APPARATUS FOR DEBURRING THE RAILS OF RAILWAY TRACK

Fig. 1.  

Fig. 2.  

Fig. 3.  

1  2  3

4  5

6  7  8

9
APPARATUS FOR DEBURRING THE RAILS OF RAILWAY TRACK
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ABSTRACT OF THE DISCLOSURE
A vehicle which travels on the rails of a track and carries a succession of grinding units having grindstones which grind the rails of the track during passage of the vehicle to deburr such rails.

BRIEF SUMMARY OF THE INVENTION
This invention relates to apparatus for removing burrs and other irregularities on the surface of the rails of a track on which a vehicle passes. It is an object of the invention to provide a deburring machine adapted to repair the irregularities in the rail profile by removing the same in situ.

The machine according to the invention comprises a vehicle bearing on each side thereof at least one unit comprising a grindstone and a motor driving the grindstone, said grindstone being adapted to contact the inside surface of the head of the rail and to bear thereagainst, means being provided to enable the grindstone to bear on the rail with a constant but adjustable pressure and to alter the inclination of the grindstone relative to the plan of the track.

Preferably, the vehicle concerned has on each side—i.e., near each of the two rails forming the track—a plurality of grinding units arranged one after another. The motor of each grindstone drives the grindstone via a pair of bevelled gears, the assembly being adapted to pivot so that the inclination of the operative surface of the grindstone can be varied.

Each unit or preferably all the units are borne so as to be movable not only transversely of the track but also vertically, so that all or some of the units can be placed out of operation by being raised above the level of the rails.

BRIEF DESCRIPTION OF THE DRAWING
FIG. 1 is a sectional view of a rail with a wheel thereon;
FIG. 2 is an elevation view of a portion of a vehicle having a number of grinding units, two of which are visible;
FIG. 3 is a diagrammatic cross-sectional view showing the arrangement of two opposed grinding units, each deburring one of the two rails which form the track;
FIG. 4 is a diagrammatical cross-sectional view of half the vehicle showing the support arrangement for a grinding unit, the grindstone being applied to a rail in a vertical position;
FIG. 5 is a view of a portion of the support arrangement of FIG. 4 showing the grindstone in an operative position inclined from the vertical; and
FIG. 6 is a view of a portion of the support arrangement of FIG. 4 showing how all the grindstones can be moved out of operation simultaneously.

DETAILED DESCRIPTION
FIG. 1 shows one form of the type of deformation produced on the rails of railway tracks in use, namely the formation of a burr or surface irregularity or distortion. In particular, as the wheels 2 of the moving stock run on a rail 1, they bear on the rail along a line which is near the inside surface of the head of the rail which line is off-center in relation to the track, thereby causing the metal in this region to creep so that an inner lateral ridge or burr 3 is formed.

The device according to the invention seeks to remove the burrs 3 by use of a vehicle which bears equipment for grinding the rail as the vehicle passes thereon. Such vehicle is shown in part in elevation in FIG. 2 and runs on two pairs of wheels on the tracks of the rail 1; one wheel 4 can be seen in FIG. 1. The vehicle can have any form of superstructure 5, for instance, of a kind adapted to carry personnel, ballast, maintenance equipment, and particularly an electrical generating set for driving deburring grindstones, or alternatively, a transformer if the power supply is taken from the mains, as well as all the necessary switches and fuses and measuring and recording instruments if desired.

A series of grindstones 6 are disposed in successive relationship below the frame of the vehicle 5 on each side thereof; and each grindstone 6 and its individual drive motor 7 forms a grinding unit supported by two metal brackets 8 rigidly secured to support elements to be described in detail hereinafter.

Preferably, the vehicle has a plurality of units, for instance, five units, although this number is not to be taken as limiting. The reason for the use of a plurality of units is that, to restore the rail head edge clearance in a single operation—i.e., in one or more passes—the operative surface of each grindstone has a different inclination to the plane of the track, so that grinding is performed in a number of consecutive planes forming a plurality of planes tangential to the required curve.

In the very diagrammatic view given in FIG. 3, the grindstones 6 are shown in operative engagement with the inside surfaces of the heads of the rails 1 of the track. In FIG. 3, the axis of each grindstone is perpendicular to the drive axis of its motor, and the drive is transmitted by a pair of bevelled gears in gearboxes 9.

