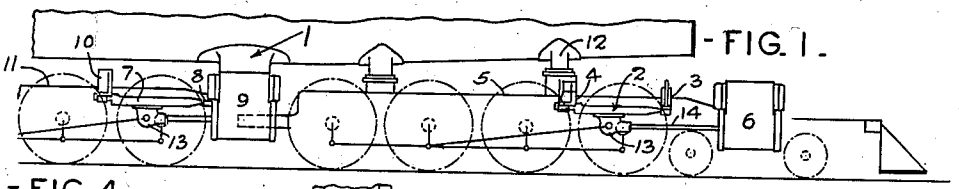
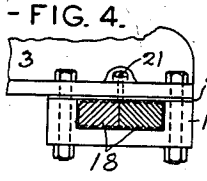
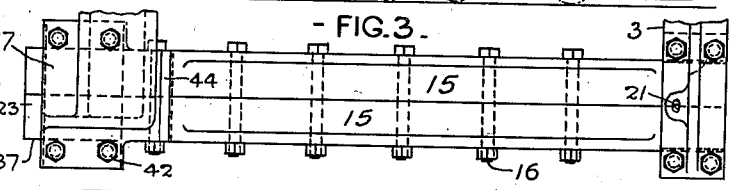
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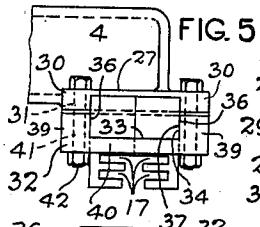
LOCOMOTIVE CROSSHEAD GUIDE

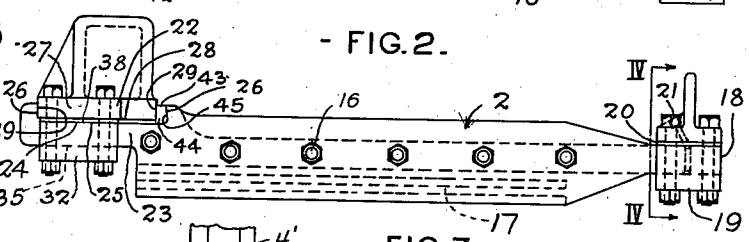
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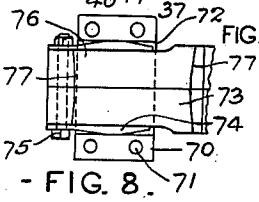


