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Tack

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[54] **SPRUNG MOUNTED SNUBBER WEAR PLATE**

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[52] **U.S. Cl.**..... **105/197 D,** 29/473.3, 29/522, 105/197 DB, 105/206, 105/207, 188/250 G

[51] **Int. Cl.**..... **B61f 5/12,** B61f 5/50, F16d 69/04

[58] **Field of Search** ..... 29/473.3, 522; 105/197 D, 105/197 DB, 206, 207; 188/250 G

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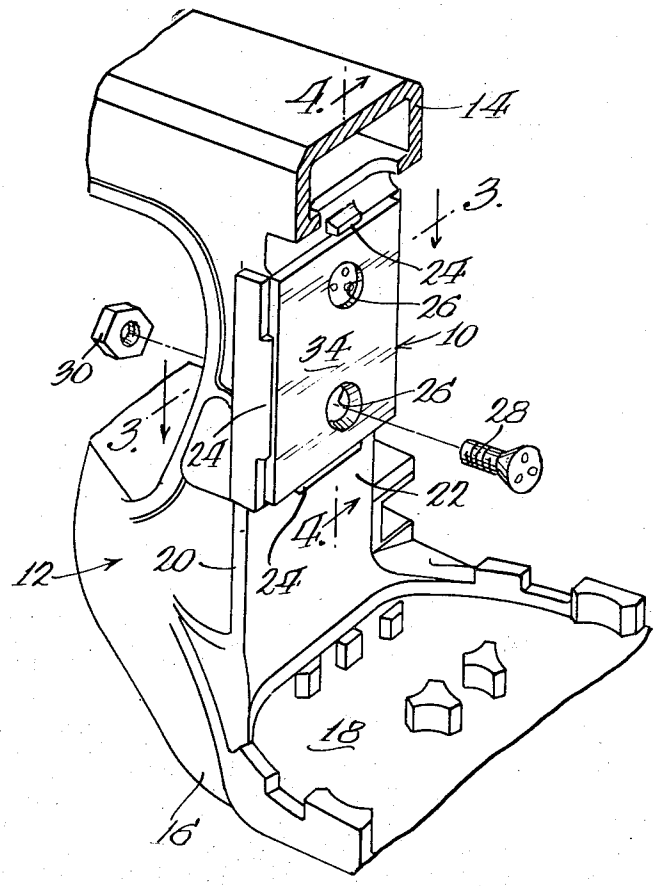
[57] **ABSTRACT**

A sprung wear plate particularly useful for reliable secure application to the side frame columns of a railway truck is made from a single metal strip having a concave surface facing the flat mounting surface on the side frame column. The plate has holes for attachment by bolts through aligned holes in the column. High strength bolts are used such that tightening of the bolts flattens out the concave surface of plate into full contact with the column locking the bolts therein. The bolts preferably have tapered heads received in tapered holes in the plates to prevent accidental application of the plates with the concave surface facing outwardly.

