We, AMSTED Industries Incorporated, a corporation organized and existing under the laws of the State of Delaware, United States of America, of 3700 Prudential Plaza, City of Chicago, County of Cook, State of Illinois, United States of America hereby apply for the grant of a Patent for an invention entitled

"SQUARING DEVICE FOR RAILROAD CAR TRUCK"

which is described in the accompanying complete specification. This application is made under the provisions of Part XVI of the Patents Act 1952 and is based on an application for a patent or similar protection made in the United States of America on the 26th day of July 1979, Serial No. 61 027, for Squaring Device for Railroad Car Truck

Our address for service is:

Care: SPRUSON & FFRGUSON
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AUSTRALIA

Dated this 17th day of March 1980.

AMSTED Industries Incorporated

Signature of Applicant

* Louis Dean Davis

ATTEST:

Walter Lothar Schlegel, Jr.
Assistant Secretary

The Common Seal of AMSTED INDUSTRIES INCORPORATED was hereto affixed in the presence of:

To: The Commissioner of Patents Commonwealth of Australia
DECLARATION IN SUPPORT OF A
CONVENTION APPLICATION UNDER
PART XVI FOR A PATENT

58471/80

In support of the Convention Application made under Part XVI of the Patents Act 1952 by AMSTED INDUSTRIES INCORPORATED, 3700 Prudential Plaza, Chicago, Illinois 60601, United States of America

for a patent for an invention entitled

"Squaring Device for Railroad Car Truck"

1. I am authorized by AMSTED INDUSTRIES INCORPORATED, the applicant for the patent to make this declaration on its behalf.

2. The basic application as defined by Section 141 of the Act was made in the United States of America on the July 26, 1979 by Harry W. Mulcahy.

3. Harry W. Mulcahy whose address is 3700 Prudential Plaza, Chicago, Illinois 60601, United States of America, is the actual inventor of the invention and the facts upon which AMSTED INDUSTRIES INCORPORATED is entitled to make application are as follows: The said AMSTED INDUSTRIES INCORPORATED is the assignee of said

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

Declared at Chicago, Illinois this 17th day of March 1980.

ATTEST:
Walter L. Schlegel, Jr.
Assistant Secretary

TO: The Commissioner of Patents
Commonwealth of Australia

Signature of Declarant
Louis D. Davis
Vice President
SUSPENSION WITH CHEVRON-SHAPED RESILIENT PAD

AMSTED INDUSTRIES INCORPORATED

58 471/80 519 249
16.5.80
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B61F 5/32
Mulcahy, H.W.
SF
54 481/73 469 387 62.4 96.5
18 472/70 439 172 96.5
17 434/70 96.4 96.5

Claim 1. A railroad car truck comprising a side frame means, a wheel bearing means mounted on said side frame means, an axle end journalled in said wheel bearing means and a chevron shape resilient pad means having a relatively low stiffness value in shear and a relatively high stiffness valve in compression and tension disposed between and attached to said side frame means and said wheel bearing means, said resilient pad means being constructed and arranged so as to restrain relative vertical movement and longitudinal movement in the intended direction of travel of said truck between said side frame means and said axle end, while yieldably permitting relative lateral movement normal to the intended direction of travel of said truck therebetween whereby said side frame means and said axle end are maintained generally normal to each other.
Name of Applicant: AMSTED INDUSTRIES INCORPORATED

Address of Applicant: 3700 Prudential Plaza, City of Chicago, County of Cook, State of Illinois, United States of America

Actual Inventor: HARRY W. MULCAHY


Complete Specification for the invention entitled: "SQUARING DEVICE FOR RAILROAD CAR TRUCK"

The following statement is a full description of this invention, including the best method of performing it known to us:

...
Inverted V-shaped elastomeric devices are interposed between axle ends of wheelsets of a railroad car truck and pedestal jaws of side frames of the car truck. The elastomeric device may comprise a series of metal plates separated by elastomeric pads. Because the pads provide a low stiffness rate in shear and high stiffness rate in tension and compression, the device inhibits relative longitudinal and vertical movements between the side frames and the wheelsets while at the same time allowing relative lateral movements therebetween. Thus, each wheelset may more readily center itself with respect to the track over which it is riding while it is inhibited from yawing. Additionally, the side frames and the wheelsets are maintained in a more truly squared relationship to improve the stability of the railroad car truck.

