April 17, 1956 A. SCHEUCHZER ET AL 2,741,883

APPARATUS FOR RECTIFYING THE RAILS OF RAILROAD TRACKS

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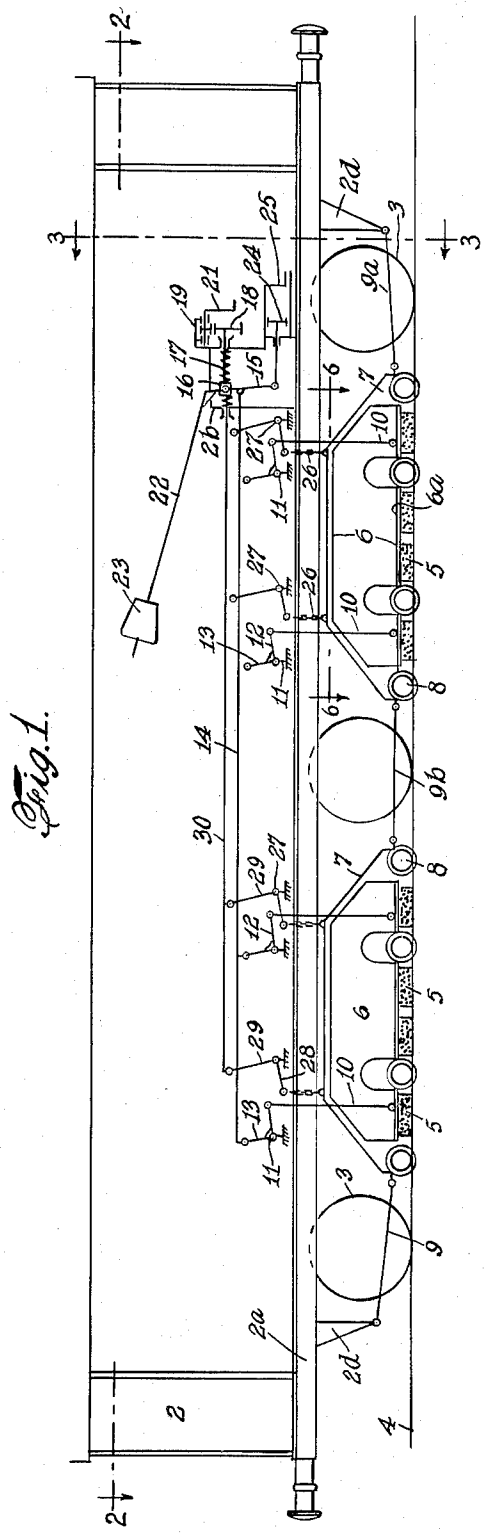


Fig. 1.

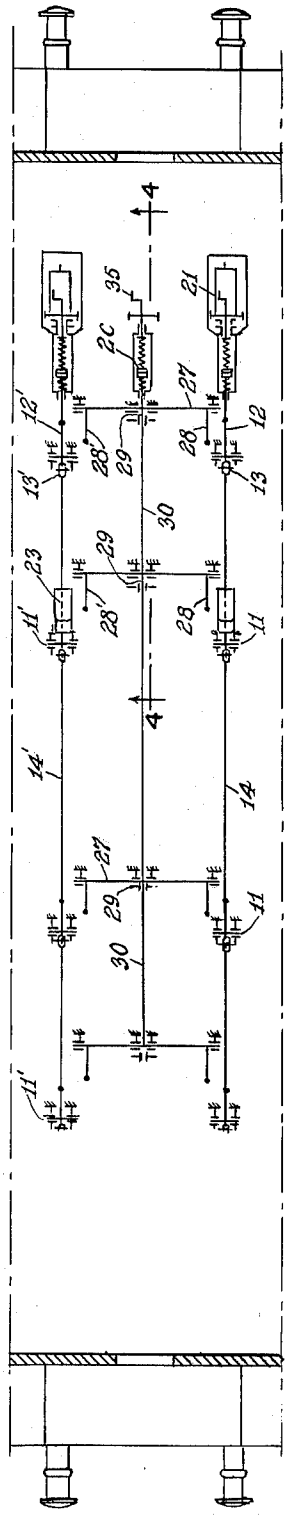


Fig. 2.