7 Claims, 4 Drawing Figures



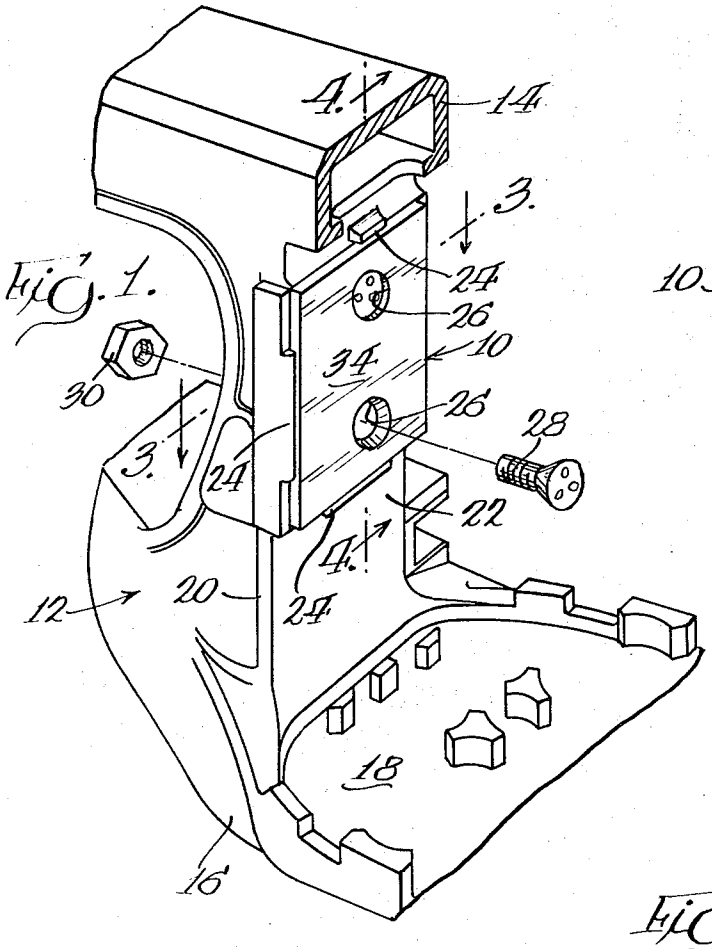


Fig. 1.

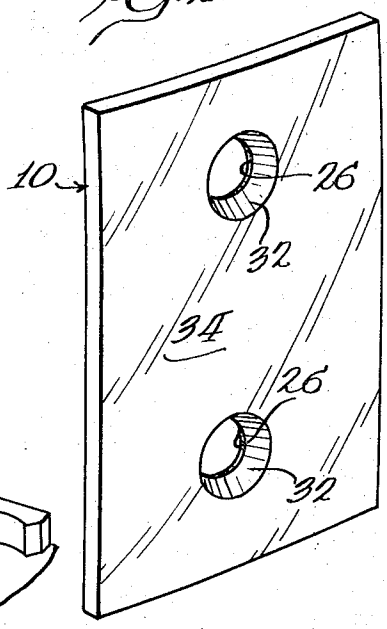


Fig. 2.

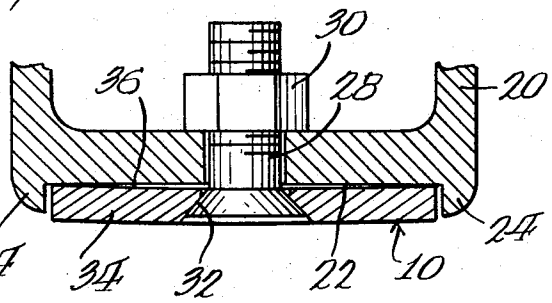


Fig. 3.

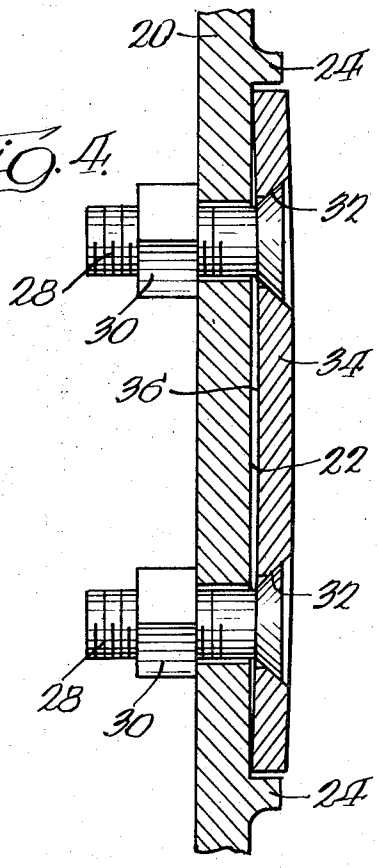


Fig. 4.

SPRUNG MOUNTED SNUBBER WEAR PLATE

BACKGROUND OF THE INVENTION

Wear plates are employed in railway and other industries as a replaceable part that is subject to friction, rubbing or abrasion from another part. A wear plate is beneficially used on a large or expensive casting having one or more surfaces that are exposed to frictional deterioration. By securing a removable wear plate over such exposed surfaces, any wear will be confined to the plate and not to the casting, thereby extending the life of the casting indefinitely with the simple replacement of wear plates.

A long unresolved problem in the railway industry is a reliable means of securing a wear plate to the side frame column without the plate becoming loose under service conditions. In that application, the side frames of a railway truck have windows therein for receiving the ends of a bolster, with the ends of the bolster being supported upon springs in the side frame. The bolster carries a friction shoe on both sides that is urged by a spring against a vertical column located at each side of the side frame window. Frictional engagement of the friction shoe against the column locking the bolts therein serves to dampen sudden vertical movement of the bolster, which in turn stabilizes the travel or ride of the railway vehicle.