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to railroad car trucks and more particularly to a truck wherein each wheelset may move laterally to continuously center itself with respect to the track over which the truck is travelling. Concurrently, the wheelsets are maintained in a squared relationship with other truck components, for example side frames of the truck.

Description of the Prior Art

The railroad car wheel in common use today has a conical-like tread profile which produces a centering effect with respect to the track over which the car truck is travelling. During travel this centering is continuous in that the distance between the tracks is not constant nor is the track absolutely straight. To accomplish this centering, the
wheelset must move laterally with respect to a longitudinal axis of the truck. These lateral movements were readily accommodated within the now obsolete sleeve bearing type journal boxes. With the adoption of the roller bearing, such lateral movements of the wheelset were inhibited.

Therefore, other means have been provided to allow this desirable lateral movement. Such means are disclosed for example in U.S. Patent Nos. 2,762,317; 2,737,907; 2,744,474 and 3,352,255. An even further improvement is disclosed in co-pending application Serial No. 849,027 owned by the assignee of this invention.

SUMMARY OF THE INVENTION

A railroad car truck comprising a pair of spaced side frames and a pair of wheelsets having axle ends positioned within pedestal jaws formed at ends of the side frames further includes a chevron-shaped elastomeric device interfacing between each axle end and the respective side frame pedestal jaw.

The elastomeric device comprises a number of metal plates separated by elastomeric pads. The pads have a low stiffness rate in shear and a high stiffness rate in tension and compression. The device allows relative lateral movements between each wheelset and the side frames in that the elastomeric pads are placed in shear during such movements. While allowing the lateral movements, the device inhibits both relative vertical and longitudinal movements between the wheelsets and the side frames in that the elastomeric pads are placed in compression and tension during such movements.

The railroad car truck of this invention has several advantages over known trucks.
It is an object of the present invention to overcome or substantially ameliorate the above disadvantages.

There is disclosed herein a railroad car truck comprising a side frame means, a wheel bearing means mounted on said side frame means, an axle end journaled in said wheel bearing means and a non-annular resilient pad means having a relatively low stiffness value in shear and a relatively high stiffness value in compression and tension disposed between and attached to said side frame means and said wheel bearing means, said resilient pad means being constructed and arranged so as to restrain relative vertical movement and longitudinal movement in the intended direction of travel of said truck between said side frame means and said axle end, while yieldably permitting relative lateral movement normal to the intended direction of travel of said truck therebetween whereby said side frame means and said axle end are maintained generally normal to each other.

A preferred form of the present invention will now be described by way of example with reference to the accompanying drawings, wherein:

FIG. 1 is a partial elevational view in section through a railroad car truck of this invention.

FIG. 2 is a perspective view of an elastomeric device incorporated as part of the truck of FIG. 1.

FIG. 3 is a cross-sectional view of the truck as generally seen along the line 3 to 3 of FIG. 1.

FIG. 4 is a cross-sectional view of the truck as generally seen along the line 4 to 4 of FIG. 1.
DESCRIPTION OF THE PREFERRED EMBODIMENT

As seen generally in FIG. 1 is a partial view of a railroad car truck which is designated 10. The truck 10 typically includes a pair of spaced side frames with a portion of one such side frame 12 shown. The truck 10 further includes a transversely positioned bolster (not shown) which may support in part a body (not shown) of the railroad car. Formed at ends of each side frame 12 is a pedestal jaw with the one jaw shown designated 14 and being typical of the remaining.