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Fig.3.

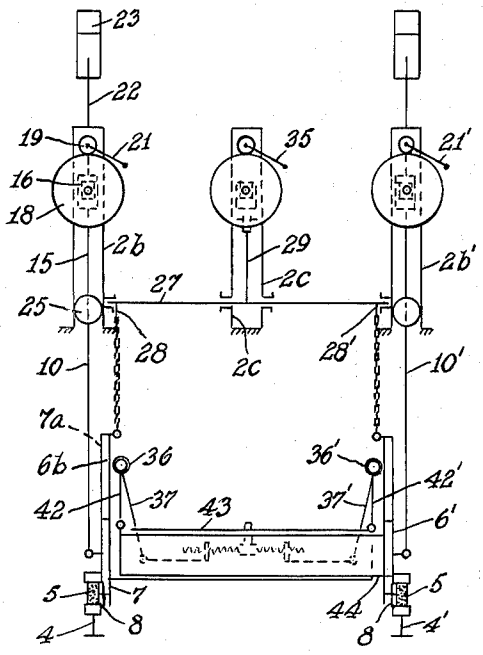
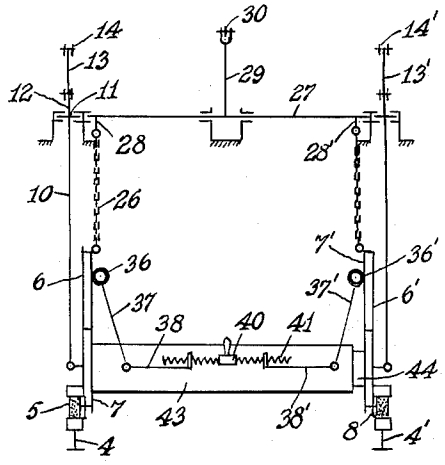


Fig.5.



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Fig. 4.

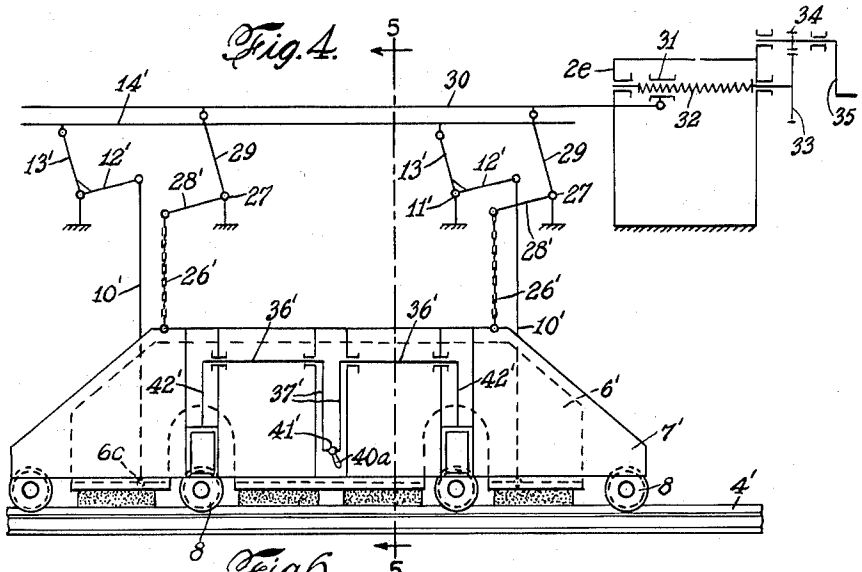


Fig. 6.

