J. T. McGARRY

WHEEL FLANGE AND RAIL LUBRICATOR

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Fig. 7.

Fig. 8.

INVENTOR.

BY

ATTORNEY.
WHEEL FLANGE AND RAIL LUBRICATOR

John T. McGarry, Cincinnati, Ohio

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My invention relates to apparatus for applying lubricant to the flanges of the wheels of railway rolling stock and thence to the rails on which they run, to reduce the wear of the flanges and rails and to afford easier traction; such apparatus being especially useful on curved tracks, wherein the friction and wear are especially severe at the outer rail of the curve. My present invention is particularly an improvement upon my invention set forth and claimed in my prior patent, No. 1,831,313, issued November 10, 1931.

Broadly, the object of my present invention is the same as that of my previous invention just referred to, in that I provide for guiding the wheel during its travel along an extent of rail wherein lubricant is to be applied, in such manner that the wheel flange is spaced an ample distance from the inner side of the rail to permit suitable lubricant-emitting means to be disposed in the best manner for applying the lubricant to the wheel flange, without exposing said means to wear or injury by the flange.

As distinguished from that prior invention, my object is to simplify the construction of such a device and to make it more reliable in operation; especially in respect of insuring that the means which determines the path of travel of the wheel shall be maintained in proper relation to the track rail on which the wheel travels and from which the flange is to be spaced as above mentioned.

Other objects will appear in the course of the following description, illustrated by the accompanying drawings, in which—

Fig. 1 is a plan view of one rail of a track, and parts of the cross ties thereof, showing a preferred example of my invention applied thereto, and also showing a car wheel in operative relation to the invention;

Fig. 2 is a side elevation of the same, parts being omitted for lack of space;

Fig. 3 is a vertical cross section of the track, showing both rails and portions of wheels on the respective rails and the axle connecting the wheels, the section being on the plane of the line 3—3 of Fig. 1;

Fig. 4 is a plan view of part of a track with a modification of my invention applied thereto;

Fig. 5 is an enlarged vertical cross section on the plane of the line 5—5 of Fig. 1;

Fig. 6 is a partial plan view corresponding to and on the same scale as the view in Fig. 5;

Fig. 7 is a cross section similar to Fig. 6, showing a second modification; and

Fig. 8 is a partial plan view of this modification.

In my prior patent I fully disclose and claim a lubricant reservoir with means for conducting lubricant therefrom up to the track rail. The reservoir is embedded below the top plane of the track bed and is provided with mechanism which is actuated by pressure of the wheel flange to force the lubricant up to the rail and wheel as the wheel passes the device.

As such a reservoir and the portions of the conduit and mechanism thereof below the top of the track bed are suited for the supply of the lubricant in the present invention, it seems sufficient to illustrate like reservoirs only diagrammatically herein, as dotted circles, in Figs. 1 and 4, and to show only the upper portions of the conduits 2 leading up from the reservoirs 1, as well as of the rods 3 for operating the reservoir mechanism of the character above mentioned with reference to said prior patent. Said patent also discloses and claims means for pumping air into the reservoir to facilitate the discharge of lubricant therefrom, which means is operated by means of an element depressed by the passing wheel flange; and such an element is represented as a rod 4 for each reservoir, only the upper parts of these being shown in Figs. 2, 5 and 7. Such pneumatic means, it will be understood, is not essential; and any one of lubricant-supplying or forcing devices other than that of said prior patent may be adapted for supplying lubricant in the present invention.

My prior patent mentioned sets forth a device in which, to guide the lubricant-receiving wheel for spacing its flange from the lubricant-receiving rail to admit the lubricant-emitting means without wear or damage from the wheel flange, a guide or guard rail is mounted adjacent to the opposite rail of the track and is engaged by the inner side of the wheel. The two wheels being rigidly connected by their axle, as a unit, this oppositely located guard rail will pull the pair of wheels axially away from the side of the track where the lubricant is to be applied; it being understood that the distance between the inner faces of the rails, or gauge, is always somewhat greater than the distance between the outer faces of the flanges of a pair of wheels. Thus the pair of wheels have some freedom of movement axially at all times. On curves it is the practice to increase the gauge of the rails over that on straight track. The lubricant is applied to the rail in the tangent approach to the curve, and it is feasible to similarly increase the gauge
of the rails in the approach. Such pulling of the pair of wheels away from the lubricant-receiving side of the track therefore permits a practicable lubricant-discharge means to be used, out of contact with the passing wheel flanges, if the proper relation of the oppositely located guard rail to the lubricant-receiving rail is maintained.