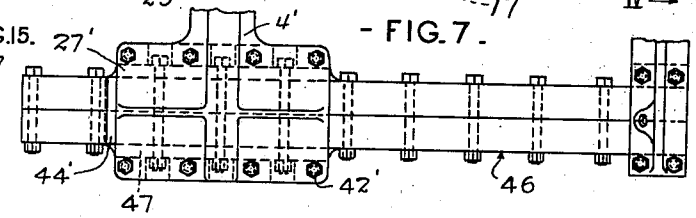


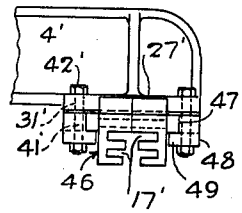


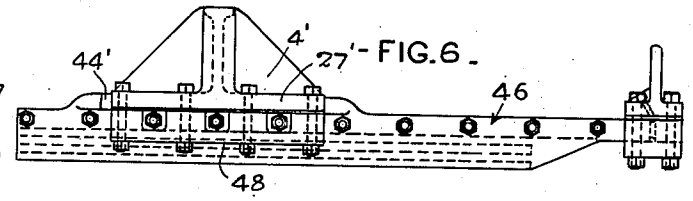


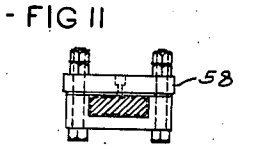


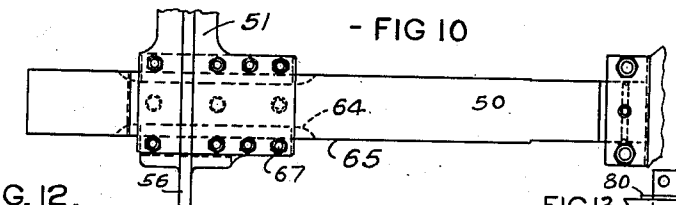


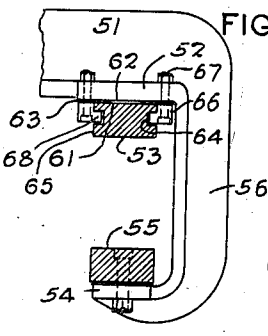


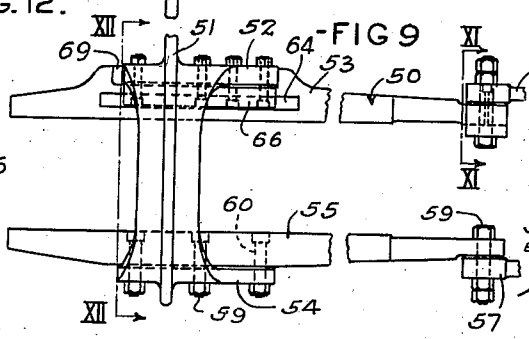


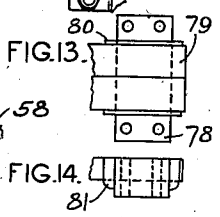












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Patented Feb. 2, 1943 2,310,159

UNITED STATES PATENT OFFICE

2,310,159

LOCOMOTIVE CROSSHEAD GUIDE

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Application September 9, 1941, Serial No. 410,134

4 Claims. (Cl. 308—3)

This invention relates to locomotive crosshead guides and more particularly to connections therefor.

It is a common practice to secure crosshead guides to locomotives by reamed and fitted bolts at one end and a sliding connection, providing for longitudinal expansion and contraction, at the other end, the bolts passing through bolt holes formed in the crosshead guide and its attachments. These bolts holes and the bolts, during the forming thereof, often develop small marginal cracks or fractures which, due to service conditions such for instance as forces transmitted to the guide by the crosshead, sometimes progress in size to an extent to fracture the guide, its attachments, or the bolts.

It is an object of the present invention to provide an improved crosshead guide and connection therefor eliminating all fracture-producing bolt fastenings and securing the crosshead guide to the locomotive by a completely clamped construction.

It is a further object to provide, in the aforementioned completely clamped construction, sufficient adjustability laterally to correct any lateral expansion misalignment resulting from the heat of the steam in the cylinders.

Referring to the drawing forming a part of this application, Figure 1 is a fragmental diagrammatic side elevation of an articulated locomotive embodying the present invention; Fig. 2 is an enlarged side elevation of the crosshead guide and associated parts; Fig. 3 is a plan view of the structure of Fig. 2, parts being broken away; Fig. 4 is a section on the line IV—IV of Fig. 2, a part being broken away; Fig. 5 is an end view, taken from the left of Fig. 2, a part being broken away; Fig. 6 is a view similar to Fig. 2, showing another embodiment of the invention; Fig. 7 is a plan view of the structure of Fig. 6, parts being broken away; Fig. 8 is an end view, taken from the left of Fig. 6, parts being omitted and a part being broken away; Fig. 9 is a view similar to Fig. 2, showing another embodiment, parts being broken away; Fig. 10 is a plan view of the structure of Fig. 9, parts being broken away; Fig. 11 is a section on the line XI—XI of Fig. 9; Fig. 12 is a section on the line XII—XII of Fig. 9, a part being broken away; Fig 13 is a fragmental plan of the front end portion of a crosshead guide and clamp, showing a modification employing lateral shims; Fig. 14 is a side elevation of the structure of Fig. 13; and Fig. 15 is a fragmental plan of the rear end portion of a crosshead guide and clamp, showing a modification employing lateral shims.

Referring to the drawing, the locomotive, indicated generally by the reference numeral 1, is of the articulated type. The invention, however, is applicable to other types of locomotives. The locomotive 1 includes a forward crosshead guide 2 secured to a forward bracket 3 and a rear bracket 4, both extending transversely of the locomotive and being mounted on the forward frame 5, to which is also secured the cylinders 6. The frame and cylinders form part of the locomotive under-structure.

The articulated type of locomotive requires additional crosshead guides for the rear engine and while this feature is not important in understanding the present invention, Fig. 1 shows a rear crosshead guide secured to the rear cylinder, the rear crosshead guide 7 being secured at its forward end to a cylinder head lug 8 of the rear cylinder 9, and at its rear end to a rear bracket 10 extending transversely of the locomotive and being mounted on the rear frame 11. Brackets 3 and 10 extend across the locomotive from side to side thereof. Bracket 4, being in line with the front boiler support 12, extends laterally from the adjacent side frame member. Crossheads 13 slide in the guides and are connected to the power pistons (not shown) of the cylinders by piston rods 14.

