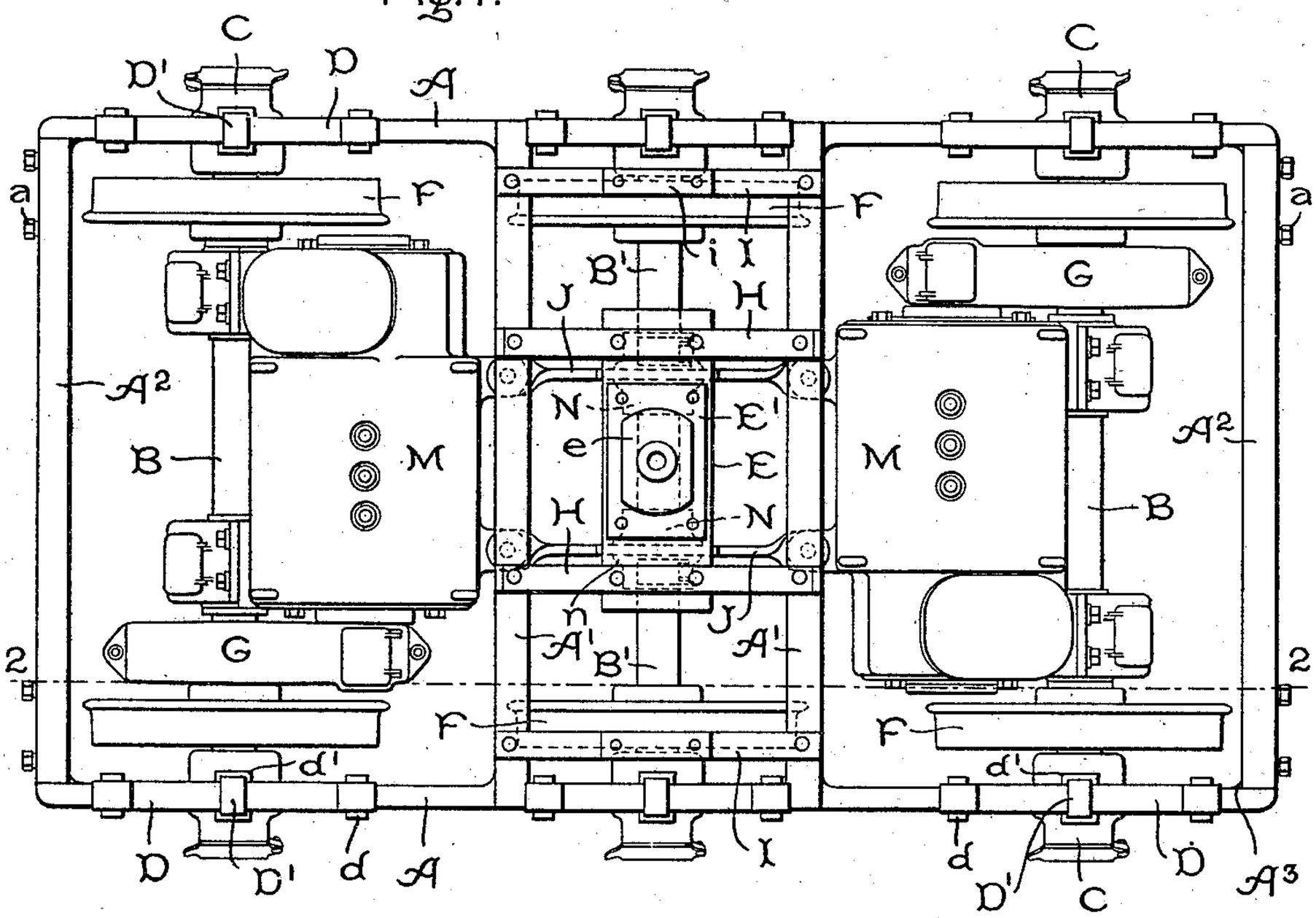
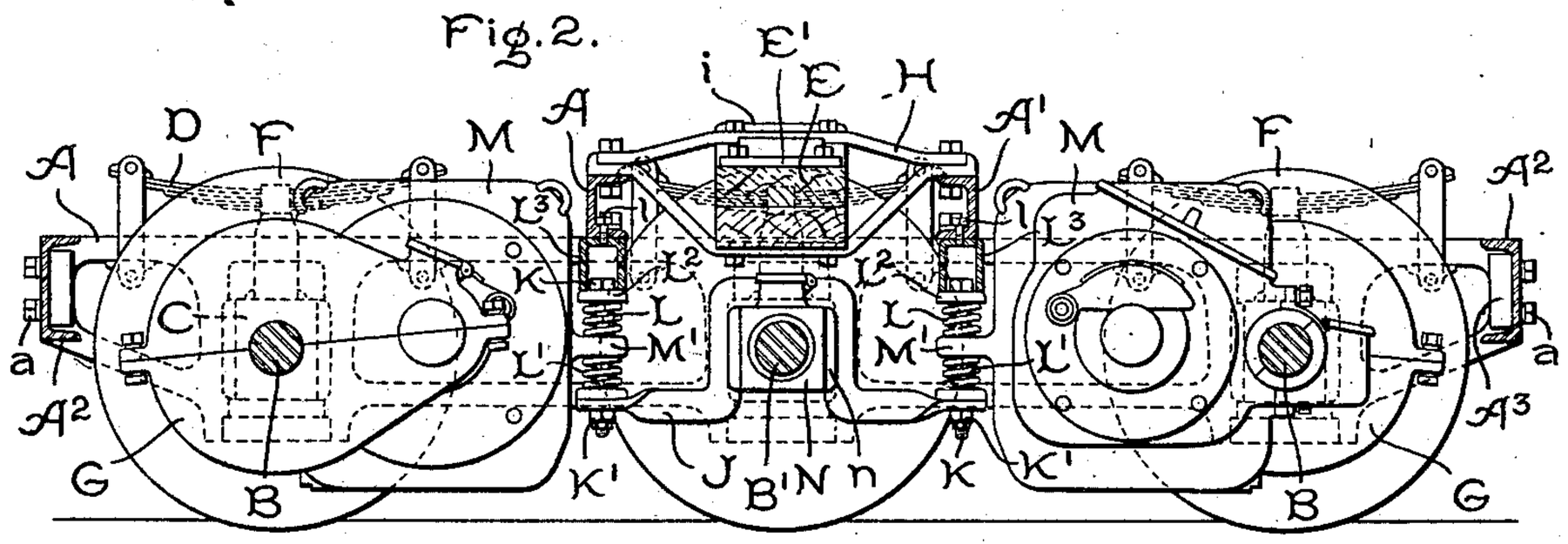


