Key for retaining an axle bearing assembly between spaced vertical pedestal walls which define an open-bottomed jaw in a railway truck side frame on a railway car. The key has a one piece body consisting of a base portion, an inner retainer end portion extending inwardly from the base portion and an outer stabilizing end portion extending outwardly from the base portion. The base portion is seated on a horizontal flange at the lower end of one of the pedestal legs and the bottom of the key body is formed to seat against upwardly and inwardly facing support surfaces at an upper, inner corner on the flange to thereby prevent downward and outward displacement of the key. The inner retainer end portion extends inwardly through an access opening in the pedestal wall above the flange in position to engage the underside of the axle bearing assembly to hold it in the jaw regardless of up and down oscillation of the railway car relative to the truck. The outer stabilizing end portion has a downwardly and inwardly directed hook which engages the underside of the flange at a level below the access opening. A downward force component exerted by the axle bearing assembly on the retainer end portion produces a force couple about an axis on the upper, inner corner portion of the flange. This is resisted by an opposite, balancing force couple about the same axis resulting from a thrust reaction between the outer stabilizing end portion and the pedestal wall. This holds the key stably in position to retain the axle bearing assembly in the jaw.

6 Claims, 9 Drawing Figures
SIDE FRAME KEY FOR RETAINING AN AXLE BEARING ASSEMBLY IN A RAILWAY TRUCK

CROSS REFERENCE TO RELATED APPLICATION

Reference is made to the following co-pending, related patent application, assigned to the same assignee: Herman D. Wrench Ser. No. 341,956 filed Mar. 16, 1973 on "SIDE FRAME KEY FOR RETAINING AN AXLE BEARING ASSEMBLY IN A RAILWAY TRUCK".

BACKGROUND OF THE INVENTION

The field of invention is side frame keys for American Association of Railroads "standard", and "alternate standard", pedestal type side frames for railway trucks.

In a standard railway car there are, of course, two, wheel-mounted trucks, one of each end of the car.

Each truck includes a pair of side frames interconnected by a transverse beam-like truck bolster which extends crosswise of the car and is pivoted through a center plate to the underside of a longitudinal center beam or bolster on the body.

In old designs of built-up trucks, a casting in the form of an inverted letter U was bolted to each truck frame holding a corresponding axle journal box in its place horizontally, but permitting it to move vertically. These U-shaped castings were called "pedestals" and the two spaced vertical walls were called pedestal legs. The space between the legs was called a jaw which was open at the bottom and closed by a pedestal tie bar extending across the mouth of the jaw beneath the so-called journal box.

Modern truck side frames are now generally cast in one piece, and the axles are supported on roller bearings instead of journal bearings, but much of the old nomenclature remains in use. The portion of the side frame receiving the roller bearing is still called a pedestal. It has a pair of spaced, vertical pedestal legs having vertical pedestal walls defining an open-bottomed jaw within which the axle bearing is mounted for limited up and down movement. At the bottom or mouth of the jaw, a side frame key is mounted on one of the pedestal walls and extends into the jaw beneath the axle bearing assembly to retain it in the jaw.

It is this side frame key with which the present invention is concerned.

Conventional side frame keys comprise a body having a base portion bolted on a flange at the lower end of one of the pedestal legs externally of the jaw. A retaining end portion extends through an opening in the pedestal wall into the jaw beneath the axle bearing assembly and serves as a keeper, holding it in the jaw regardless of up and down oscillations of the car.

These conventional side frame keys have a serious disadvantage. They are held on the pedestal leg flange by a bolt and nut connection. Through normal train operations (oscillation of the car which lifts the axle and wheel), downward impact of the axle bearing assembly on the key stresses the bolt-nut assembly beyond the yield point. The nut loosens and backs off. The key falls out and is lost. This leaves no way of retaining the axle and wheel with the car under severe oscillating conditions. This is dangerous and can result in car derailment.

The American Association of Railroads considers this so serious that it has issued a special warning (Letter TB-10.3, dated Aug. 31, 1972) alerting all concerned members and private car owners to make prompt repair or replacement of these keys "until such time as a cause and solution are determined."

BRIEF SUMMARY OF THE INVENTION

A general object of the present invention is to provide a railway truck side frame key having strength and positional stability which are completely independent of any bolt or other means for retaining it on a pedestal key.

An important object of the invention is to provide a side frame key with a body having a unique outer stabilizing end portion engageable with the underside of the horizontal pedestal leg flange externally of the jaw to thereby resist downward displacement of the inner retaining end portion of the key body by reason of a novel thrust reaction between the stabilizing end portion and the flange.