Since the side frame is a heavy and relatively expensive member, friction plates are commonly secured against the side frame columns to confine frictional wear to the plates and prevent permanent damage to the side frame. Various methods have been proposed to secure the wear plates, including welding and bolting, but none of these methods alone have proven to be successful in achieving permanent securement for all side frames and service conditions. Under service conditions, especially with the advent of heavier and faster vehicles, a welded joint tends to develop cracks and may eventually break. Bolted connections, including both threaded connections and lockbolts applied with an impact device, have failed to adequately solve the problem since in many instances the wear plates become loose after a period of time.

The experience within the railway industry indicates that it would be desirable to devise a highly reliable and yet inexpensive means for securing wear plates in such a manner that they would not become loose or fall off under severe and continued service conditions. The loosening of a friction plate can result in various problems, the most serious of which are permanent damage to the columns or friction shoes, or in case of a lost plate, loss of ride control in the truck.

Existing wear plates are required by A.A.R. standards to be flat, with a possible tolerance in either direction of 0.025 inches. The cast column surfaces to which the wear plates are attached are also designed to be flat, but experience has shown that such surfaces may vary from 0.025 inches concave to 0.010 inches convex. All efforts have been directed to establishing a flat, smooth interface to achieve full contact between the facing members before they are secured together.

SUMMARY OF THE INVENTION

In accordance with the present invention, the wear plate is curved or shaped into a predetermined form prior to its application to the side frame column. I have found that the wear plate becomes loose because the allowable tolerance may permit only partial contact and may result in a situation where the facing surface of the plate is spaced from the column surface in one or more areas. Under heavy pressure, the plate is able to flex slightly, which eventually causes wearing of contacting surfaces or loosening of the bolts or other securement means.

The present invention provides a wear plate which is initially formed with a concave surface facing the side frame column. The concavity of the plate or plate surface is designed to be greater than any normal or abnormal variation from flatness in the column surface, in order to assure that the central portion of the plate surface will be initially spaced from the column surface while the outer perimeter of the plate surface will contact the column surface.

The central portion of the plate surface is then drawn into full contact with the column surface with heavy threaded bolts and nuts passing through the plate and column. Since the plate has characteristics of a spring, two heavy bolts are employed and are alternately tightened until the spring force of the plate is met or exceeded and the central portion of the plate fully engages the column.

Upon application, the wear plate takes advantage of the spring forces generated during its attachment, and the edges of the plate conform to any variation from flatness in the column surface. Loads on the wear plate therefore tend to be distributed evenly, and the tendency of the plate to flex or rock on the column is greatly minimized.

THE DRAWINGS

FIG. **1** is a fragmentary perspective view of a railway truck side frame, showing a wear plate in position for attachment to the side frame column in accordance with the present invention;

FIG. **2** is a perspective view of the wear plate of the present invention;

FIG. **3** is a fragmentary sectional view taken along section line **3—3** of FIG. **1**; and

FIG. **4** is a fragmentary sectional view taken substantially along section line **4—4** of FIG. **1.**

DESCRIPTION OF THE PREFERRED EMBODIMENT

The principles of the present invention will be described in connection with a friction plate **10** adapted to be mounted on a side frame **12** of a railway truck as shown in FIG. **1,** but it shall be understood that the invention has applicability to other forms of plates secured in other locations, as will be readily apparent to those skilled in this and related arts.

The side frame **12** is conventional in nature and generally comprises an upper compression member **14** and a lower tension member **16** having a spring seat **18** formed therein for support of spring groups that resiliently support the end of the bolster (not shown). A vertical column **20** extends between the tension and compression members and has an inwardly facing surface **22** upon which the friction plate **10** is supported and carried. Spaced lugs **24** may be provided on the column surface to locate and maintain the friction plate in proper position on the column.

Since only a portion of the truck is shown for the sake of brevity, it will be understood that a second column is connected between the compression and tension members in parallel relation to the first, and the second column is also provided with an inwardly facing surface carrying a friction plate. The friction plates in each side frame therefore face one another and serve as frictional surfaces for sliding engagement by friction shoes carried by the bolster.

