COMMONWEALTH OF AUSTRALIA
Patents Act 1952-1973
APPLICATION FOR A PATENT
29386/84

We, MITSUBISHI DENKI KABUSHIKA KAISHA
of 2-3, Marunouchi 2-chome, Chiyodaku, Tokyo, JAPAN

hereby apply for a grant of a Patent for an invention entitled:

A SWING BOLSTER DEVICE FOR A MIDDLE TRUCK IN AN ELECTRIC LOCOMOTIVE OF THE THREE-TRUCK TYPE

which is described in the accompanying complete specification. This Application is a Convention Application and is based on the Application(s) numbered: 109618/1983 for a Patent or similar protection made in Japan on 18 June 1983

Our address for service is care of GRIFFITH HASSEL & FRAZER, Patent Attorneys of 71 York Street, Sydney 2000, in the State of New South Wales, Commonwealth of Australia.

Dated this 14th day of June 1984

MITSUBISHI DENKI KABUSHIKA KAISHA
By their Patent Attorneys

GRIFFITH HASSEL & FRAZER

TO: THE COMMISSIONER OF PATENTS
COMMONWEALTH OF AUSTRALIA

A SWING BOLSTER DEVICE FOR A MIDDLE TRUCK IN AN ELECTRIC LOCOMOTIVE OF THE THREE-TRUCK TYPE
In support of the application No. (a) made by (b) MITSUBISHI DENKI KABUSHIKI KAisha for a patent/patent of addition for an invention entitled (c):

A SWING BOLSTER DEVICE FOR A MIDDLE TRUCK IN AN ELECTRIC LOCOMOTIVE OF THE THREE-TRUCK TYPE.

I, (d) Moriya SHIKI of (e) 2-3, Merinouchi 2-chome, Chiyoda-ku, Tokyo, Japan do solemnly and sincerely declare as follows:

1. (f) I am/we are the applicant(s) for the patent/patent of addition.
2. The basic application(s) as defined by Section 141 of the Act was/were made in the following country or countries on the following date(s) by the following applicant(s) name(s):

<table>
<thead>
<tr>
<th>Country</th>
<th>Date</th>
<th>Applicant(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>18 June 1983</td>
<td>by (k) MITSUBISHI DENKI KABUSHIKI KAISHA, 1-1, Tsukaguchi Hon-machi, 8-chome, City of Amagasaki, Hyogo Prefecture, JAPAN</td>
</tr>
</tbody>
</table>

I/are the actual inventor(s) of the invention.

3. (m) Shigeya OHBA

4. The basic application(s) referred to in paragraph (2) of this Declaration was were the first applications made in a Convention country in respect of the invention the subject of the application.

Declared at Tokyo, Japan this 9th day of May 1984

KATSUSHI DENKI KABUSHIKI KAISHA

To: The Commissioner of Patents, Commonwealth of Australia.

GRAFFITI, HASSEL & FRAZER, 2133, G.P.O. SYDNEY 2001 AUSTRALIA

along the outsides of the respective side frame members 11 centrally thereof and substantially in flush with their upper surfaces, and the lower surfaces of the roller pair members 11 being spaced apart to define a passage therebetween for accommodating the wheel truck.
1. In a swing bolster device to be used for a middle truck in an electric locomotive of the three-truck type wherein said middle truck is provided with a main electric motor and the underframe of said electric locomotive is adapted to be laterally movably supported on said middle truck through rollers which are rotatively disposed between said underframe and the roller mounting members arranged at left and right sides of the side frame members of said middle truck, respectively, said roller mounting members being supported on shelves integrally formed with said side frame members outside thereof, respectively, through bolster springs disposed therebetween so that said roller mounting members are moved up and down relative to said side frame member, the improvement wherein:

each of said rollers mounted on said roller mounting members, respectively, is divided into two so as to respectively position front and behind said main electric motor.
The following statement is a full description of this invention, including the best method of performing it known to me—*

* Note: The description is to be typed in double spacing, pica type face, in an area not exceeding 250 mm in depth and 160 mm in width, on tough white paper of good quality and it is to be inserted inside this form.
A SWING BOLSTER DEVICE FOR A MIDDLE TRUCK IN AN ELECTRIC LOCOMOTIVE OF THE THREE-TRUCK TYPE

BACKGROUND OF THE INVENTION

The present invention relates to a three-truck type electric locomotive in which each truck is provided with one main motor, and more particularly to an improvement in a swing bolster device to be used for the middle truck of the electric locomotive of this type including rollers and roller guides for the lateral shift of the truck relative to the locomotive underframe.