Fig. 2.



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UNITED STATES PATENT OFFICE.

THOMAS J. JOHNSTON AND ARTHUR H. ABELL, OF SCHENECTADY, NEW YORK, ASSIGNORS TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

MOTOR-TRUCK.

SPECIFICATION forming part of Letters Patent No. 630,356, dated August 8, 1899.

Application filed February 16, 1899. Serial No. 705,645. (No model.)

To all whom it may concern:

Be it known that we, THOMAS J. JOHNSTON and ARTHUR H. ABELL, citizens of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Motor-Trucks, (Case No. 1,066,) of which the following is a specification.

Our present invention relates to the mounting of electric motors, and has particular adaptation to the requirements of heavy service where a number of electric motors are mounted upon cars—such, for example, as the large and heavy cars of the Pullman or Wagner type.

The special feature of the invention is the adaptation of electric-motor mountings to six-wheel trucks, such as may be used in express service, and as another feature the mounting of two such motors upon each truck. In such service the attachment of the outer or free end of the motor to any part of the truck-frame or car-body, such as has been proposed with other types of motor, is unsatisfactory for a number of reasons, which need not be fully explained, but may be summarized by saying that the large starting torque of the heavy motors used for train-service renders the shock of starting unpleasantly perceptible in the cars where these forms of mounting are used. At the same time it is imperative that some sort of flexible connection be employed for the free end of the motor, so as to take up to some extent the shock incident to starting. To obviate these difficulties, we provide a support for each motor upon an outer axle, sleeving its field-magnet thereon and spring-supporting the free end upon the intermediate axle. The two motors when thus mounted have a certain balance of effect upon the free axle. As is well known, they rotate in opposite directions, being upon opposite sides of their respective driven axles, so that as one motor tends to lift upon its support the other tends to depress it, and by this arrangement the axle practically runs sustaining only its own weight. While of course there is a certain proportion of the weight of the motors carried by the intermediate axle, yet far the larger part is carried by the outer or driving axles, to which the motors are geared.

Nothing in our invention limits us to the use of geared motors. For very many reasons these have been preferred in the electric-railway art and are still largely in use even with the heaviest service; but of course "gearless motors," so called, which drive the axle directly, may be employed and the support which takes up the turning moment or torque of the motor may be arranged according to our invention and with good results.

The accompanying drawings show a truck to which the invention is applied, Figure 1 being a plan, and Fig. 2 a side elevation with parts removed, some of the parts being in section on the line 2 2 of Fig. 1.

