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French

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[54] **CLIP SUITABLE FOR USE AS A CRANE RAIL CLIP**

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[52] **U.S. Cl.** **238/349**

[51] **Int. Cl.** **E01b 9/48**

[58] **Field of Search** 238/349, 304, 310, 338, 238/287

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[57] **ABSTRACT**

A crane rail clip of bar spring steel has first arcuate portions extending upwardly from a central portion and diverging outwardly with respect to one another, second arcuate portions contiguous to the first arcuate portions and extending downwardly, the second arcuate portions converging inwardly towards, or diverging outwardly away from, one another, and end portions contiguous to the second arcuate portions. The end portions extend generally towards, and are disposed on the same side of, a plane passing through the central portion but not through either end portion, and the first arcuate portions extending from the central portion on the same side of the plane.

7 Claims, 6 Drawing Figures

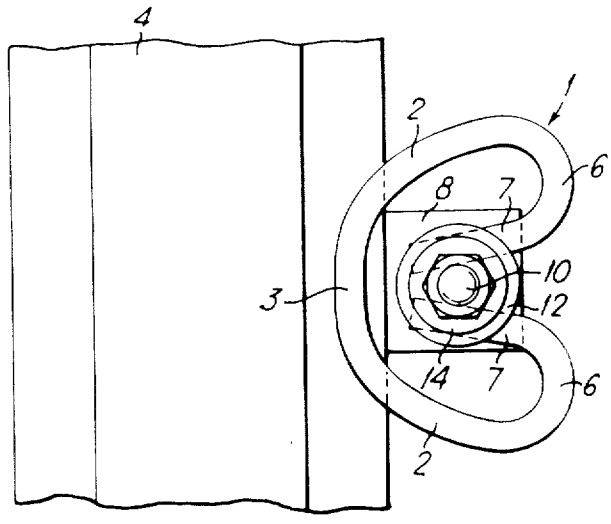


Fig. 1.

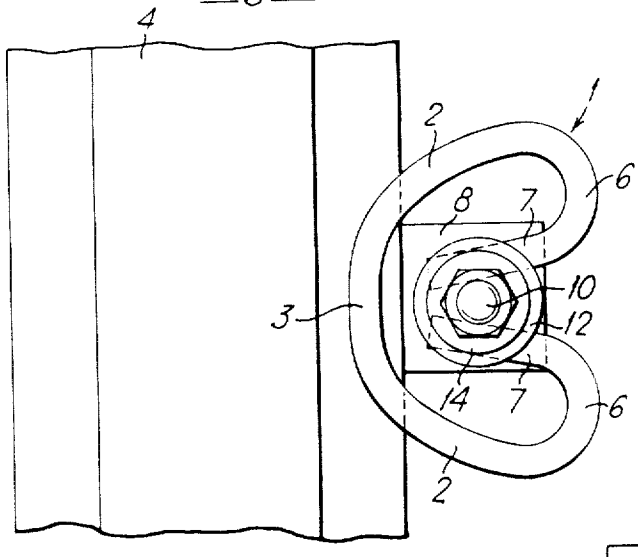


Fig. 1a

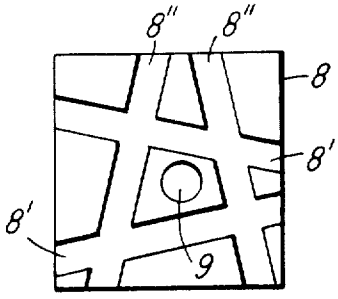


Fig. 2.