Hitherto, as a swing bolster device for a middle truck in an electric locomotive of this type, such one as shown in Figs. 1 and 2 of the attached drawings has been commonly used.

In the drawings reference numeral 1 designates a truck frame, 2 rollers, 3 bolster springs, 4 wheels, 5 a main motor, and 9 anchor bolts, whereby the main motor 5 is mounted on the truck frame 1 within a space formed at its central portion, and the output of the motor 5 is transmitted to the wheels 4 through an axle-driving gear (not shown), while the bolster springs 3 are mounted in pairs on shelves, respectively, which are integrally formed with the left and right side frame members 1₁ of the truck frame 1, respectively, at their lower portions such that they protrude respectively outwards with regard to the longitudinal center line of the truck frame 1 and centrally thereof. Roller receiving seats 2₁ are disposed
along the outsides of the respective side frame members 1₁ centrally thereof and substantially in flush with their upper surfaces, and the lower surfaces of the roller receiving seats 2₁ are respectively secured to the upper ends of the bolster springs 3 mounted on the respective shelves, the rollers 2 being rotatively mounted on the roller receiving seats 2₁ by any suitable means, respectively, and the roller receiving seats 2₁ are connected to the side frame members 1₁, respectively, through a pair of anchor bolts 9 in a manner wellknown in the art. The locomotive underframe (not shown) is adapted to be laid on the rollers 2 with liners secured to the underframe being interposed therebetween, and the rollers 2 are adapted to be supported at their diametrical opposite peripheries by the roller guides (not shown) secured to the underframe, respectively.

In an electric locomotive provided with a middle truck having such a constitution, the truck is required to have its forward and rearward movement constrained, but to have a considerable amount of lateral movement so as to be allowed a free movement in this direction, whereby the rollers 2 are possible to roll leftwards and rightwards on the roller receiving seats 2₁ relative to the longitudinal center line of the truck frame along the guide of the roller guides provided in the locomotive underframe when the electric locomotive runs on a curve. However, in this case, since the main motor 5, rollers 2, roller guides, etc. are arranged on a line passing transversely through the center of the truck frame there is
that is, in general the amount of the lateral movement (A) is decided by the minimum radius of the curve, and the length of the roller guides to be provided in the locomotive underframe is necessary to be equal to this amount of lateral movement (A), while the width (B) of the locomotive underframe is determined by the minimum rolling stock gauge.

Therefore, the length of the cutout to be provided in the underframe is limited to be below (B-2A-C), where the notation "C" represents the width of the passage to be provided in the locomotive underframe, a surplus clearance between the main motor and the locomotive underframe, etc. Accordingly such a limitation to the dimension of the cutout to be provided in the locomotive underframe leads to limitation in size of the main motor, and, accordingly, the output capacity of the main motor.

Hitherto, as a countermeasure to compensate for such a limitation, when the increase in size of a main motor of a middle truck in an electric locomotive is difficult and yet an output exceeding the capacity of a three-truck electric locomotive is required, multiple operation of two-truck electric locomotives has been adopted. However, if a large-sized electric
motor could be mounted on a truck, of the three-truck type, the electric locomotives in multiple operation would not be required.

**SUMMARY OF THE INVENTION**

It is a principal object of the present invention to provide a swing bolster device for a middle truck in a three-truck type electric locomotive which can eliminate the defect as above-described in a conventional electric locomotive of this type.

It is another object of the present invention to provide a swing bolster device for a middle truck in a three-truck type electric locomotive which allows the cutout to be formed in the locomotive underframe in order to accommodate a main motor to be mounted on the middle truck to be made large so that a main motor having a larger output can be mounted on the truck, thereby realizing a three-truck type electric locomotive having a larger output.

In accordance with the present invention a swing bolster device for a middle truck in a three-truck type electric locomotive is provided wherein rollers to be rotatively mounted on the respective roller receiving seats which are arranged side by side the side frames of the truck frame, respectively, through the bolster springs disposed between them and the shelves integrally secured to the side frames.
Thus, according to the present invention, since in the middle truck in an electric locomotive of the three-truck type the rollers and the main motor are not arranged in line laterally the longitudinal center line of the truck the cutout to be provided in the locomotive underframe, i.e. the length of the cutout measured in the direction laterally the longitudinal center line of the truck can be made as large as B-C when expressed by using the same notations as those used for the above described conventional middle truck in the electric locomotive of this type. Therefore, a large-sized main motor and, accordingly, a main motor having a larger output can be mounted on the trucks, making it possible to increase the output of an electric locomotive of the three-truck type.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the present invention will become more readily apparent upon reading the following description and upon reference to the accompanying drawings, in which:

Fig. 1 is a schematical plan view of a middle truck in a conventional electric locomotive of the three-truck type;

Fig. 2 is a schematical side elevational view of the truck shown in Fig. 1;
Fig. 3 is a schematical side elevational view of a middle truck in which one embodiment of the swing bolster device in accordance with the present invention is provided; Fig. 4 is a schematical plan view of the truck shown in Fig. 3; and Fig. 5 is a cross sectional view of the truck shown in Figs. 3 and 4 taken along the line V-V of Fig. 3.