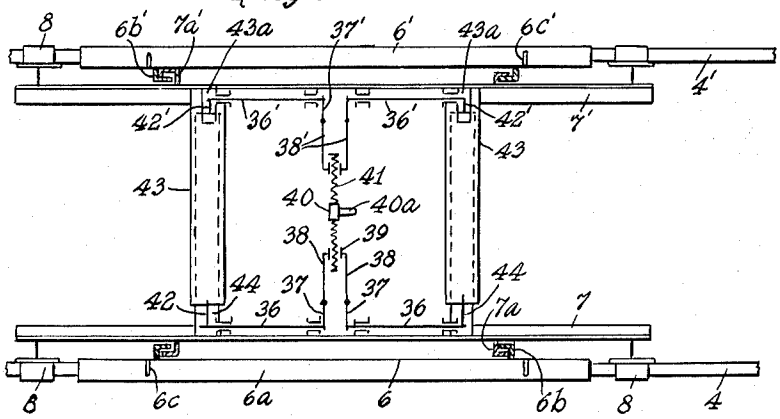


Fig. 8.

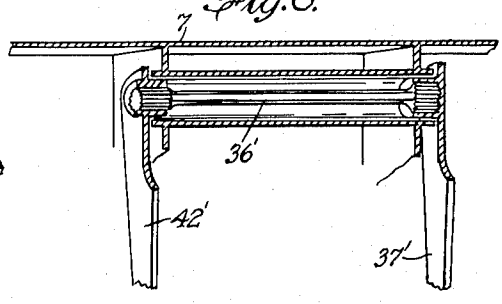
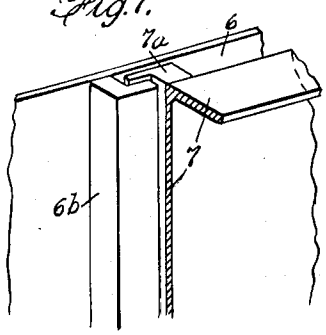


Fig. 7.



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2,741,883

APPARATUS FOR RECTIFYING THE RAILS OF RAILROAD TRACKS

Alfred Scheuchzer and Andre Scheuchzer, Lausanne, Switzerland

Application November 19, 1954, Serial No. 470,089

9 Claims. (Cl. 51—178)

The present invention relates to railway track repairing devices and more particularly to processes and installations to rectify the rolling surface of one at least of the rails of a railroad.

Its object is to improve such processes and installations in order to increase their efficiency.

The process belongs to the kind which uses at least the translation movement of a vehicle rolling on the defective railway track to get at least one of the rails rubbed by an abrasive tool dragged along by this vehicle in such a way that this tool rectifies the rolling surface of this rail through abrasion of the prominent points of undue undulations of this surface, and according to which this abrasive tool is mounted on a device which is movable relatively to the vehicle following a practically vertical direction and which is submitted to a downward force.

The accompanying drawings represent schematically and by way of example, one embodiment of the installation to set such a process into action conformably to this invention.

Fig. 1 is a side elevation view of this embodiment.

Fig. 2 is a top view of a mechanism which is represented by the upper part of Fig. 1 i. e., a partial sectional view along line II—II of Fig. 1.

Fig. 3 is a sectional view along line III—III of Fig. 1 on an enlarged scale.

Fig. 4 is a sectional view along line IV—IV of Fig. 2 on an enlarged scale, but also showing the lower part of the installation, which is not represented in Fig. 2.

Figure 5 is a sectional view along line V—V of Fig. 4, on the same scale.

Figure 6 is a sectional view along line VI—VI of Fig. 2 on the same scale as Figs. 3, 4 and 5, also showing the lower part not represented in Fig. 2.

Figs. 7 and 8 are perspective views, on an enlarged scale, of two different details.

The installation represented comprises a car **2** the ordinary wheels of which are able to roll on the rails **4** and **4'** of the track. This installation serves to rectify the rolling surfaces of these rails either simultaneously or separately. It comprises, for this car, a traction vehicle which is not represented. Grinding-stone blocks **5** are fixed, in two groups of four for each rail, under the lower edges **6***a* of two vertical plates **6**, the edges of which are bent at right angle so that they present horizontal surfaces. These plates are guided, vertically when the track is horizontal or normally to the plane of a track which is inclined longitudinally or transversally, by means of grooves **6***b* of their inner faces in which are inserted slide-blocks **7***a* that are fastened on the external surfaces of plates designated by **7** on the visible side on Fig. 1 and themselves maintained parallel to the rails and perpendicular to the plane of the track by the following means.