FIG. 4 shows in greater detail the right half of that part of the vehicle which illustrates the invention. In FIG. 4 can be seen the head of a rail 1 to be deburred, and the grindstone 6 in engagement therewith. To give an accurate picture of the position of FIG. 4, it should be noted that a cylinder 10 of a hydraulic jack 11 is disposed on the vertical axis of the vehicle, and metal section members 12 bearing the jack 11, and metal members 13 which are disposed above members 12 and which bear a cylinder 14 of a hydraulic jack 15 disposed on a transverse axis of the vehicle are longitudinal members which extend over the whole length of the vehicle and are secured to the vehicle frame. The girder formed by the members 13 supports pairs of the metal brackets 8 at intervals, each such pair supporting a grinding unit as discussed hereinabove in relation to FIG. 2. Slides or caricages 16 run on the bottom horizontal arms of the brackets 8. The slides 16 have upwardly projecting plates 17. Two flanges 18 retain and clamp the end of a shaft 19 bearing the grinding unit, and the flanges 18 are secured to the plate 17 by bolts 20. Therefore the ends of the motor shaft are engaged in the flanges 18 of each carriage 16 which are borne by the two brackets 8 of the pair corresponding to the particular grinding unit concerned.

With the grinding unit suspended in this way, the grindstone 6 can be moved towards or away from the rail 1 by...
the displacement of the carriages 16 on the brackets 8. The grindstone and its motor can be inclined as an assembly by rotating the shaft ends 19 in flanges 18 and locking the assembly by suitable means (not shown). The bolts 20 which connect the flanges 18 to the plates 17 extend through slotted openings 21 in the plates whereby the grindstones can be adjusted vertically in plates 17.

Each slider 16 has a lug 22 disposed opposite the associated grindstone and the two lugs of each pair of slides 16 are interconnected by a pivot pin 23 mounted on an adjustable length member 24 connected to the bottom end of a lever 25 mounted at its center on a pivot pin 26 borne by the vertical arms of the brackets 8. When the lever 25 rotates counterclockwise as in FIG. 4, the slides 16 associated therewith move to the right and thus apply their grindstone 6 to the inside surface of the rail 1.

The required force corresponding to the pressure applied by the grindstone is supplied by the pull of a cable 27 secured to the lever 25 at the end opposite that connected to the slides 16. The pull provided by the cable 27 is adjustable, so that the force of the grindstone can be checked and adjusted, but is maintained constant during a deburring operation. The required pull can be produced by various means such as a counterweight, a spring or a hydraulic jack.

Some of the parts hereinbefore described are shown in FIG. 5 in a different working position. In FIG. 5 the grindstone 6 is inclined relative to the plane of the track as are the motor 7 and the gearbox 9. The slides 16 have been moved to the right and the grinding unit has been raised by raising the two suspension flanges 18 in plate 17. The pressure with which the grindstone is urged against the rail in this new position is produced by the same means as hereinbefore described and which act on the slides 16.

Each successive grinding unit is inclined in this way at different angles from the others so that the inner edge of the rail is ground in a number of planes to restore a rounded shape. The rail profile can therefore be restored by the passage of the deburring vehicle over the track one or more times depending upon the number of grinding units. Of course, the other half (the left-hand half in respect of the drawings) of the system described is symmetrical to the part described for operating on the other side of the track.

A description will now be given of some further features which are shown in FIGS. 4 and 6.

The central jack 10, 11 acts on a plate 28 interconnecting the longitudinal members 13 supporting all the pairs of brackets 18, and is thereby linked to simultaneously raise all these brackets in order to move the grindstones 6 out of operation above the level of the rails when the vehicle is required to run without deburring the rails. The central jack 10, 11 can also be used to determine the vertical movement of the grindstones.

However, before being raised, the grindstones must be out of bearing engagement with the inside surfaces of the rails, and to achieve this purpose, the longitudinal members 13 bear a frame 29 with the interposition of rollers 30 on rails 31 which extend transversely of the vehicle longitudinal axis. The frame 29 has abutments 32 adapted to contact the levers 25. The frame 29 and the abutments 32 can be moved laterally outwards by the jack 14, 15 which acts on a hook 33 rigidly secured to the frame 29. In the outermost end position shown in FIG. 6, the abutments 32 force the levers 25 to pivot clockwise and displace the associated grinding units to a position in which the grindstones are disengaged from the rail. The same action is effected symmetrically on that side of the machine which is not shown.