In these drawings the same or similar elements are affixed with identical reference numerals throughout.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference is now made to Figs. 3 to 5 of the accompanying drawings wherein reference numeral 1 designates a truck frame of the middle truck of an electric locomotive of the three-truck type, 2 rollers, 3 bolster springs, 4 wheels, 5 a main motor, 6 a traction gear unit, 7 a so-called WN coupling, 8 a reduction gear unit, and 10 a roller mounting frame having generally a hollowed rectangular configuration in plan view in which the left- and right-hand side frame members 10₁, 10₂ are integrally connected at both ends by end frame members 10₃, 10₄, respectively. Two rollers 2 are rotatively mounted on each side frame members 10₁, 10₂ of the roller mounting frame 10, respectively, near their front and rear end portions generally aligning in the longitudinal direction of the truck frame 1. Numeral 11 designates upstanding sliding plates fixedly secured to the left- and right-hand side frame members of the truck frame 1, respectively, on their upper
slopes substantially at their mid portions such that the
sliding plates 11 allow the side frame members 10₁, 10₂ of the
roller mounting frame 10 to be moved up and down relative to the
side frame members of the truck frame 1, but force the roller
mounting frame 10 to be moved laterally together with the truck
frame 1.

Thus, in accordance with the present invention,
since two of the rollers 2 are mounted on each of the side frame
members 10₁, 10₂ of the roller mounting frame 10, respectively,
so as to lie before and behind the main motor 5, respectively,
the locomotive underframe can be supported by four of the
rollers 2, making the lateral movement of the middle truck frame
easy, and at the same time, owing to such an arrangement of the
rollers 2, since the cutout to be provided in the underframe to
accommodate the main motor 5 can be made large, the dimension
and, accordingly, the output of the main motor 5 can be made
large.

Thus, in accordance with the present invention, since
the rollers and the main motor in a middle truck are not
disposed so as to align laterally with each other with respect
to the longitudinal center line of the truck frame contrarily
to the conventional truck frame, the cutout to be formed in the
locomotive underframe can be made large, allowing the dimension
and, accordingly, the output of the main motor to be made large,
so that the output of an electric locomotive of the three-truck
type can be increased.

Although, as one of the embodiments of the present
invention a swing bolster device has been described and
illustrated above as being applied for a middle truck in an electric locomotive of the three-truck type it will be appreciated that the present invention can be similarly embodied in a middle truck in a Diesel locomotive of the three-truck type or a truck having two main motors, etc.
What is claimed is:

The claims are as follows:

1. In a swing bolster device to be used for a middle truck in an electric locomotive of the three-truck type wherein said middle truck is provided with a main electric motor and the underframe of said electric locomotive is adapted to be laterally movably supported on said middle truck through rollers which are rotatively disposed between said underframe and the roller mounting members arranged at left and right sides of the side frame members of said middle truck, respectively, said roller mounting members being supported on shelves integrally formed with said side frame members outside thereof, respectively, through bolster springs disposed therebetween so that said roller mounting members are moved up and down relative to said side frame member, the improvement wherein:

   each of said rollers mounted on said roller mounting members, respectively, is divided into two so as to respectively position front and behind said main electric motor.

2. A swing bolster device as claimed in claim 1 wherein said roller mounting members arranged at said left and right sides of said side frame members are integrally connected together at their front and rear ends by front and rear end members, respectively, so as to reveal substantially a hollowed rectangular configuration in plan view, and said roller mounting members are in contact with upright sliding members fixedly secured to said side frame members of said frame of said middle truck, respectively, on their upper.
surfaces, whereby said roller mounting members are adapted to be shifted up and down relative to said sliding members, but to be integrally moved laterally together with said side frame members.

3. A swing bolster device for the middle truck of an electric locomotive of the three-truck type when constructed, arranged and operable substantially as described herein with reference to Figures 3 to 5 of the accompanying drawings.

Dated this 14th day of June 1934

MITSUBISHI DENKI KABUSHIKI KAIYUSHI
BY THEIR PATENT ATTORNEY
GRIFFITH HASSELL & FRANK