Small rolling wheels **8** lie on the rail in front and at the rear of each group of blocks **5** as well as of two middle blocks of each group. These small wheels or rollers sustain the plates **7** by the intermediary of one of the two

elements of their bearers which is integral with the bottom of plates **7**. Each plate **7** of a group visible in Fig. 1 is maintained in parallelism relation with a symmetrical plate **7'** on the opposite side of the wagon **2** by means of an extensible cross-bar a tube or telescopical element **43** of which is fixed by one end perpendicularly to the plate **7** and another element **44** of which is guided in the inside of the first one and is fixed by its end jutting out of the latter free end to the plate **7'** itself connected to the plate **6'** by sliding guides **7***a'* and **6***b'* and upheld by small wheels **8** rolling on the rail **4'**.

The small wheels **8** of both sides are formed like wagon wheels presenting as the latter do, a flange on the interior side of the track, this flange being joined by a revolution surface having a concave generatrix to a surface of smaller diameter, and being mounted according to axes practically horizontal and transversal to the track.

By the action of elastic means hereinafter described, the plates **7** and **7'** of the front and rear groups are pushed towards the exterior of the track by forces able to overcome the transverse friction of the tools on the rails and to ensure the small wheels **8** bearing by said joining surfaces on the rounded and symmetrically arranged parts of both rails, this in view of the operation described further on.

From the constructive features described up to here, it follows that the plates **7** and **7'** form, with the cross pieces that bind them, two rolling units independent of the wagon **2** but set below the frame **2***a* of the latter between the axles of the wheels **3**, one at the front and the other at the rear of the middle. There are however the following connections between the frame **2***a* and these units. Two practically horizontal bars **9** and **9***a* are placed under the frame, one at the front and the other at the rear, on each side of the wagon. They are journaled at one end on timber-members **2***d* extending downwards from the frame **2***a*; both bars **9** of the front are on the other hand journaled on the front unit and the bars **9***a* are journaled on the rear unit, whereas two bars **9***b* connect both rolling units to each other. Those connections of the rolling units to the bars are represented as made by the plates **7** and **7'**. They do not hinder a vertical movability of the units for putting out of action the tools **5** and reducing the wagon to prescribed dimensions for its transport. These connections are completed through the medium of plates **6** and **6'** and the guides **6***b* and **7***a*.

Each plate **6** is provided, near either end of its edge **6***a*, with a hinge piece **6***c* for its journaling with a connecting rod **10** which is part of a mechanism contrived to force downwards upon the tools or blocks **5** as well as to lift them. The reference signs indicating the elements of this mechanism are marked (') in order to designate the corresponding elements of similar mechanisms acting upon the plates **6'**.

For every plate **6**, the upper link of each connecting rod **10** connects the later with the almost horizontal arm **12** of a bell crank mounted upon the frame **2***a*. This link presents an important radial play or windage allowing a considerable inclination of the connecting rod on a plan transverse to the track. Another arm **13**, of the same lever, is directed upwards and connected with a horizontal connecting rod **14** with a second bent lever one long arm **22** of which, with a large horizontal projection, is loaded with a weight **23** and a short arm **15** of which is connected with connecting rod **14**. The axis of this lever is transversal to the track and is supported by a nut **16** of a screw **17** mounted in a frame **2***b*. This screw carries a toothed wheel **18** gearing with a pinion **19** joined to a crank **21**. The arm **15** is also connected with a piston-rod **24** the cylinder of which communicates with a compressed air distributor, not represented. The pres-

sure of this air is chosen conjointly with the diameter of the piston so that, when the air is let into the cylinder, it pushes the piston with a force the moment of which, relatively to the lever-axis, exceeds that of the weight **23**. The arm **22** can thus be lifted and the connecting rod **14** be pushed to the left, thus lifting the plate **6** and raising the blocks **5** by a few centimeters above the rail.

In the working position represented, the weight **23** acts in such a way as to exert a traction upon the horizontal connecting-rod **14** corresponded to by a compression of the vertical connecting rods **10** and a downward force pressing the blocks **5** against the rail **4**. This force is much stronger than the load of the arm **22** by the fact of the amplifying ratio of the lever-arms; its value is about 2000 kilogrammes for each of the plates **6** and **6'**. It is clear that the weight supported by the wheels **3** of the wagon is diminished of the total value of this force on the four plates.