As shown in FIGS. **2, 3** and **4,** the column surface **22** is designed to be substantially flat within standard tolerances established by the industry. The friction plate, however, is provided with a curved configuration, with the surface **36** facing the column surface **22** having a concave curvature. A pair of vertically spaced apertures **26** are provided in the generally rectangular plate **20** for attachment by bolts **28** and nuts **30** to the side frame column. The apertures are countersunk or tapered inwardly at **32** from the outwardly facing surface **34** of the plate, and the heads of the bolts **28** are similarly tapered but of less width than the length of the tapered areas **32,** such that the head of the bolt, when seated, will be spaced inward from the outer surface **34.**

The friction plates of the present invention are preferably made from resilient steel plate or strip stock. The strength and wear characteristics of the metal are improved by heating and quenching, with subsequent heating to a lower temperature to control hardness. These procedures are commonly employed by the industry in the manufacture of flat plates, all of which steps make it difficult, if not impossible to achieve and hold a small tolerance on flatness.

In addition to the foregoing, the friction plates are given the desired degree of curvature as shown during or after routine processing. Curvature may be imparted to the plate while hot by forming on a die, or a shaping die may be employed while the apertures **26** are being punched. In the alternative, after final tempering the plate may be shotpeened on one side, which will cause it to curl in the desired amount and direction. Other well known methods may be employed to achieve the same result, and the above should be considered as only exemplary.

An important feature of the present invention is the means by which proper and fool-proof installation of the friction plate is achieved. Installation with the concave surface facing outwardly would defeat the purpose of the invention. For this reason, the apertures **26** taper inward from the convex outer surface **34,** and this feature assures that the concave surface **36** will also face the column upon installation.

The ends of the present invention may be achieved if the plate **10** is formed with curvature about either a vertical or horizontal axis, or with a compound curvature, but in the preferred embodiment, the plate is formed with a spherical curvature as shown in FIGS. **3** and **4.** The plate may be curved along its entire width, or the majority of the curvature may be confined to the central portion of the plate, with the outer perimeter of the surface being substantially flat. In the case of wear plates for columns, a spherical radius between about 9 to about 15 inches, preferably in the order of about 12 inches, will be sufficient to achieve the desired degree of curvature. The friction plate will generally measure 8 to 10 inches long, 4 to 7 inches wide, and approximately ⅛ to ⅜ inches thick. The degree of curvature should in any event be greater than the maximum convex curvature expected in the facing part, such that the central portion of the plate will be spaced from the facing surface before the bolts are tightened.

The relation of the wear plate to the column is shown in FIGS. **3** and **4,** and it may be seen that the central portion of the plate is slightly spaced from the facing column surface with the bolts applied but not tight. The bolts are then tightened alternately until the central portion of the plate is drawn up against the column surface. The apertures **26** must be located toward the center of the plate in order to assure deflection when the nuts are tightened. It will be understood that a sufficiently heavy bolt must be employed to fully deflect the plate into contact position. We have found that a ¾ by 2 inch grade 8 bolt having a high strength self-locking nut which is torqued to 175 to 200 ft. -lbs., will fully deflect the plate, although bolts of lower grades might possibly be used.

I claim:

1. In a railway truck having side frames, each side frame comprising vertical columns with wear plates secured on the inwardly facing surfaces thereof, said column surfaces being substantially flat, the improvement wherein the wear plate has a concave shape relative to and facing said column surface, and securement means for securing and deflecting said plate into substantially full contact with said surface, said wear plate, upon securement, being spring-loaded against said column surface.

2. The improvement of claim **1** wherein said securement means comprise vertically spaced threaded fasteners secured through apertures in said plate and column.

3. The improvement of claim **2** wherein said apertures and the heads of said bolts have similar tapered surfaces and said apertures receive said heads.

4. The improvement of claim **2** wherein said apertures are spaced inward from the sides of said plate.

5. The improvement of claim **1** wherein said wear plate is generally rectangular and said concave shape is in the form of a spherical curvature.

6. Wear means adapted to be secured against the surface of a support comprising a resilient metal wear plate having a surface facing said support surface, which, when in unstressed engagement therewith, is concave relative thereto with a central portion of said plate surface being spaced from said support surface, and securement means for drawing said central portion substantially against said support surface, said wear plate, upon securement, being spring loaded against said support surface.

7. The wear plate of claim **6** wherein said plate is formed with a spherical curvature.

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