June 11, 1929. C. T. RIPLEY ET AL 1,717,345

CAR WHEEL GRINDER

Filed June 11, 1925 2 Sheets-Sheet 1

Fig. 1.

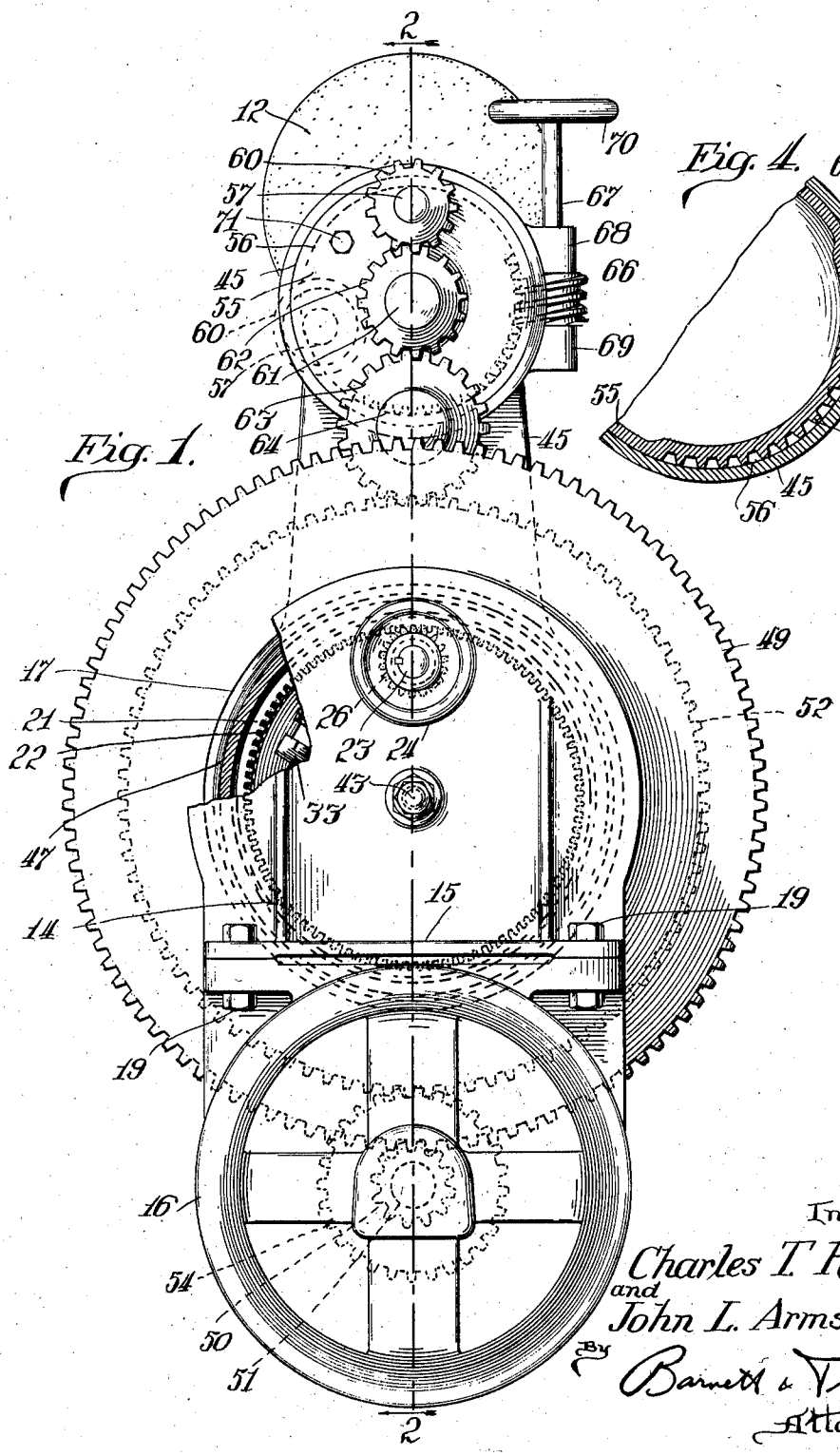


Fig. 4.

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Filed June 11, 1925 2 Sheets-Sheet 2

Fig. 3.