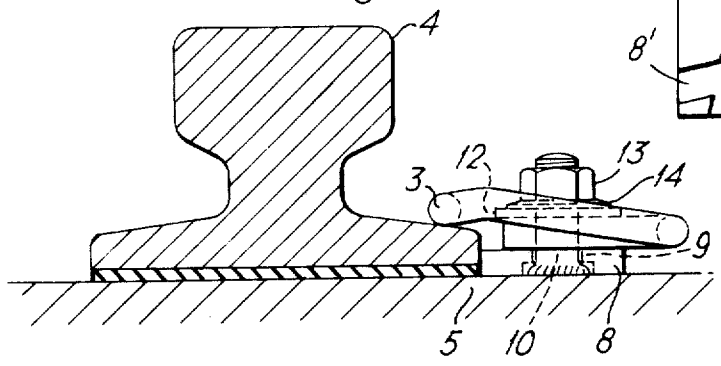
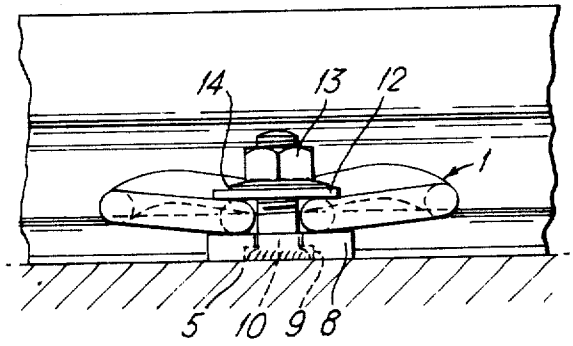


Fig. 3.



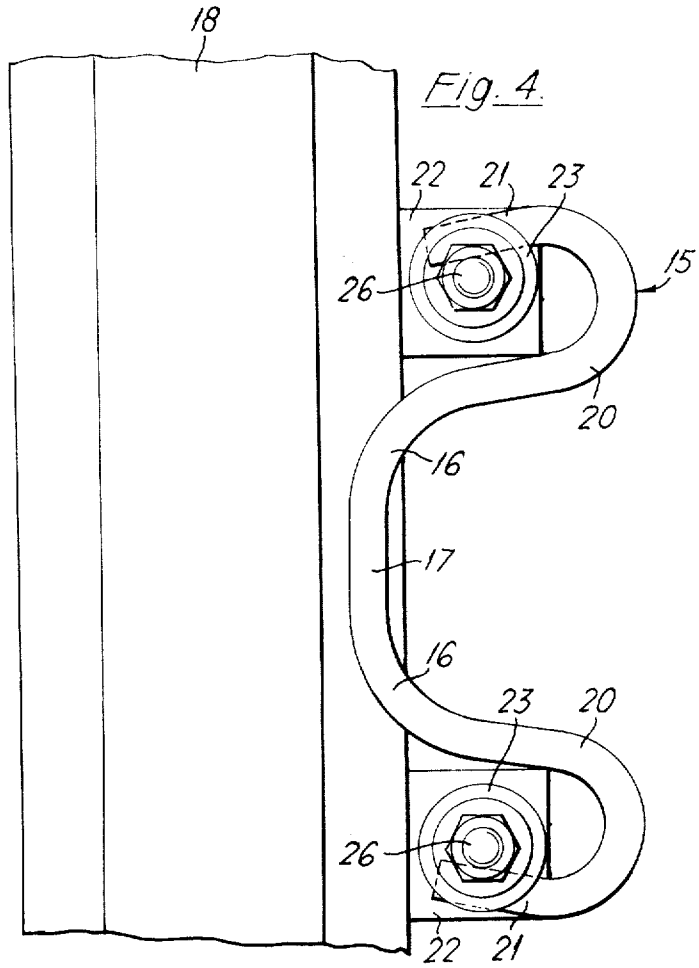

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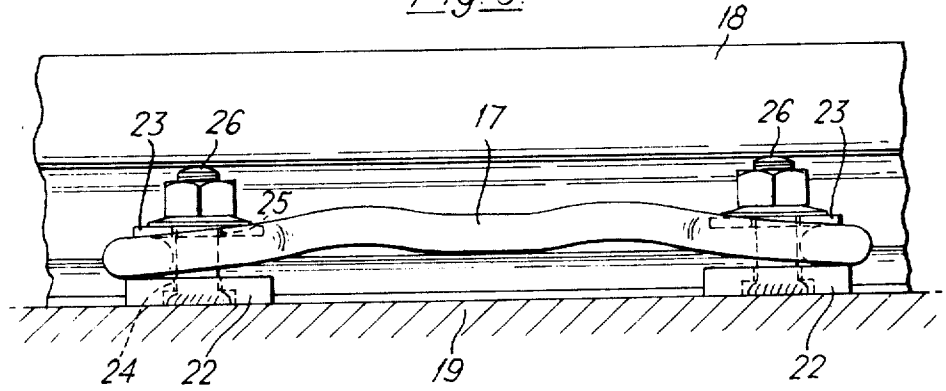
Fig. 4.