This maintenance, however, depends upon the securing of fastening of the guard rail to the track rail opposite the lubricant-receiving rail; usually by bolts that stretch and loosen under the impacts of side thrust of the guided wheels. Also, as the relation between the two rails at the opposite sides of the track is dependent upon their fastenings to the cross ties, usually of wood with the rails secured thereto by spikes, accurate installation for the required accurate guidance of the wheels is difficult, and if made sufficiently accurate may not be maintained so by the cross-tie connection.

My present invention provides for elimination of such inaccuracy, and for maintaining the accuracy, by confining the wheel-guiding structure entirely to the rail that is to be lubricated. This is accomplished by providing a wheel guiding element at the outer side of the rail that is to be lubricated. Also, preferably a second guiding element is provided along the inner side of the rail. In any case there is no necessity of applying any thing to the opposite track rail; and preferably the connection to the rail at the lubricating side is so made that there is no use of bolts or the like for such connection, which are liable to loosen and which require drilling or other cutting into the track rail. Also, the connecting means is made of such strength and stiffness, and with such rigid engagement with the track rail that the guide structure is practically unitary with the track rail and will not be materially displaced with relation thereto under the axial side thrusts of the wheels in either direction. Further, the structure is adapted for shop production, ready for track installation, as distinguished from assembly in the track, as is required in my previous invention also referred to. This has the added advantage of convenience for those who must install the devices on the tracks.

I have shown in Figs. 1, 2, 3, 5 and 6 a construction in which the guide elements and their connecting means are made integral, in longitudinally succeeding sections; the short device in Fig. 4 also being integral, but a single section only. In Figs. 7 and 8, instead of an integral casting, rails, which may be such rails as have been discarded as unfit for use as track rails, are used for the guide elements, and brackets thereon. The approach of the track rail is rigidly secured to the guide rails, preferably by welding. It will be understood that the construction in this example may be sectional, after the manner of the construction shown in Figs. 1, 2, 3, 5 and 6.

In the preferred construction, Figs. 1, 2, 3, 5 and 6, each section device is composed of three sections; the middle section 5 being straight and the end sections 5a and 5b having diverged ends on the guide elements to receive and guide the wheels into the space between the guide elements, after the manner of guard rails well known in the art.

The straight right webs join the two opposite guide elements together; in Figs. 1, 2, 3, 5, 5a or 5b, extending under the track rail and being fixed to the base thereof. Thus, in middle section 5, three such ribs or webs 6 connect the outer guide element 7 with the inner guide element 8; their transverse portions extending under the track rail 9 and engaging the bottom of the base 10 thereof. Lugs 11 and 12 project inward from the inner sides of the guide elements 7 and 8, respectively, engaging the adjacent edge portions of the base 10; these lugs being in the transverse vertical plane of the webs 6, and the lug 12 being continuous with the middle portion of said web 6, in each instance. The two guide elements 7 and 8 and the webs 6 and lugs 11 and 12 are preferably parts of one integral casting; as also are feet 13 fitting on the tops of the respective cross ties 14 of the track, and flanges 15 and 16, respectively, on the ends of the guide elements 7 and 8, at one end of the section, and extending laterally outward from the respective elements. At the opposite end of the section, one of the webs 6 has its face coincident with the ends of the elements 7 and 8, corresponding with the flanges 15 and 16 of the first mentioned end of the section.

The section 5a, seen at the right in Figs. 1 and 2, has two transverse webs connecting its outer guide element 7a and inner guide element 8a; the left hand web 6a corresponding to the webs 6 of the middle section 5 in every respect, the second web 6a', near the right hand end of the section 5a differing from the others only in being wider in accordance with the divergence of the end portions 7a' and 8a' of the guide elements, as before alluded to, and in having its tie engaging feet 13a at the left instead of at the right of the web. The left hand ends of the elements 7a and 8a have the flanges 15a and 16a, like the flanges 15 and 16 on the adjacent end of the middle section 5.