As opposite sides of the locomotive are similar and as crosshead guides 2 and 7 are substantially similar, only a description of the crosshead guide 2 at the right hand side of the locomotive will be given.

Crosshead guide 2 is better shown in Figs. 2 to 5. It is formed of two longitudinally extending parts 15 secured together by bolts 16. The bolt holes for bolts 16 are not injurious to the guide because no opposing forces are applied between bolts 16 and the guide due to power piston thrusts. Crosshead guide 2 is of the multiple bearing type providing a plurality of crosshead supporting guideways 17. Its forward end 18 is rectangular in cross section and is secured to bracket 3 by a channel-shaped clamp 19. Clamp 19 provides a sliding connection permitting expansion and contraction of the crosshead guide, due to frictional heat, without distortion thereof, the crosshead guide at its other end being rigidly secured to the under-structure as will presently appear. A shim 20 and lubricating orifice 21 for the connection are provided at the front end of the crosshead guide.

The present invention provides an improved

connection for the rear end of the crosshead guide. The connection 22 of Figs. 1–5 includes the rear end portion 23 of the crosshead guide, which portion 23 is channel-shaped, the channel 24 extending transversely of the crosshead guide and having a bottom face 25 directed upwardly, and side faces 26. Portion 23 forms an intermediate portion of connection 22. Bracket 4 has a bottom rectangular plate 27 formed integrally therewith. Plate 27 has a flat bottom face 28 opposite face 25 and vertical end faces 29 opposite side faces 26. Plate 27 extends beyond each side of the crosshead guide providing flanges 30 containing orifices 31.

The intermediate portion 23 is secured to the bracket 4 by a channel-shaped clamp 32, the bottom face 33 of the channel 34 of the clamp 32 engaging the bottom face 35 of the portion 23, and the side faces 36 of the channel 34 engaging side faces 37 of the portion 23. Plate 27 and clamp 32 form upper and lower outer portions respectively of connection 22. A shim 38 is disposed between faces 25 and 28.

The sides 39 of the clamp 32 serve as fillers and instead of being made integral with the plate-like portion 40 of the clamp may be made separate and the plate-like portion extended therebeneath, or they may even be made integral with the plate 27, in which case the shim 38 would only extend across the guide. In some cases the fillers may be dispensed with, but they are highly desirable as producing a better clamping effect and preventing lateral movement of the guide relative to the bracket 4 at the connection 22.

Orifices 41 are formed in the clamp 32 and shim 38 and bolts 42, extending through orifices 31 and 41, rigidly secure clamp 32 to bracket 4.

It will be noted that the rear end portion 23 (connection 22 intermediate portion) of the crosshead guide is imperforate, orifices 31 and 41 being disposed laterally beyond the margins of the crosshead guide connection intermediate portion. Thus the bolts 42 are free from the crosshead guide, the elimination of the aforesaid fractures in the crosshead guide, its attachments and bolts being thereby assured. These bolts 42 do not receive the forces imparted from the crosshead to the crosshead guide, as will presently appear.

Channel 24 is of greater width than plate 27, providing a space 43 adjacent the forward end face 29. The forward side face 26 of the channel 24 extends obliquely downwardly and forwardly, and a key 44, having a forward face 45 complementary to the forward face 26, is driven into the space 43 so as to rigidly secure the crosshead guide to the bracket 4 against longitudinal movement relative thereto. The rear face of the key in effect forms one side face of the channel 24 which engages the adjacent end face of the plate 27. Thus the crosshead guide 2 is rigidly secured to bracket 4 at its rear end and slidably secured to bracket 3 at its forward end. Longitudinal thrusts imparted to the crosshead guide by the crosshead during operation of the locomotive will therefore fall on plate 27 and not on bolts 42. Danger of shearing off the connection bolts is therefore eliminated as well as fractures of the portions of the connection 22.

Shims 20 and 38 provide a simple means of adjusting the crosshead guide vertically to insure proper alignment of the crosshead guide with the crosshead sliding therein, which adjustment may become necessary, for example, due to wear of the crosshead and guideways.