The plates **7** and **7'** must be able to be elevated higher than it is necessary to raise the plates **6** and **6'** when the wagon must be reduced to its prescribed dimensions for its free displacements and in order that the magnitude of the lateral oscillations of the elevated rolling units may not be excessive.

For this purpose, they are attached in two points which are distant one from the other and are located on to their upper edges, one to chains **26**, the other to chains **26'** (Fig. 4). The ends of these chains which are opposite to these points of attachment are connected, above the frame **2**, to parallel arms **28** and **28'** attached to a shaft **27** extending itself transversely to the frame **2***a* and supporting, in the longitudinal plane of symmetry of this frame, an arm **29** which extends itself upwards, where it is journaled with a connecting rod **30** which connects it to all the other similar arms. This connecting rod is connected to a nut **31** of a screw **32** mounted in a frame **2***e* and integral with a toothed wheel **33** which meshes with a pinion **34** the shaft of which bears a crank **35**. It is comprehensible that this crank allows the displacement of the nut **31** towards the right in order ot raise simultaneously the plates **7** and **7'** by the intermediary of chains **26** and **26'**. One can also, by a reverse displacement of the nut, place these chains in a released state when the rollers **8** must roll on the rails.

The elastic means which tend to increase the distance of the plates **7** and **7'** of a same rolling unit are torsion bars **36** and **36'**, mounted on the high part of the internal faces of these plates as shown in Figs. 6 and 8.

The two bars **36** or **36'** of the same alignment operate like the halves of a single bar in the middle of which would be keyed an arm **37** or **37'** extending downwards. For each pair of bars are represented two such arms mounted on the strengthened and slotted ends, facing each other, of the two bars. These arms **37** and **37'** are respectively connected by links to connecting rods **38** and **38'** otherwise journaled with nuts **39** and **39'**, one of which is mounted on one of the halves at reverse threads of a screw **41** and the other on the other half which is separated from the first one by an unthreaded part **40** on which is fastened a handle **40***a* for rotating the screw.

The opposite ends of each pair support, in the same way as their ends facing each other, arms **42**, respectively **42'**, directed almost parallelly to the arms **37** and **37'** in the released position of the bars. In Fig. 6, it is supposed that the winding of the bars is obtained by the propulsion towards the center of the screw of the one and the other of the nuts **39** and **39'** and that the tubes **43** are secured to the plates **7'** while in Figs. 3 and 5 they are secured to the plate **7**. Then, one sees in Fig. 6 that the arms **42** are disposed in such a manner that their ends may push the upper edges of the free ends of the tubes **43** and that the arms **42'** of the bars **36'** penetrate inside these tubes **43** through openings **43***a* of these latter in order to act against the free ends of the inner telescopic elements **44** fixed by their opposite ends to the plate **7**.

When the movable installation comprising the car **2** must be conveyed to the track to be rectified, the plates **7** and **7'** are elevated to a prescribed height by operating the crank **35**. In order to allow an elevation of the rollers **8** of about 20 centimeters, the plates **6** and **6'** present vertically extending cuttings visible in Fig. 1, because these latter plates are raised only about 8 centimeters by operating the cranks **21**, **21'** which is more than sufficient to set the tools **5** out of action, the vertical oscillations of the frame **2***a* being taken into account.

One understands that the torsion bars must be unstressed when the rollers **8** are raised, for, if they should be stressed, they would unbend themselves and space the plates **7** and **7'** one from the other and also the plates **6** and **6'**, which implies that the rollers would be brought above the track and out of the rails.

When the installation has arrived on the track to be rectified, one must operate the cranks **21**, **21'** and **35** in order to lower on the rails the abrasive blocks **5** and the rollers **8** and, after that, stress the torsion bars by the handle **40***a* in such a way that the arms **42** and **42'** shall push the opposite rollers **8** away from each other towards the outer sides of the track so that these rollers may press against the rails by their flanges or by the joining surfaces, already described.