In Fig. 1, A is the side beam of the truck-frame, the outline of which is best seen in dotted lines in Fig. 2. The entire frame is intended to be of forged iron or steel, so as to present the least chance of breakage. A^2 is the end channel-iron, which is bolted or otherwise secured to the two side beams and holds them together. The ends of the latter are turned in, as at A^3, Fig. 2, and to these the channel-irons are bolted at *a a*. Of course the truck might be, if desired, of solid forged construction, as our invention is not limited in this feature. Cross-beams A′ A′ are mounted at intermediate points. The axles B B carry the motors M M, which are geared to and sleeved upon them in a way now well understood, the gear-cases being shown at G G and the usual wheels F being mounted upon the axles. The motor here illustrated is one of those large and heavy motors which have been recently devised for electric-train service. Its field-magnet is an iron box, within which the armature is housed, being removed from its bearings sidewise, so that in practice it is necessary to remove the motor from the axle before the armature can be taken out. With an equipment of this type, which must always be dismantled in the shop and cannot be conveniently repaired without facilities for handling heavy bodies, it is not necessary to provide arrangements for facilitating the dismounting of the different parts. The axles B B turn in the usual journal-

boxes C, which may be of any desired construction. Springs D are connected to the truck by links *d* and saddles *d'*, with a bearing D' in the middle of the spring, those shown being of the elliptical type, though others might be employed. Mounted upon the cross-bars A' A' are frames H H, which carry the bolster E. Upon the top of the bolster is a plate E', within which is the usual cup-shaped recess *e* for the center bolt, or "king-bolt," as it is often called. Other bars or frames I I are provided at the sides, and bearing-plates *i i* upon them check the oscillation of the car when for any reason it becomes excessive—when it tilts in going around a curve, for example.

Referring now to Fig. 2, the motors M are provided with projecting lugs M' M'. These are symmetrically disposed with reference to the axis of the truck, so that either motor may be mounted upon either one of the axles. Above and below the lugs M' are coil-springs L L', which are held in place by the bolts K, with the usual lock-nuts K'. Above the plate L^2, upon the top of the spring L, is a check L^3, secured by a bolt *l* to the lower side of the cross-beam A'. This is designed to prevent the motors tilting too far in starting. In ordinary running it would not come into play, only being needed where large current is used, as in starting upon a heavy grade or with a very heavy load. A frame or bar J connects the two motors and passes, as shown, over the axle. A bearing N is provided upon the axle for each of these bars J J. The bearing N is formed with a lug *n*, within which a groove is cut, so that the bar J may reciprocate slightly vertically. In practice there would be some little slack in this construction, so that the axle B' would not bind even if it should tilt with reference to either of the motor-axles, or vice versa. In starting, one of the motors tends to lift upon the bar J and the other tends to depress it, giving it very little rotation around the axle; but this is strongly resisted by the springs and, if it becomes at all excessive, by the stops or checks L^3. Practically the effects are to a large degree balanced in this way, so that, as pointed out in this specification, there is a certain balance of effect tending to cause the idle axle to run with about the same load at all times.

It will be apparent from the foregoing description that the truck of our invention renders the motors practically independent of any motion of the car-body and substantially so of any motion of the truck-frame. Neither are the oscillations of the motors in starting conveyed to the car-body, nor the momentum oscillation of the latter, as in going round curves or making stops or starts, conveyed to the motors, so that the greatest ease of motion and best efficiency of running are obtained. The two motors being located entirely within the wheel-base, the truck is compact, has no projecting parts, and allows ample accommodation for a brake-rigging, which we have not illustrated, because it would unduly complicate the drawings, and because no claim is based thereon.

In ordinary cases the simplest and easiest way of dismounting the motors will be to lift off the truck-frame after the usual checks under the pedestals are removed. The bolts K can then be readily removed either by blocking up the motors or in any other convenient way.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a truck for heavy service, the combination of a metallic truck-frame spring-supported upon three axles, with two motors entirely within the wheel-base, each of the motors carried at its free end by a spring-support upon the intermediate axle.

2. A truck for heavy service, comprising a metallic truck-frame, with three axles mounted therein and two motors entirely within the wheel-base, sleeved upon each of the outer axles and having a common spring-support upon the intermediate axle.

3. A truck for heavy service, comprising a metallic truck-frame spring-supported upon three axles, motors entirely within the wheel-base, a motor being sleeved upon each of the outer axles, a bearing upon the inner axle, a U-shaped bar resting upon the bearing, and springs carried upon the outer ends of the U-shaped bar and supporting the free ends of the motors so that the motors are balanced upon the intermediate axle of the truck.

4. A truck for heavy service having outer and intermediate axles, motors sleeved upon the outer axles and spring-supported upon the intermediate axle, and a check on the truck-frame for preventing the undue tilting of the motors under heavy currents.

5. In a truck for heavy service, a spring-supported truck-frame with three axles, motors within the wheel-base, each sleeved upon one of the outer axles and having lugs projecting from their free ends, bearings upon the inner axle, and U-shaped bars passing over the bearings and supporting the motors by springs above and below the lugs, with checks upon the truck-frame preventing undue motion of the motors.

In witness whereof we have hereunto set our hands this 13th day of February, 1899.

THOMAS J. JOHNSTON.
ARTHUR H. ABELL.

Witnesses:
B. B. HULL,
M. E. JACOBSON.