The crosshead guide 46 of Figs. 6–8 is similar to the guide 2 and similar parts will therefore be designated by like numerals with an accent added, only sufficient description being given of this embodiment to indicate how it differs from the embodiment of Figs. 2–5. The bracket 4′ is wider than the bracket 4 and is disposed over the guide 46 a short distance from the rear end thereof, and the key 44′ is at the rear of the bracket 4′. The crosshead guide 46 has, adjacent the bracket 4′, laterally extending tongues or flanges 47, these flanges 47 with the adjacent part of the guide 46, forming the intermediate portion of the connection securing the guide 46 to the bracket 4′.

A longitudinally extending clamp 48 is disposed at each side of the guide 46, one adjacent each flange 47. Each clamp 48 has a flange 49 providing a face beneath and in overlapping supporting relation with the adjacent flange 47. Clamps 48 are secured to plate 27′ of bracket 4′ by bolts 42′, the orifices 31′ and 41′ for the bolts being formed entirely in the plate 27′, and clamps 48 exterior of the lateral margins of the guide 46. Plate 27′ forms the outer portion of the connection and clamps 48, taken together, form the outer lower portion of the connection. The clamps 48 may be made each in two parts in a similar manner as was mentioned in connection with clamp 32. The clamps 48 perform the function and obtain the advantages of clamp 32, and no further description thereof is deemed necessary.

The crosshead guide 50 of Figs. 9–12 is of the alligator type whereas the previously described crosshead guides are of the single bar type. The bracket 51 provides an upper portion or plate 52 for the top bar 53 of the guide, and a lower portion 54 for the bottom bar 55 of the guide, the portion 54 being supported by a depending arm 56. The bottom bar 55 is rigidly connected to bracket 51 at its rear end and to cylinder head lug 57 at its forward end in the usual manner, and bar 53 is slidably secured to cylinder head lug 58 at its forward end in a well-known manner, as shown in Fig. 11. The bolts 59 securing bar 55 to bracket 51 and lug 57 pass through orifices 60 formed in the bar 55, as it has been found that progressive fractures do not start at these orifices of the lower bar.

Bar 53 adjacent plate 52 is rectangular in cross section, providing a top face 61 opposite the bottom face 62 of plate 52 and spaced therefrom by a shim 63. Grooves 64 are formed in the side faces 65 of bar 53 below plate 52. Clamps 66, similar to clamps 48, are secured to the plate 52 by bolts 67. The flanges or tongues 68 of the clamps 66 are disposed in the grooves 64 and coact therewith to firmly secure bar 53 to bracket 51.

The connection securing bar 53 to bracket 51 is formed of an intermediate portion (the upper part of bar 53 adjacent grooves 64), an upper outer portion (plate 52), and a lower outer portion (formed by the two clamps 66).

The upper face of the bar 53 is channel-shaped and provided with a key 69 similar to the crosshead guide 46 of Figs. 6–8.

It is obvious that the advantages present in the first two embodiments as above set forth are also present in this third embodiment.

It will be seen, by a comparison of Figs. 2, 6 and 9, that the connections are, in principle, similar, the connection used in the embodiment of Fig. 6 differing slightly from the connection used in the embodiment of Fig. 2 to be applicable

to a crosshead guide having longer guideways 17', and the connection of Fig. 9 being substantially the same as the connection of Fig. 6 but applied to an alligator type of guide.

While the connections shown are each rigid longitudinally at the rear portion of the crosshead guide and the slidable connection is at the forward end, it will be understood that these may be reversed, although preferably, and according to usual practice, the slidable connection is at the forward end.

Furthermore, the invention is applicable to other single bar or similar two-bar crosshead guides than those having multiple guideways.

Where the crosshead guide is slidably connected at its forward ends to the cylinder head, as for instance the crosshead guide 7, it is desirable to provide means permitting the rear end of the crosshead guide to slightly turn in a horizontal plane to prevent binding thereof in its attachments when the cylinder expands or contracts laterally due to temperature changes thereof. Fig. 15 shows a means of providing for this angular movement. The clamp 70, which is provided with the bolt holes 71 for the bolts bolting it to the bracket (the bolts and bracket not being shown), is provided with a widened channel 72 for supporting the crosshead guide 73, thereby providing spaces each side of the guide. Lateral shims 74 having convexly shaped backs are disposed in these spaces. The shims are provided with orifices at portions extending rearwardly beyond the clamp 70 and the rearmost bolt 75 which secures the parts of the crosshead guide together passes through these orifices, securing the shims to the cross head guide.