A specific object of the invention is to provide such a side frame key seated on a flange on the pedestal wall, the key having an inner retaining end portion extending into the jaw below the axle bearing assembly, and also having an outer stabilizing end portion with a downwardly and inwardly directed hook engaging the underside of the flange, whereby a downward impact from the axle bearing assembly on the inner retaining end portion, producing a force couple about an axis extending along an upper, inner corner portion of the flange, will be resisted by an equivalent thrust reaction between the outer stabilizing end portion and the pedestal leg flange to produce a balancing reactive force couple about that same axis for keeping the key on the flange without stressing the bolt or other key-fastening means.

A primary feature of the invention is the provision of a railway truck side frame key having an outer stabilizing end portion with a hook engageable with the underside of a pedestal leg flange. Another feature is utilizing such outer key end portion to stabilize the key against stresses that cause loss of conventional keys.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary side view of a railway car showing a specific application of the present invention;

FIG. 2 is a fragmentary, enlarged view of FIG. 1;

FIG. 3 is a fragmentary, sectional view of any of FIGS. 2, 4 and 5, as seen in the direction of arrows 3-3;

FIG. 4 is a longitudinal sectional view taken along line 4-4 of FIG. 3, but reduced in scale for ready comparison with FIG. 2;

FIG. 5 is a fragmentary, enlarged view of FIG. 4, showing a longitudinal cross-sectional view of the new side frame key in detail;

FIG. 6 is similar to FIG. 5, but shows a conventional side frame key from the prior art; and

FIGS. 7, 8 and 9 are different perspective views of the new side frame key.

Like parts are referred to by like reference characters throughout the figures.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the specific embodiment of the in-
vention illustrated in the drawings, FIG. 1 shows one end of a railway freight car 20 supported on a four wheel truck 22. There is a side frame 24 at each end of a transverse truck bolster 26. Each side frame has a fork and aft pedestals 28 and 30 providing supporting connections between the car 20 and wheels 32 and 34 mounted on axles rotatable within axle bearing assemblies 36 and 38. The foregoing is conventional so will not be described in detail.

The novel side frame key will be described in connection with one of the pedestals 28, it being understood that the structure associated with the other pedestals may be the same.

Pedestal 28 comprises a pair of downwardly extending legs 39 and 41 which are spaced apart in a direction longitudinally of the side frame 24 to define a downwardly open jaw 44 between them. The legs 39 and 41 respectively comprise vertical pedestal walls 40 and 42 extending transversely between side walls 52 and 54. The fore and aft limits of the jaw 44 are defined by these pedestals walls 40 and 42. The axle bearing assembly 36 is retained and guided for limited up and down movement in one of the jaws 44. The axle bearing assembly 36 may be a conventional roller bearing and cartridge type journal housing, and a conventional adapter 46 may be provided between the bearing assembly 36 and a horizontal wall 48 which closes the upper end of the jaw 44. The jaw 44 is open-bottomed except for the side frame key to be described.

The side frame 24 is a one piece casting, preferably steel, and includes the above-described pair of vertical, longitudinal side walls 52 and 54 integral with the pedestal walls 40 and 42. A horizontal pedestal flange 50, which also may be an integral part of the side frame is at the bottom of pedestal leg 41 and extends transversely between the side walls 52 and 54. In effect, the flange 50 may be described as an outer (with respect to jaw 44) flange on wall 42. Referring to FIG. 5, the flange 50 has an upwardly facing support surface 56, and an edge surface 58 which faces inward, that is, inward toward the jaw 44. An access opening 60 is provided through the pedestal wall 42 above the flange 50 externally of the jaw.

The side frame key 62 is the crux of the present invention. It comprises a one piece body preferably forged or cast of material such as steel. While the method of manufacturing is not part of the present invention, the key may be made in one piece initially or it may be fabricated in sections which are subsequently welded or otherwise fastened together. The key comprises a unitary body having base portion 64, an inner retainer end portion 66, and an outer stabilizing end portion 68.

The base section generally indicated 64 includes a horizontal plate 70 having a longitudinal central groove or recess 72 flanked by a pair of parallel, horizontal, bottom, bearing surfaces 74, 74 seated on the upwardly facing support surface 56 of flange 50. Any suitable means for keeping the key in place on the side frame under normal transit vibrations may be provided. In this case a bolt 76 is provided, extending through openings 78 and 80 in the base plate 70 and flange 50, respectively. Nut 82 holds the bolt and keeps the key in place. The bolt head 81 is seated in a top recess 83 in the base plate 70.

The inner retainer end portion 66 projects from the base portion 64, through the pedestal wall access opening 60, into the jaw 44 to engage and retain the under side of the axle bearing assembly 36.