The section 5b forming the left end part of the device, as seen in Figs. 1 and 2, is similar to the right end section 5a just described, differing merely in that it is of formation inverse thereto and the right hand web 6b has its tie engaging feet 13b at the right, as the same as the feet 13b of the left end web 6b', which web 6b' connects the diverged parts 17b and 17b' of the guide elements.

This left end web 6 and these flanges 15b and 16b have openings which register when the guide elements of the sections are in alignment; and the flanges 15 and 16 and 15a and 16a likewise have openings registering when the guide elements of the middle and right hand sections register. Boats 17 through the registering openings hold the three sections rigidly together, preferably having lock washers 17' under their nuts 17'' as seen in Fig. 6.

The outer guide elements 1, 1a and 1b thus allied as a unit, extend a considerable distance above the horizontal plane of the top of the track rail head 9a, and are preferably of such depth throughout their lengths as to extend down close to the tops of the ties; this ample depth giving them strength, and their cross section being slanted inwardward and outward so that their lower edges clear the edge of the rail head 9a.

This cross sectional shape also adds to the strength of these elements, which must guide the wheel 18 by engagement with the outer face of the rail rim portion. These elements extend along the rail head 9a so close thereto as to cause the sections 18, 19 to travel with its flange 19 spaced a considerable distance inward away from the inner side of the rail head 9a.
The innerguide elements 8, 8a and 8b, aligned in their assembly as above explained, have their tops substantially in the plane of the top of rail head 9a; and they also are of such depth as to extend down close to the tops of the ties, and the lower portions of the elements are offset outwardly so that their lower edges clear the edge of the rail base 10; the depth and cross sectional formation giving them strength, to guide the wheel 18 by engagement with the inner face of the wheel rim portion. These elements extend along the rail head 9a, starting from the rail head 9a and extending inward therefrom to admit the wheel 18 easily between them and the outer guide elements, but sufficiently close thereto to prevent the wheel from using with its flange 19 an excessive distance from rail head 9a, for reasons to be explained.

As shown in Figs. 1 and 2, four lubricating devices are provided, at intervals along the guide structure; each comprising a nozzle casing receiving lubricant from a respective conduit 2 by operation of the reservoir mechanism understood according to the previous reference to my prior patent. One of these lubricating devices is shown in detail in Fig. 5; and it will be understood that the others are duplicates of it. As here seen, the lower edge of the inner guide element 8 has a recess 20 admitting the nozzle casing 21, the lower end of which has the conduit 2 leading up into it, so that the casing 21, curving around the edge of the rail base 10 toward the middle of the rail, is accommodated, to further extend upward, becoming much narrower transversely of the track and somewhat wider along the track, so that its top end forms a nozzle 22 standing closely along the inner side of the rail head 9a, with its top outlet and slightly below the plane of the top of said rail head 9a. Also, preferably, the inner wall 22' of this nozzle is not extended up as far as the outer wall 22'' thereof next to the rail head 9a. This results in the lubricant being discharged, not vertically, but over toward the wheel flange 19, in the form of a dab A, Fig. 5, which is directed into the throat 19' at the junction of the working face of the flange 19 with the tread 18' of the wheel 18, to pass toward the periphery of the flange 19 and not appreciably to pass onto the wheel tread 18'.

The nozzle casing 21 has ears 23 extending from its opposite sides along the inner guide element 8, to which these ears are secured by bolts 24 extending through the guide element 8 and through bosses 2' on the other side of the element 8, which seat the nuts 24' of these bolts. The nozzle casing thus is rigidly mounted, to maintain the location of the nozzle 22 with relation to the rail head 9a; yet without any attachment to the track rail 3. It will be seen that it is not necessary to mussulate this track rail 3 in any way; as the guide structure is fastened to the rail merely by extension around the edges of its base 10, and the lubricant discharge means is supported by the guide structure.