Fig. 5.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CLIP SUITABLE FOR USE AS A CRANE RAIL CLIP

FIELD OF THE INVENTION

This invention relates to a clip, suitable for use as a crane rail clip, and to a device comprising such a clip.

Crane rails are welded into a continuous length in order to eliminate high impact forces when a wheel passes over an ordinary butt joint. The crane rails behave as continuous beams and any deflection of a crane girder which supports the rails will cause differential longitudinal movement of the rail. Forces transmitted to the rails as a result of acceleration and deceleration of the crane wheels over the rails will also give rise to longitudinal movement of the rails. Surge forces giving rise to lateral movement of the rails are caused by cross travel of the crane crab and load, or steering forces applied to the side of the head of the rail by the flanges of the wheels or by steering rollers.

PRIOR ART

One known type of crane rail fixing device comprises a clip in the form of an integral piece of sheet steel having a base portion adapted to be bolted on to the upper surface of the girder or other support, and a spring tongue portion which extends from the side of the base portion remote from the rail and curves back over the base portion and then downwardly so that its extremity is adapted to engage the flange of the rail. This device is expensive and may not permit longitudinal structural and expansion movements of the rail.

Another known device comprises a clip made of a sheet of spring steel. The clip has a substantially planar portion provided with an aperture for receiving with clearance a stud which is welded to a girder on which a rail is to be mounted. The clip has a curved end portion the extremity of which is intended to engage a flange of a rail.

In order to clamp a rail on a girder, a base plate through which the stud passes is urged against the toe of the rail by means of a cam enabling variable adjustability of the position of the base plate on the girder. A nut is then screwed onto the stud so that the substantially planar portion of the clip is clamped onto the base plate and so that the extremity of the curved end portion exerts pressure on the flange of the rail. This device has the disadvantages that the clip may work loose and the extremity of the curved end portion of the clip has a tendency to dig into the flange of the rail thereby preventing longitudinal structural and expansion movements of the rail.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a clip, suitable for fixing a rail on a girder, which is capable of being used so that problems of longitudinal and lateral movement referred to above can be overcome or at least mitigated in relatively inexpensive manner.

It is another object of the invention to provide a device comprising such a clip, the device being adjustable so that misalignment of the rail can be corrected.

According to one aspect of the present invention there is provided a clip suitable for use as a crane rail clip, of bar spring steel, which comprises a continuous member having two end portions, by which the clip is, in use to be retained on a first member, and a central portion, by which a force is, in use, to be applied to a second member, the end portions both being on the same side of a plane through the centre of the central portion not passing through either end portion and the end portions both being directed towards the said plane through the centre of the central portion. The bar spring steel member has first arcuate portions extending upwardly from the central portion and diverging outwardly with respect to one another, and second arcuate portions contiguous to the first arcuate portions converging inwardly towards, or diverging outwardly from, one another. The end portions are contiguous to the second arcuate portions.

According to another aspect of the present invention there is provided a device for fixing an elongate member on a support member, which device comprises a clip according to the preceding paragraph, a base plate defining an aperture, a stud which in use of the device, is received in the aperature, a clamping plate defining an aperture which receives the stud, and means clamping the end portions of the clip between the clamping plate and the base plate.

Conveniently, the or each base plate is in the form of a polygon and the aperture is eccentrically disposed in the or each base plate. Desirably, the clamping means comprises a nut which can be screwed down on the stud which is, in use, secured to the support member, and a conical disc spring which is disposed between the nut and the clamping plate.