The pedestal jaw 14 includes a lower portion 16 defined by spaced front and rear end walls 18, 20. It should be understood that the truck 10 is nondirectional and that the terms "front" and "rear" are used merely for distinguishing purposes. Each end wall 18, 20 has an upper radiused portion 22 which projects inwardly to terminate at front and rear inner spaced end walls 24, 26. The end walls 24, 26 define in part an opening 28 to an upper portion 30 of the pedestal jaw 14. The upper portion 30 has an inverted V-shaped roof 32 defined by a front and a rear inclined portion 34, 36 which converge upwardly and join to form a radiused roof apex 38. A lower end of each roof portion 34, 36 terminates at a concave-shaped end wall 40, 42, a lower end of which joins front and rear inner end walls 24, 26 respectively.

Received in the pedestal jaw lower portion 16 is an axle end 44 of a wheelset 46 shown in part. It is recognized that the truck 10 has two such wheelsets 46 each comprising a pair of spaced wheels affixed at ends on an elongated axle. The axle ends 44 are received in pedestal
jaws 14 of the side frames 12 respectively.

Separating the axle ends 14 of the wheelset 46 from the side frame 12 is a bearing 48 allowing the wheelset 46 to freely rotate as the car truck 10 moves forward or backward during operation. On an upper portion 50 of the bearing 48 is an adapter 52 having a wedge-shaped configuration.

The adapter 52 is positioned within the upper portion 30 of the pedestal jaw 14 and is defined by a lower radiused surface 54 which interfaces with the upper portion 50 of the bearing 48. The adapter 52 further includes an upper front and rear flat inclined engaging surface 56, 58 which converge upwardly and join at a radiused apex 60. On each side of the front and rear flat engaging surfaces 56, 58 is a pair of inner and outer spaced grooves 62, 64 positioned parallel to and proximately equidistant on each side of a longitudinal axis of the adapter 52.

Between the adapter 52 and the side frame pedestal jaw roof 32 is an inverted V-shaped or chevron-shaped elastomeric device 70 which is shown in detail in FIG. 2. The device 70 includes an upper, middle and lower metal plate 72, 74 and 76 separated by elastomeric pads 78, 80. The plates 72-76 and pads 78, 80 may be joined into a rigid structure by suitable bonding technique. The pads 78, 80 have a low stiffness value in shear but a high stiffness value in compression and tension.

The upper plate 72 and the lower plate 76 are divided into a front and rear inclined contact portion 82, 84 and 86, 88 respectively formed at an angle to complementarily engage with the pedestal jaw roof portion 34, 36.
and the upper engaging surface 56, 58 of the adapter 52.

The inclined portion 86, 88 of the lower plate 76 join at a radiused corner 90 having a dimension slightly greater than that of the apex 60 of the adapter 52 so as to provide a space 92 therebetween when the side frame 12 is fully loaded. Likewise, the front and the rear inclined portions 82, 84 of the upper plate 72 join at a radiused corner 94 having a dimension slightly less than that of the apex 38 of the pedestal jaw roof 32 to also provide a space 96.

Along an inner and outer edge 98, 100 of the upper plate 72 are two pairs of spaced, upwardly projecting tabs 102. The tabs 102 fit snugly against inner and outer side-walls 104, 106 of the side frame 14. In a similar manner, along inner and outer edges 108, 110 of the lower plate 76 are two pairs of spaced tabs 112 which project downwardly and fit snugly within the adapter grooves 62, 64.

During operation of the truck there are continuous relative vertical, longitudinal and lateral movements between the wheelsets 46 and the side frames 12. As seen in FIG. 2, the arrow V-V' represents the vertical direction, the arrow Lo-Lo' represents the longitudinal direction and the arrow La-La', the lateral direction.

Because the wheels of the wheelsets 46 have a conical-like tread profile and because the distance between the tracks over which the wheelset 46 travels is not constant nor straight, each wheelset 46 attempts to move laterally to center itself with respect to the track. Centering each wheelset 46 with respect to the track is most desirable in that it reduces wheel and track wear and minimizes frictional
resistance to travel.