To lubricate the engaging surfaces of the outer guide element 7 and the wheel 18, a small tube 25 leads from the lower part of the nozzle casing 21 out under the rail 9 and guide element 7, up along the outer side of this guide element 7, and then into a socket 26 in a boss projecting out from the guide element 7, which socket is in the outer end of a passage 27 through the guide element 7, opening through the inner working surface thereof. The inner guide element 8 preferably is similarly lubricated through a tube 28 leading from the inner side of the nozzle casing 21 up into a socket 29 in a boss projecting from the inner guide element 8, which socket is the end of a passage 30 through guide element 8, opening on the working surface thereof which is engaged by the inner face of the wheel rim portion.

The arrangement just described has an advantage in addition to the primary one of lubricating the guide elements, in those cases where the curve of the track rail 32, or outer rail of which is to be lubricated, has a guard rail running along its inner side, as for example the sharp curves on elevated or under-surface railroads in cities. Portions of the lubricant supplied for the inner guide element 8 will be carried by the wheel 18 on its inner face, and spread on such a guard rail, so that both the main track rail and the guard rail of the curve are lubricated.

When the wheel 18 is guided by my device as above explained, the opposite wheel 18a being unitary with wheel 18 by connection of the axle 31, will travel with the wheel 18 at a distance 15a very close to the opposite track rail 32, as indicated in Fig. 3. It is preferable that this opposite flange 19a not be crowded against rail 32, in the interest of safety; and the outer guide element 7 is located accordingly. The inner guide element 8 thus takes the function that the opposite rail 32 would have in the absence of element 8, of limiting the departure of the wheel flange 19 from the rail head 9a. This is limited because, were the wheel 18 caused to travel with flange 19 an excessive distance in from rail head 9a, the wheel tread 18 would be raised most of the dab A of lubricant, instead of the throat 19', where the lubricant is most needed. It of course is not prohibitive to permit the opposite rail 32, coating with opposite flange 19a, to act as the limiting means, allowing the inner guide element 8 to be eliminated; the wheel 18 being allowed a little more axial play by increasing the gauge, with a little more allowance of discharge to the wheel tread 18'; and I wish it to be understood that such a modification is within the scope of my invention.

As indicated by the arrow in Fig. 1, the wheel is traveling to the left, entering the device, which leads toward the curve 33, the beginning of which is indicated past the left hand end of the device. The rods 3 are positioned to the right of the respective nozzles 22; being depressed by the wheel flange 19 just as the throat 19' of the flange starts over the nozzle 22. This results in dabbing the portion A of lubricant, understood to be of somewhat thick consistency, into the throat 19'. Each succeeding nozzle 22 will dab such a portion onto a succeeding segment of the flange throat; 19'; so that when the wheel 18 passes to the left out of the device, it will have at intervals around it, in the throat 19', such dabs of lubricant. Then, when the wheel 18 passes onto the curve 33, where it is no longer guided by the device, the gravitational action on the pair of wheels and their axle causes the wheel flange 19 to bear close to the rail 9, so that the throat 19' absorbs the dabs A of lubricant along the rail, from its inner upper corner down along the inner face of its head 9a a slight distance. The dabs thus become a continuous coating of lubricant along those areas of the rail where it is most needed, and of course also become continuous around in the throat 19', which is the area of the wheel.
where the lubricant is most needed. The lubricant is kept away from the tread 10 of the wheel, as fully as practicable, as it is thereby wasted, and also is a detriment if spread on the top of rail head 20, tending to cause slippage of locomotives or like motive apparatus.

It will be understood that the discharge mechanism of the reservoir 1, in each instance, may be so adjusted as to deliver portions A so nearly the right size that there is a minimum of waste of lubricant. My present invention further contributes to this attainment by insuring that the nozzle 22 will not be worn or distorted, so that it will afford a certain required outlet capacity and thus facilitate the exactness of the discharge adjustment.

The rods 3 are bent so that their lower parts pass the edge of the rail base 10 and their upper ends are in the path of the wheel flange 19, as best seen in Fig. 5. Also, as seen in Figs. 5 and 6, lips 34 preferably are cast on the inner guide element 8, straddling the upper end part of rod 3, with their ends bent partly around the rod, forming a guide for the rod 3. It will be understood that each rod 3, associated with the other nozzles 22 and tube 20 and 26, has the arrangement and guidance just described. Although not shown, since it is of minor importance with my present invention, such formation and guidance may be provided for the rods 4, before mentioned as operating pneumatically and for forcing the lubricant from the reservoirs 1, as described in my prior patent mentioned.