Such a device, when used to fix a rail on a girder, permits movement of the rail in the longitudinal direction so that structural and expansion movements of the rail are permitted. However, the clip offers substantially no resistance to surge forces exerted laterally of the rail, these forces being resisted by the base plate which can, if necessary, be welded to the girder after final alignment of the rail.

For a better understanding of the present invention, and to show how the same may be carried into effect reference will now be made, by way of example, to the accompanying drawings in which:

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** shows a plan view of part of a device, in accordance with the present invention, being used to clamp a rail on a girder,

FIG. **1***a* is a top view of the base plate of the device,

FIG. **2** shows a side elevational view of the device of FIG. **1**,

FIG. **3** shows a rear elevational view of the device of FIG. **1**,

FIG. **4** shows a plan view of part of another device, in accordance with the present invention, being used to clamp a rail on a girder, and

FIG. **5** shows a rear elevational view of the device of FIG. **4**.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to FIGS. **1** to **3** of the drawings, the device comprises a clip **1** of bar spring steel, such as **15** mm diameter EN **29** spring steel. The clip **1** comprises arcuate portions **2** which diverge outwardly from a central portion **3** of the bar. The central portion **3** is adapted to engage the flange of a rail **4** and urge the same against a girder **5**. The arcuate portions **2** extend upwardly from the central portion **3** and are continued by other arcuate portions **6** which converge inwardly towards one another, extend downwardly and are continued by end portions **7** of the clip. The end portions

of the clip 1 extend towards the central portion 3 of the bar and preferably, the end portions 7 converge towards one another.

The end portions 7 of the clip 1 rest on a square, steel base plate 8 having a circular aperture 9 for receiving a stud 10 which is welded to the girder 5. The aperture 9 has a portion of increased diameter for receiving weld metal which welds the stud 10 to the girder 5. The aperture 9 is preferably eccentrically disposed in the base plate 8, as shown in FIG. 1a.

A steel clamping plate 12 which is a hardened circular washer is disposed above the clip 1 in contact therewith.

The device further comprises a nut 13 which can be screwed onto the stud 10, above the clamping plate 12, in order to clamp the clip 1 between the clamping plate 12 and the base plate 8. A conical disc spring 14 is disposed between the nut and the clamping plate. The conical disc spring 14 has predetermined load deflection characteristics so that, when the spring is collapsed on tightening the nut 13, a predetermined stress is exerted on the clamping plate 12 and the nut 13 is retained absolutely tight.

In order to prevent the clip 1 from turning on the base plate 8, the base plate is preferably provided with grooves 8', 8'' for receiving the end portions 7 of the clip 1. Several pairs of grooves 8', 8' and 8'', 8'' may be provided in accordance with the fixed adjustability of the position of the base plate 8 as will be described hereafter. Alternatively, the undersides of the end portions of the clip 1 may be serrated in order to prevent the clip from turning.

In use of the device in accordance with the present invention for fixing a rail 4 on a girder 5, the central portion 3 of the bar of the clip is arranged to overlie the base flange of the rail which is disposed on the girder. The end portions 7 of the clip 1 lie on the base plate 8 and the stud 10 which is welded to the girder 5 extends through the aperture 9 in the base plate 8 which may be welded to the girder 5 after final alignment of the rail 4. The base plate 8 is disposed with one edge adjacent the base flange of the rail 4. If the aperture is eccentrically disposed in the base plate, misalignment of the rail 4 can be corrected by selecting an appropriate edge of the base plate 8 to lie adjacent the rail. In this way, rails on existing supports which are out of line due to settlement can be realigned. Rails of a large ship building crane, for example, could be up to 100 metres apart, with a required tolerance of ± 2 mm and thus it will be appreciated that some adjustment of the rails may be necessary. By varying the dimensions of the base plate 8, or by increasing the number of sides thereof, various degrees of misalignment of the rails can be corrected. The dimensions of the base plate are preferably such that a minimum variation of 6 mm in the alignment of a rail can be achieved by rotating the base plate such that different sides thereof lie adjacent the base flange of the rail.