A downwardly and outwardly facing shoulder 84 (FIG. 5) is seated against the inwardly facing edge support surface 58. The above described structure, involving key surfaces 74, 74 seated on upper flange surface 56 and key surface 84 seated against flange inner edge surface 58, along the upper, inner corner 59 of the flange, prevents downward and outward movement of the key body relative to the jaw when assembled in the retaining or keeping position shown in FIG. 5.

The outer stabilizing end portion 68 has a downwardly and inwardly directed hook 90 comprising a downward bight 92 and an inward end portion 94 which bears against the under side 96 of the flange 50, when the key is assembled into its retaining position shown in FIG. 5. A center cut-out 98 in the end portion 94 provides room to insert and rotate a wrench on nut 82.

The advantages of the improved side frame key, using the novel outer stabilizing end portion 68 are illustrated clearly by the forces, reactions and moment arms indicated by the lines and arrows on FIG. 5 as follows: Assume the axle bearing assembly 36 moves downward (or the key 62 moves upward with the side frame 24) and strikes the key with a vertical force component F, tending to rotate the key body on an arm f about a moment center or axis P extending along the flange corner 59. The abutment of the upper surface 100 of the hook portion 94 against the under side 96 of the flange 50 will produce a vertical reaction component R about a reaction arm r, centered on that same moment axis P. Thus, the force component couple Ff which is counterclockwise about axis P in FIG. 5, will be balanced by an identical, clockwise reactive force component couple Rr about that same axis. The stresses will all be taken up within the key body and none will be transmitted to the bolt 76 to tend to loosen the same as has been a disadvantage in the past.

By contrast, refer to FIG. 6 which shows a prior art side frame key 62'. It will be understood that FIG. 6 represents identical construction to FIG. 5 except that the key stabilizing end portion 68 is missing. In FIG. 6, the downward impact of the axle bearing assembly 36 on the inner end extension of the key will produce a force component couple F'f' tending to rotate the key body counterclockwise about the moment axis P'. This is resisted by a clockwise reactive force component couple R'r' which, as shown in FIG. 6, is directly resisted by tension in the bolt 76'. Repeated hammerlike impacts on this conventional side frame key result in stretching the bolt, loosening the nut, and eventual loss of the key 62'.

While one preferred embodiment of the improved side frame key has been shown and described, it will be apparent to those skilled in the art that other specific constructions and arrangements are possible within the scope and spirit of the invention as covered by the following claims.

1. In a side frame key, for retaining an axle bearing assembly between spaced vertical pedestal legs which define an open-bottomed jaw in a railway truck side frame, said key having a body with a base portion having a bottom surface including downwardly and outwardly facing shoulders defining an elongated recess extending along a moment axis at the intersection of
3,841,231

5 said shoulders, said recess being engageable with a corner on one of the pedestal legs extending along said moment axis and said body having a retainer end portion extending in one direction from said base portion relative to the recess engageable with the underside of an axle bearing assembly in the jaw when said key is seated in a retaining position on said one pedestal leg; the improvement comprising:

said body having a stabilizing end portion extending outwardly from said base portion in a direction opposite said retainer end portion and having a downwardly and inwardly extending hooked end engageable with the underside of said one pedestal leg to resist rotation of said body by thrust reaction about said moment axis and thereby resist downward displacement of said retainer end portion in response to downward force exerted thereon by an axle bearing assembly within the jaw.

2. In a side frame key, for retaining an axle bearing assembly between spaced vertical pedestal walls which define an open-bottomed jaw in a railway truck side frame, one of the pedestal walls having a horizontal support flange, said key having a body with a base portion having a bottom surface including downwardly and outwardly facing shoulders defining an elongated recess extending along a moment axis, said recess being engageable along said moment axis with an upper inner corner of said horizontal support flange to prevent downward and outward movements of the body when said key is seated in a retaining position on the flange, and said body having a retainer end portion extending in one direction from said base portion relative to the recess engageable with the underside of an axle bearing assembly in the jaw when said key is seated in a retaining position on the flange; the improvement comprising:

said body having a stabilizing end portion extending outwardly from said base portion in a direction opposite said retainer end portion and having a downwardly and inwardly extending hooked end engageable with the underside of said flange externally of the jaw to resist rotation of said body by thrust reaction between said hooked end and said underside of said flange about said moment axis and thereby resist downward displacement of said retainer end portion in response to downward force exerted thereon by an axle bearing assembly within the jaw.