The example of Fig. 4 is useful where a limited amount of lubrication is only required, as at switch turn-outs and the like. Such a short structure may be one casting 35, with the end webs 36 connecting the outer guide element 37 and the inner guide element 38, by extension under rail 39; these webs being understood to fit around the rail base 40 in the manner of the webs previously described, with lugs 35a and 36a engaging over the edge portions of rail base 40. Feet 37c and 38c, understood to extend from the lower edges of the guide elements 37 and 38, respectively, serve to attach the structure to the cross ties 14. The arrangement of the nozzle 22, guide element lubricating tubes 25 and 26, and operating rods 3 and 4 will be understood to be substantially that of the previous example.

In the modification of Figs. 7 and 8, rails 41 and 42 form the outer and inner guides, respectively, and are welded to the upper ends of brackets 43 of C-shape, which straddle under the rail 9, with lugs 44 and 45 engaging over the edge parts of rail base 10, as do the web lugs of the first example. The nozzle casing 46 has ears 47 secured by bolts 48 to an edge part of the base of the rail forming the inner guide 42, and its nozzle 49 projects upward beside the rail head 50, and it has tubes 50 and 51 leading to passages 52 and 53 through the heads of the guide rails 41 and 42, respectively. Each bracket has feet 44 to engage the top of the tie 14. The operating rod 3 is guided in a hole in the inner guide rail part 40, and its upper part is bent to lie in the path of the wheel flange 19, other parts of the wheel being numbered as in the first example; and the device being understood to operate as described in connection with that example. Only one bracket 43 is shown, but it will be understood that the plurality of brackets would be arranged substantially as are the webs of the integral cast structure of the first example. The entire structure may be continuous from end to end, or sections may be made and the other ends suitably secured together at their abutting ends.

In any of the examples, the device is applied to the rail by sliding it onto one end thereof and therealong to the desired location, while the rail is properly laid on the track, after which the rail is lowered and secured to the ties by the spikes 14a at those ties not under the device, and by spikes 14b through feet 13, 13a, 13b, or 37c and 38a, or 54, as the case may be. With the guide structure made up of sections, as the sections 5a and 5b of Figs. 4, 7, 8, and 9, the middle section 5 is first slid on to the rail base, to a place previously marked on the rail for correct location; then the end sections 5a and 5b are slid on until they abut the middle section 5. The sections then are bolted together before lowering the rail and spiking as just described. It will be understood that the parts may fit the rail loosely enough to be slid or driven along it, especially if a suitable lubricant is applied to the rail base 10; yet the parts will not be so loose that the rail will not be properly supported. The guide elements 41 and 42, having sufficient firmness and accuracy for the purpose of my invention, and for safety. It may be considered that my guide elements take the end thrust of the wheels, relieving the track rail; and that this thrust is only that of the two wheels of the axle, not that of the load on the wheels, as is the case when the wheels are traveling on the curve.

The castings in any of the examples, as the integral guide and web construction of Figs. 1 to 6, inclusive, or the brackets for the guide rails in Figs. 7 and 8, are preferably of high strength alloy steel, such as is used in track appliances successfully, for other purposes. The guide structure thus may be amply strong without excessive weight. The formation of the recesses that receive the rail base, the webs or brackets, may be by simply boring and hand fitting to a model rail base in the shop; or these recesses may be milled or broached to shape for more exact fitting to the track rail.

It will be understood that where there is two-way traffic such as the 25 and 26, and operating rods 3 and 4 will be understood to be substantially that of the previous example. In a combination of the character described, including a track rail and a device disposed at the inner side of the head of the track rail to emit lubricant near said inner side, and including lubricant supply means operative coincident with passage of a wheel over said device to cause emission of lubricant on said base, and an upper part of the wheel guiding means for so guiding a flanged wheel that the normally track-rail-engaging side of the flange of the wheel, during said passage, is spaced from the track rail sufficiently to prevent damaging contact of said flange with said device, but not that the plurality of brackets would be arranged substantially as are the webs of the integral cast structure of the
said track rail, as to be guidingly engaged by a rim portion of the wheel while said flange of said wheel is receiving the lubricant.