The rollers **8** thus constitute feeler means avoiding inconveniences which, until now, have been caused by facts of two sorts. The first ones are the variations that present practically the width of the track in various parts of the track; the others are the effects of the curvature of the track in the curves, and also so transverse play of the wagon on the track caused by the fact that the flanges of the wheels of each spindle shaft are at a distance one from the other which is shorter than the smallest distances between rails.

The inconveniences of these facts are that the abrasive tools ought to be notably wider than the rails in order to remain in good condition of contact with these rails, which is rendered impracticable because the erosion of these tools gives to them a concave form more or less embracing the section of the rails, since the straight parts of a track are much longer than the curved ones; the consequence of that is that the tools, when they have become concave by rubbing along straight parts of the track break when they arrive on curved rails if the organs on which they are fastened, like the plates **6**, are not movable transversely to the track.

From this remark one understands that the elastic or gravity actuated means, or yet hydraulic or pneumatic, tending to space the feeler means on one side and on the other and serving to guide the tools **5** along the rails are not indispensable, the transversal movability alone of these tools being able to suffice if they are worn or moulded into the complementary form of the rail section.

Then, rolling or sliding feeler means could be mounted on the plates **6** and **6'** at the front and at the rear of these latter, by means allowing a vertical mobility with a recall back force downwardly directed but insuring a transversal rigidity provided that these organs embrace each rail by its two sides as would do worn abrasive tools. If these feeler means should be rollers or small wheels, they would have the shape of grooved pulleys.

As in known installations, the abrasive tools could be cylindrical grinding stones having their axles transversal to the track and mounted between two slides sliding on the rail in front and behind them and mounted, like them, on vertically movable supports submitted to an apparatus allowing to press on these slides and to raise them.

The described installation like all its other possible embodiments, allows, therefore, the setting into action of a method for the rectification of the railroads consisting in compelling each tool lying on a rail to follow this rail in such a manner that, even in parts of the track successively

scoured which differ one from the others by one at least of the track characteristics that are the precise distance between both rails, the radius of curvature in the plane of the track and the transversal play of the wagon between the rails, the same state of mutual situation does practically subsist relatively to the transverse direction, between two planes of reference one of which is bound to the abrasive tool and the other to the segment of rail touched by this tool, planes both of which are perpendicular to a straight line drawn by a contact point of the tool and rail, transversely to the track and tangentially to the superior faces of both rails.

One can then understand that, in the curves, the longitudinal plane of symmetry of the car placing itself according to the chord of the arc comprised between the spindle shafts or the bogies of front and rear, the displacements of the rollers of the left and of the right can be produced on the same side or direction relatively to the wagon. The lateral relative displacement of the wagon and of the movable unit supporting the abrasive tools are rendered possible by the transverse play especially provided for the links of the connecting rods **10** and **10'** and by the pliancy of the connections due to the chains **26**, **26'**. The possible order of magnitude of these displacements is the decimeter.

The feeler rollers could have their axles practically vertical and their peripheral surfaces cylindrical and be disposed in such a way that those which cooperate with one of the rails and those cooperating with the other rail are symmetrically in contact with one of the lateral surfaces of the rails which are turned toward the interior and towards the exterior of the track.

The rollers could also have their axles inclined in such a way that the rollers of the left and those of the right roll against the surface elements of reverse inclination pertaining to the rounded part of the corresponding rails.

It is clear that the feeler means must be shaped, as well when they are sliding as when they are rolling and in order to ensure their guiding function, in such a way that each of them may be able to be into contact with the corresponding rail on such a point of this rail that its position may satisfy the following condition: on the outline of the transverse section of the rail sectionate following a plane passing by this point, the tangent drawn by the summit of this outline and the tangent drawn by the said point must form a notable angle.

What we claim is:

1. Apparatus for the rectification of the rolling surface of at least one of the rails of a track, comprising a car having a frame and wheels adapted to roll on the rails of the track, the car being adapted to be drawn along the track, a sub-frame generally spanning the distance between opposite rails supported by the car, the sub-frame being mounted for limited movement independent of the car transversely of the track, at least two oppositely symmetrically disposed abrasive tools one mounted on each side of the lower edges of the sub-frame in a position generally overlying the respective rails, means to adjust the abrasive tools toward and away from each other, means connecting the sub-frame to the frame of the car selectively to lift the sub-frame to separate the abrasive tools from the rails, feeler means associated with each abrasive tool for contacting the inner vertical surface of the respective rail to position its associated abrasive tool with respect thereto, the feeler means also having generally horizontal surfaces which contact the upper rolling surface of the rails and support the sub-frame.