3. In a side frame key, for retaining an axle bearing assembly between spaced vertical pedestal walls which define an open-bottomed jaw in a railway truck side frame, one of the pedestal walls having an opening providing access between the interior and exterior of the jaw, said one pedestal wall having a horizontal support flange externally of the jaw along the lower edge of the opening, the flange having upwardly and inwardly facing support surfaces, said key having a body with a base portion having a bottom surface including downwardly and outwardly facing shoulders defining an elongated recess extending along a moment axis, said recess being engageable along said moment axis with an upper inner corner of said horizontal support flange at the intersection of said upwardly and inwardly facing support surfaces to prevent downward and outward movement of the body when seated in a retaining position on the flange, said body having a retainer end portion extending inwardly from said base portion through the opening to engage the underside of an axle bearing assembly and retain it in the jaw when seated in said retaining position on the flange; the improvement comprising:

said body having a stabilizing end portion extending outwardly from said base portion and having a downwardly and inwardly extending hooked end engageable with the underside of said flange at a position outside the jaw at a level below the opening when seated in said retaining position, whereby said body is stabilized in said retaining position by a reactive force couple produced about said moment axis by a downward force exerted on said retainer end portion by an axle bearing assembly within said jaw and a thrust reaction between said underside of said flange and said hooked end.

4. In a railway truck side frame, a pair of spaced vertical pedestal legs which define an open-bottomed jaw, an axle bearing assembly guided for up and down movement in said jaw, a side frame key having a body with a base portion having a bottom surface including downwardly and outwardly facing shoulders defining an elongated recess extending along a moment axis at the intersection of said shoulders, said recess being engageable with a corner on a horizontal flange on one of said pedestal legs extending along said moment axis and said body having a retainer end portion extending inwardly from said base portion into said jaw engageable with the underside of said axle bearing assembly when the latter moves downward to a lower limit determined by said key; the improvement comprising:

said body having a stabilizing end portion extending outwardly from said base portion and including a downwardly and inwardly extending hook engageable with the underside of said flange to resist rotation of said body by thrust reaction about said moment axis and thereby resist downward displacement of said retainer end portion in response to downward force exerted thereon by said axle bearing assembly within said jaw.

5. In a railway truck side frame, a pair of pedestal legs with spaced vertical pedestal walls which define an open-bottomed jaw, an axle bearing assembly guided for up and down movement in said jaw, one of said pedestal walls having a horizontal support flange, a side frame key having a body with a base portion having a bottom surface including downwardly and outwardly facing shoulders defining an elongated recess extending along a moment axis, said recess being engageable along said moment axis with an upper inner corner portion of said horizontal support flange to prevent downward and outward movement of said body relative to said jaw, said body having an inner extended retainer end portion extending into said jaw and engageable with the underside of said axle bearing assembly when the latter moves downward to a lower limit determined by said key; the improvement comprising:

said body having a stabilizing end portion extending outwardly from said base portion and having a downwardly and inwardly directed hook engaged with the underside of said flange outside of said jaw to resist rotation of said body by thrust reaction between said hook and said underside of said flange about said moment axis and thereby resist downward displacement of said retainer end portion in response to a downward force exerted by said axle bearing assembly on said retainer end portion.
6. In a railway truck side frame, a pair of pedestal legs with spaced vertical pedestal walls which define an open-bottomed jaw, an axle bearing assembly guided for up and down movement in said jaw, one of said pedestal walls having an opening providing access between the interior and exterior of said jaw, said one pedestal wall having a horizontal support flange externally of said jaw along the lower edge of said opening, said flange having separate upwardly and inwardly facing support surfaces at an upper, inner corner portion thereof, a side frame key having a body with a base portion having a bottom surface including downwardly and outwardly facing shoulders defining an elongated recess extending along a moment axis and respectively engaging said flange support surfaces at said upper, inner corner portion to prevent downward and outward movement of said body relative to said jaw, said body having a retainer end portion extending from said base portion inwardly through said opening to engage the underside of said axle bearing assembly and thereby limit downward movement thereof; the improvement comprising: said body having a stabilizing end portion extending outwardly from said base portion and having a downwardly and inwardly directed hook engaged with the underside of said support flange at a position outside said jaw, whereby displacement of said body in one rotative direction about said moment axis by downward force of the axle bearing assembly on the retainer end portion is counteracted by a thrust reaction between said hook and underside of said support flange to produce a resisting torque reaction in the opposite rotative direction about said moment axis.

* * * *
UNIVERS STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,841,231 Dated October 15, 1974

Inventor(s) Emil J. Hlinsky

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Abstract:
Line 25, after "balancing" insert -- reactive --;

In the Specification:
Col. 2, line 30, change "of" to -- on --;
Col. 8, line 3, change "movmeent" to -- movement --.

Signed and sealed this 14th day of January 1975.

(SEAL)
Attest:

McCOY M. GIBSON JR. C. MARSHALL DANN
Attesting Officer Commissioner of Patents