As the wheelset 46 attempts to move laterally, i.e. La-La' direction, it places the elastomeric pads 78, 80 in shear since the upper plate 72 and lower plate 76 are secured to the side frame 12 and the adapter 52 and the pads 78, 80 are secured to the plates 72-76. Because the pads 78, 80 have a low stiffness value in shear, lateral movements between the upper and lower plates 72, 76 may readily occur allowing relative lateral movements between the wheelset 46 and the side frame 12. Thus, each wheelset 46 may more readily move across the track to take up an optimum wear position.

While it is desirable to allow lateral movement between the wheelset 46 and the side frame 12, it is equally desirable to maintain the wheelset 46 and the side frame 12 in a squared relationship. Maintaining this squared relationship prevents the side frame 14 and bolster from lozenging, i.e. the bolster is out-of-square with respect to a body of the railroad car and the side frames remain parallel by becoming longitudinally offset from each other. When lozenging occurs, the critical speed at which the wheelsets will hunt is reduced. Because the wheelset 46 may also hunt or yaw, i.e. an inherent dynamic tendency of a wheelset to oscillate about its vertical axis above the critical speed the wheelset 46 must be restrained against such if such occurs.

During such hunting, the wheelset 46 attempts to rotate and thus the axle ends 44 move in the Lo-Lo' direction. When the axle end 44 moves in the Lo' direction, for example, the upper rear surface 58 of the adapter 52 is forced
against the rear portion 88 of the lower plate 76 of the elastomeric device 70. This force is transferred to the rear inclined portion 36 of the pedestal jaw roof 32. No significant longitudinal movement of the wheelset 46 with respect to the side frame 12 occurs because of the high compression stiffness value of the pads 78, 80. Thus, the wheelset 46 is inhibited from hunting while at the same time the side frames 12 are inhibited from lozenging to provide a more stable railroad car truck having improved wheel wear characteristics.

While various modifications may be suggested by those versed in the art, it should be understood that we wish to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come within the scope of our contribution to the art.
The claims defining the invention are as follows:

1. A railroad car truck comprising a side frame means, a wheel bearing means mounted on said side frame means, an axle end journalled in said wheel bearing means and a non-anular resilient pad means having a relatively low stiffness value in shear and a relatively high stiffness value in compression and tension disposed between and attached to said side frame means and said wheel bearing means, said resilient pad means being constructed and arranged so as to restrain relative vertical movement and longitudinal movement in the intended direction of travel of said truck between said side frame means and said axle end, while yieldably permitting relative lateral movement normal to the intended direction of travel of said truck therebetween whereby said side frame means and said axle end are maintained generally normal to each other.

2. The truck as defined in claim 1 wherein said resilient pad means comprises elastomeric pad means.

3. The truck as defined in claim 2 wherein said elastomeric pad means is fixedly interposed between a pair of spaced rigid plate means and one of said rigid plate means is mounted for movement with said side frame means and the other of said rigid plate means is mounted for movement with said wheel bearing means.

4. The truck as defined in claim 3 wherein said elastomeric pad means comprises a pair of elastomeric pads bonded on opposite sides of a metal plate.

5. The truck as defined in claim 4 wherein said elastomeric pad means is generally of an inverted V shape.

5. The truck as defined in claim 5 wherein one of
said rigid plate means includes two pairs of upwardly projecting tabs spaced on opposite ends thereof axially of said axle end so as to be mounted for movement with said side frame means and the other of said rigid plate means having two pairs of downwardly projecting tabs spaced on opposite ends thereof axially of said axle end so as to be mounted for movement with said wheel bearing means.

6. A railroad car truck substantially as hereinbefore described with reference to the accompanying drawings.

DATED this TWENTY-NINTH day of JULY, 1981

AMSTED INDUSTRIES INCORPORATED

Patent Attorneys for the Applicant
SPRUSON & FERGUSON