The channel 76 formed in the upper face of the crosshead guide is provided with convexly-shaped side faces 77 for engaging the end faces of the bracket (not shown). This construction of convexly-shaped channel side faces permits the aforesaid slight turning of the rear end of the crosshead guide, thereby preventing binding.

Preferably the shims 74 will be given respectively a suitable thickness to align the crosshead guide with the cylinder in the position it assumes from lateral expansion due to the heat of the steam in the cylinder. In such a case when the cylinder cools and contracts laterally, the crosshead guide will be free to slightly turn about its rear end as aforesaid to compensate for this, the front end of the crosshead guide attachment to the cylinder being given sufficient tolerance to permit this turning without binding at the front end.

Similar provision may be made for the top bar 53 of the crosshead guide 50 except here the lateral shims will be used in the grooves 64, sufficient space being provided for this between the base of the grooves and the adjacent face of the flanges 63.

A somewhat similar provision may be made for aligning the crosshead guides 2 and 46 with their respective cylinders in their laterally expanded positions. Here the rear ends will be provided with lateral shims similar to the shims 74 except that they will be rectangular instead of having convexly-shaped backs. Such convex backs are not required as these crosshead guides are not secured to the cylinder.

The front ends of the crosshead guides 2 and 46 are also provided with lateral shims of suitable relative thicknesses to complete the alignment of the crosshead guides. Figs. 13 and 14 show a crosshead guide having a modified front end appropriate for either crosshead guide 2 or 46. Here a simple type of lateral shim is employed for accomplishing the aforesaid front end alignment. Similar to Fig. 15 the bracket and securing bolts are not shown. The clamp 78 for supporting the front end of the crosshead guide 79 is widened to provide spaces for the lateral shims 80. These shims are disposed in these spaces and extend at each end therebeyond, the extended portions having downwardly directed lips 81 which engage the adjacent sides of the clamp to prevent endwise displacement of the shims.

The rectangular shims and the shims of Figs. 13 and 14 may be used in any suitable type of crosshead guide that is not attached to the cylinder, and the shims of Fig. 15 may be used with any suitable type of crosshead guide that is attached to the cylinder. Also other types of shims may be employed for effecting alignment of the crosshead guide with the cylinder or if desired, for effecting slight horizontal turning of the rear end of the guide.

While there has been hereinbefore described approved embodiments of this invention, it will be understood that many and various changes and modifications in form, arrangement of parts and details of construction may be made thereto without departing from the spirit of the invention and that all such changes and modifications as fall within the scope of the appended claims are contemplated as a part of this invention.

The invention claimed and desired to be secured by Letters Patent is:

1. A crosshead guide device for a steam locomotive under-structure having a frame and a power cylinder, said device comprising a crosshead guide member; and two connections for supporting said guide member from said under-structure in longitudinal operative alignment with said cylinder, said connections being longitudinally spaced from each other, one of said connections permitting longitudinal movement of the adjacent portion of said guide member relative to said under-structure responsive to expansion and contraction, and the other of said connections having vertically aligned parts, clamping means supporting the lower of said parts and provided with inner longitudinal side faces opposed to outer longitudinal side faces provided on said lower part, and bolts disposed at said side faces of said lower part exteriorly thereof and extending through said clamping means and the upper of said parts tightly securing said clamping means and said parts together, one of said parts being provided with a channel and the other of said parts fitting within said channel, said lower part being formed as an integral portion of said guide member, said upper part being adapted to be rigidly secured to said under-structure, and said channel extending transversely of said guide member holding said guide member fixed against longitudinal thrusts.

2. A device as defined in claim 1, wherein the supporting of the lower part by the clamping means is effected by an integral portion of said clamping means extending transversely entirely across the bottom of the said lower part in supporting relation therewith.

3. A device as defined in claim 1, wherein the lower part is provided at its oppositely disposed longitudinal sides with longitudinally extending laterally projecting lips having longitudinal side faces forming part of the longitudinal side faces of said lower part, and the supporting of said lower part by the clamping means is effected by

lugs forming an integral part of said clamping means and supportingly engaging the bottom of said lips.

4. A device as defined in claim 1, wherein the inner longitudinal side faces constitute a pair of side faces, and the outer longitudinal side faces constitute another pair of side faces, the faces of one of said pairs being convex in a longitudinal direction, and the channel and the part fitting therewithin having each a pair of transverse side faces, each transverse side face of one pair being opposed to a transverse face of the other pair, the faces of one of said pairs of transverse faces being convex in a transverse direction.

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