2. A combination as set forth in claim 1, in which the therein mentioned guiding means comprises a guide element along the outer side of said track rail, engaging the outer side of the therein mentioned wheel rim portion.

3. A combination as set forth in claim 1, in which the therein mentioned guiding means comprises a guide element along the outer side of said track rail engaging the outer side of the therein mentioned wheel rim portion, and including a second guide element along the inner side of said track rail, guidingly engaging the inner side of the therein mentioned wheel rim portion.

4. A combination as set forth in claim 1, in which the therein mentioned guiding means comprises a guide element along the outer side of the track rail engaging the outer side of the therein mentioned wheel rim portion, and including means receptively related to the lubricant supply means and so disposed as to permit portions of the lubricant to said guide element in an area thereof engaged by the therein mentioned wheel rim portion.

5. A combination as set forth in claim 1, in which the therein mentioned guiding means comprises a guide element along the outer side of the track rail engaging the outer side of the therein mentioned wheel rim portion, and including a second guide element along the inner side of said track rail, guidingly engaging the inner side of the therein mentioned wheel rim portion, and including means receptively related to the lubricant supply means and so disposed as to permit portions of the lubricant to the guide elements along the outer and inner sides of the track rail in an area of each engaged by the wheel rim portion.

6. A combination as set forth in claim 1, including means comprising a member unitary with the guiding means and having unitary parts fitting closely under and around the inner and outer base flanges of the track rail against top and bottom areas of said flanges, in substantially rigid relation to the rail.

7. A combination as set forth in claim 1, in which the therein mentioned guiding means comprises a guide element along the outer side of the track rail engaging the outer side of the therein mentioned wheel rim portion, and including a second guide element along the inner side of said track rail, guidingly engaging the inner side of the wheel rim portion, and including means comprising members unitary with the respective guide elements and with each other, and having unitary parts fitting closely around the inner and outer base flanges of the track rail against top and bottom areas of said flanges, in substantially rigid relation to the rail.

8. A combination as set forth in claim 1, in which the therein mentioned guiding means comprises a guide element along the outer side of said track rail guidingly engaging the outer side of the wheel rim portion, and including means comprising a member unitary with the guide element and having unitary parts fitting closely under and around the inner and outer base flanges of the track rail against top and bottom areas of said flanges, in substantially rigid relation to the rail, and extensions rigidly unitary with the guide element to engage a cross tie that supports the track rail and to be secured to said cross tie.

9. As a guiding device for guiding a flanged wheel relatively to a track rail, to space the wheel flange from the rail for the purposes set forth, a plurality of guide elements arranged end to end along a side of the rail, means fixing said elements together at their meeting ends, members rigidly unitary with said guide element, extending under the track rail, and means rigidly unitary with said members closely engaging top and bottom areas of the respective base flanges of the rail, thereby substantially rigidly fixing said members around the base of said rail.

10. As a guiding device for guiding a flanged wheel relatively to a track rail, to space the wheel flange from the rail for the purposes set forth, a plurality of guide elements arranged end to end along a side of the rail, means fixing said elements together at their meeting ends, members rigidly unitary with the respective guide elements, extending under the rail, and means rigidly unitary with said members closely engaging top and bottom areas of the respective base flanges of the rail, thereby substantially rigidly fixing said members around the base of said rail.

11. As a guiding device for guiding a flanged wheel relatively to a track rail, to space the wheel flange from the rail for the purposes set forth, a plurality of sections, each comprising guide elements along opposite sides of the rail, said sections being arranged end to end along the rail, means fixing said sections together at their meeting ends, members rigidly unitary with the opposite guide elements of each section, extending under the rail, and means rigidly unitary with said members closely engaging top and bottom areas of the respective base flanges of the rail, thereby substantially rigidly fixing said members around the base of the rail.

12. A guiding device as set forth in claim 9, including means associated with the respective members that are fixed around the base of the rail, adapted to be fixed to respective cross ties on which the rail is supported.

JOHN T. MCGARRY.