2. The track rectifying apparatus as claimed in claim 1, in which the means connecting the sub-frame to the frame of the car is flexible and allows the sub-frame to hang freely from the car and to be guided laterally of the track during travel of the car only by engagement of the feeler means on the opposite sides of the sub-frame with the track.

3. The track rectifying apparatus as claimed in claim 1, in which the said sub-frame is connected to lifting means set above it on the frame of the car and near the two ends of the sub-frame by yielding tension means long enough to be released when the feeler means repose on the rail.

4. The track rectifying apparatus as claimed in claim 1, in which the lifting means for the sub-frame comprises two levers each of which is composed of a shaft transverse to the track and of three arms, two of which, situated above the side walls of the sub-frame, diverge slightly in their extreme position, from the horizontal plane containing the axis of the two levers and supports the upper ends of the said yielding tension means, respectively attached to the upper edge of the two walls of the sub-frame, and the third arm, situated in the middle of the shaft, extends upwardly, an operating lever, and a connecting rod extending longitudinally and connecting the operating lever to the third arm.

5. Apparatus for the rectification of the rolling surface of at least one of the rails of a track, comprising a car having a frame and wheels adapted to roll on the rails of the track, the car being adapted to draw along the track, a sub-frame unit generally spanning the distance between opposite rails supported by the car generally within the car and between the wheels of the car, the unit being mounted for limited movement independent of the car transversely of the track, the unit having two parallel longitudinally extending plates forming the side walls thereof, at least two oppositely symmetrically disposed abrasive tools one mounted on the lower edge of the respective plate in a position generally overlying the respective rails, means to adjust the lower edges of the plates and thus the abrasive tools toward and away from each other, said last named means comprising an extensible cross bar composed of at least two telescopically mounted elements, the outer end of one of said elements being attached generally perpendicularly to one plate near the lower edge thereof, the outer end of the other element being connected to the other plate, and means to adjust the two elements longitudinally of each other, means connecting the unit to the frame of the car selectively to lift the unit to separate the abrasive tools from the rails, feeler means associated with each abrasive tool for contacting the inner vertical surface of the respective rail to position its associated abrasive tool with the respect thereto, the feeler means also having generally horizontal surfaces which contact the upper rolling surface of the rails and support the unit.

6. The track rectifying apparatus as claimed in claim 5, in which the feeler means are rollers journaled on the lower edge of the unit on horizontal axis, the rollers riding along the rails, the rollers having flanges on their inner edges adapted to contact the inner vertical surfaces of the respective rails.

7. The track rectifying apparatus as claimed in claim 6, in which means is provided on the unit constantly to urge the side walls of the unit away from each other so as to thrust the flanges on the rollers against the inner vertical surfaces of the rail.

8. The track rectifying apparatus as claimed in claim 7, in which the means constantly thrusting the side walls of the unit apart comprises a longitudinally extending torsion bar mounted on the upper portion of each side wall of the unit parallel to the respective rail, each torsion bar having at least two spaced arms extending laterally to it, one of such arms being connected to one side wall of the unit, and the other of such arms being connected to the other side wall of the unit by means of an interposed mechanism which places the torsion bar in stressed condition.

9. The track rectifying apparatus as claimed in claim 8, in which there are two aligned torsion bars disposed on each side wall of the unit, each of said torsion bars has a similar arm at each end thereof, the arms at the outer ends of the two torsion bars of one set being connected to the side wall plate of the unit on which they are mounted, the

arms at the outer ends of the two torsion bars of the other set being similarly connected to their side wall plate, the inner ends of the pairs of torsion bars being connected together by linkage means, and means connecting the two such linkage means to stress all of the torsion bars simultaneously in the same relative direction and in generally the same amount.

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