The nut 13 is then tightened on the stud 10 thereby to collapse the disc spring 14 and clamp the clip 1 between the clamping plate 12 and the base plate 8. As the nut 13 is tightened, the clip 1 is deflected and the central portion 3 of the bar of the clip exerts a load on the base flange of the rail 4. As an example, if the clip is made of a bar of 15 mm diameter EN 29 spring steel, the length of the central portion 3 of the bar in contact with the base flange of the rail may be 25 mm and the toe load exerted on the base flange may be three-quarters of a ton.

Referring now to FIGS. 4 and 5 of the drawings, the device shown is exerting a larger toe load of, for example, one and a half tons on the base flange of a rail. The device comprises a clip 15 of bar spring steel having a diameter greater than 15 mm. The clip 15 comprises arcuate portions 16 which diverge outwardly from a central portion 17 of the bar. The central portion 17 is adapted to engage the rail 18 and urges the same against the support 19. The arcuate portions 16 extend upwardly from the central portion 17 and are continued by arcuate portions 20 which diverge outwardly relative to one another, extend downwardly and are continued by end portions 21 of the clip which extend towards the rail 18. The device comprises two base plates 22 and two clamping plates 23 for clamping respective end portions 21 of the clip. Each base plate 22 and clamping plate 23 has an aperture 24, 25, respectively, for receiving a respective stud 26 which is welded to the support 19.

It will be appreciated that instead of receiving a stud which is welded to a support, a clamping plate and a base plate of a device in accordance with the present invention may be adapted to receive a bolt which is fixed to the support.

Rails which are fixed on a girder by means of a device in accordance with the present invention are preferably "soft mounted" by means of a resilient pad, for example rubber disposed between the rails and the support.

What I claim is:

1. A crane rail clip, which comprises a continuous member of bar spring steel having two end portions by which the clip is, in use, to be retained on a first member, and central portion by which a force is, in use, to be applied to a second member, the bar spring steel member having first arcuate portions extending upwardly from the central portion and diverging outwardly with respect to one another, second arcuate portions contiguous to the first arucate portions, the second arcuate portions extending downwardly and converging inwardly towards one another, and the end portions being contiguous to the inwardly converging second arcuate portions, the end portions extending generally towards, and being disposed on the same side of, a plane passing through the center of the central portion but not through either end portion, and the outwardly diverging first arucate portions extending from the central portion on the same side of the plane.

2. A device for fixing the second member on a support member, which device comprises a clip according to claim 1, a base plate defining an aperture, a stud which, in use of the device, is received in the aperture, a clamping plate defining an aperture which receives the stud, and means clamping the end portions of the clip between the clamping plate and the base plate.

3. A device according to claim 2, wherein the base plate is a polygon and the aperture is eccentrically disposed in the base plate.

4. A device according to claim 2 wherein the base plate is provided with a plurality of pairs of grooves, each pair being adapted to receive the end portions of the clip.

5. A device according to claim 2, wherein the clamping means comprises a nut which can be screwed down on the stud which is, in use, secured to the support

member, and a conical disc spring which is disposed between the nut and the clamping plate.

6. A crane rail clip, which comprises a continuous member of bar spring steel having two end portions by which the clip is, in use, to be retained on a first member, and a central portion by which a force is, in use, to be applied to a second member, the bar spring steel member having first arcuate portions extending upwardly from the central portion and diverging outwardly with respect to one another, second arcuate portions contiguous to the first arcuate portions, the second arcuate portions extending downwardly and diverging outwardly away from one another, and the end portions being contiguous to the outwardly diverging second arcuate portions, the end portions extending generally towards, and being disposed on the same side of, a plane passing through the center of the central portion but not through either end portion, and the outwardly diverging first arcuate portions extending from the central portion on the same side of the plane.

7. A device for fixing the second member on a support member, which device comprises a clip according to claim 6, two base plates each defining an aperture, two studs each of which is, in use of the device, received in a respective aperture, two clamping plates each defining an aperture which receives a respective stud, and means clamping the end portions of the clip between a respective clamping plate and base plate.

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