A valve controlling the hydraulic circuits of the jacks 10, 11 and 14, 15 is constructed so that the jacks 14, 15 operate before the jack 10, 11. Consequently, by control of the hydraulic circuit operating all the jacks, the jacks 14, 15 first act via the abutments 32 and levers 25 to disengage the grindstones from the rails, whereas the central jack 10, 11 raises all the grinding units so as to bring the grindstones above the top level of the rail. The converse operation is performed to bring the grindstones into operation.

Of course, the grindstone motors can be other than electric motors and the gearing in the gearboxes 9 can be replaced by a flexible shaft. The grindstones can be of various kinds such as abrasive, ceramic, diamond ring, discs with blades, and the like.

What is claimed is:

1. Apparatus for deburring the rails of railway track in situ, comprising a vehicle adapted to travel on the rails of railway track, at least one unit on either side of the vehicle for operating with a respective rail to deburr the same, each unit comprising a grindstone and a drive means thereof, and means supporting the grindstone of each unit from the vehicle such that the grindstone can contact the rail on the inner surface thereof and including means to vary the position and inclination of the grindstone relative to the track and means for varying the pressure with which the grindstone contacts the rail.

2. Apparatus as claimed in claim 1, wherein the means for varying the position and inclination of the grindstone comprises a carriage for each unit movable transversely with respect to the longitudinal axis of the vehicle, said grindstone and drive means of each unit being mounted as an assembly on said carriage for movement therewith.

3. Apparatus as claimed in claim 2, wherein the means for varying the position and inclination of the grindstone further comprises means pivotally connecting the assembly of grindstone and drive means from the associated carriage for pivotable movement about an axis parallel to the vehicle longitudinal axis and means for vertically adjusting said assembly relative to the carriage.

4. Apparatus as claimed in claim 2, wherein said drive means includes a motor having a vertical output shaft, said grindstone being rotatable about a horizontal axis, and gearbox means between the motor and grindstone for transmitting power therebetween.

5. Apparatus as claimed in claim 2, wherein the means for varying the position and inclination of the grindstone further comprises a pivotal linkage arrangement coupled to each carriage and an actuator element coupled to the linkage arrangement for controlling the transverse position of the carriage.

6. Apparatus as claimed in claim 5 comprising means for actuating the linkage arrangement for the carriage of each unit on one side of the vehicle to cause all such carriages to be simultaneously displaced away from the associated rail to a position in which the grindstones are displaced from the rail.

7. Apparatus as claimed in claim 1, wherein said means which support the grindstone from the vehicle comprises a vertically displaceable element supporting all said units for raising the grindstone together to a position above the level of the rails.

8. Apparatus as claimed in claim 7, wherein said means which supports the grindstone from the vehicle comprises means for moving the grindstones of all units to a position above the level of the rails and drive means for the latter means.

9. Apparatus as claimed in claim 8, wherein said means which supports the grindstone from the vehicle further comprises means for simultaneously raising the grindstones of all units to a position above the level of the rails and drive means for the latter means.

10. Apparatus as claimed in claim 9, wherein the drive means for the means for raising the grindstones of all units above the rails and for the means for moving the grindstones away from the rails are coupled such that, when the grinding units are to be rendered inoperative,
the grindstones are moved away from the rails before being raised, and vice versa when the grinding units are brought into operation.

11. Apparatus as claimed in claim 9, wherein the drive means for the means for raising the grindstones and the drive means for the moving of the grindstones away from the rails are constituted by respective hydraulic jacks.

References Cited

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Inventor(s)</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,706,089</td>
<td>4/1937</td>
<td>Moore</td>
<td>51—178</td>
</tr>
<tr>
<td>1,067,624</td>
<td>7/1913</td>
<td>Simard et al.</td>
<td>51—178</td>
</tr>
<tr>
<td>3,358,406</td>
<td>12/1967</td>
<td>Speno et al.</td>
<td>51—178</td>
</tr>
</tbody>
</table>

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