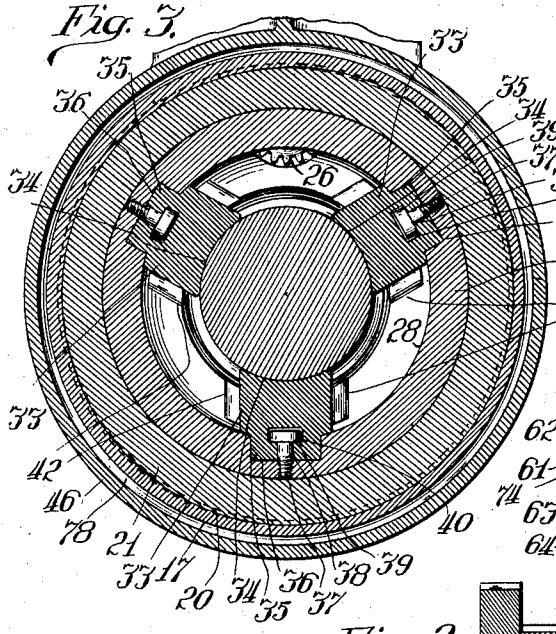


Fig. 5.

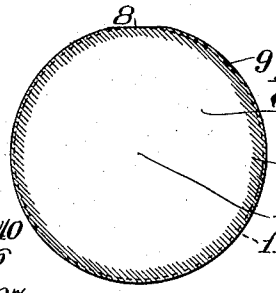


Fig. 2.

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UNITED STATES PATENT OFFICE.

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CAR-WHEEL GRINDER.

Application filed June 11, 1925. Serial No. 36,362.

This invention relates to a car-wheel grinder, and more particularly to a portable grinding unit which may be supported upon the end of the car-wheel axle, and then automatically operated to grind down the wheel tread until it is concentric with the axle at all points.

As is well known, flat spots are often caused on railway car wheels by sliding the wheels on the rails when the brakes are applied, the excessive use of sand at such time, or other causes. These flat spots destroy the concentric periphery of the wheel, and as the wheel rolls along the rail, disturbing noises and injurious shocks are caused by the successive impacts of this flat surface on the rail. If this flat spot exceeds a certain size, the wheel must be scrapped, or its tread renewed or resurfaced. A car wheel is composed of a unitary metal casting, having a comparatively soft web portion and a comparatively hard, chilled, rim or tread for rolling contact with the rail. If the flat spot does not go through this chilled rim, the periphery of the wheel may be ground down to remove the flat, that is, the other portions of the rim are removed until the radius of the periphery is no greater than the radius of the lowest portion of the flat spot. The present invention relates to an improved method and apparatus for grinding down the tread of car wheels to remove these flat spots or defects.

One main object of the invention is to provide a mechanism for mounting and driving a grinding unit, so that this grinder will revolve bodily about the axis of the wheel to grind all portions of the tread concentric with this axis.

Another object is to provide a portable grinding unit of the above type, that may be easily supported on the car-wheel axle.

Another object is to provide an improved chuck or securing means, for mounting this grinding unit concentrically upon the car-wheel axle.

Another object is to provide an improved means for adjusting the grinding wheel radially toward or from the tread of the car wheel, to adapt the mechanism for grinding wheels of different diameters, and to determine the amount of material that is ground away from any one wheel.

Another object is to provide an improved lubricating system for the rotating portions of the apparatus.

Other objects and advantages of this invention will be apparent from the following detailed description of one approved form of apparatus involving the principles of this invention.

In the accompanying drawings:

Fig. 1 is an end elevation of the grinding apparatus.

Fig. 2 is a longitudinal vertical section, taken substantially on the line 2—2 of Fig. 1. The motor, the grinding wheel, and the car wheel and axle, are shown in elevation.

Fig. 3 is a transverse vertical section on an enlarged scale, taken substantially on the line 3—3 of Fig. 2.

Fig. 4 is a transverse vertical section, enlarged and partially broken away, taken substantially on the line 4—4 of Fig. 2.

Fig. 5 is a diagrammatic view for illustrating the process of removing a flat spot.

Referring first to Fig. 2, a car wheel 1 is mounted rigidly on the axle 2, it being understood that a similar wheel is mounted on the right hand end of this axle 2 which is broken away in the drawings. The slightly reduced portion 3 of the axle, at the left of wheel 1, forms the journal, which is mounted in the car journal-box, and through which the car is supported from the axle. The peripheral portion of wheel 1 comprises the flange 4 for engaging the inner edge of the rail, and the tread 5 which rolls along the top of the rail.

Referring now to the diagram shown in Fig. 5, 6 indicates the comparatively soft web portion of the wheel, and the hard, chilled, rim or tread is indicated by shading at 7. At 8 is indicated a flat portion which has been ground away from the normal periphery or tread 9 of the wheel which should be entirely concentric with the axis 10 of the wheel and axle. If this flat 8 is not excessively deep, and does not penetrate through the chilled portion 7 of the wheel, the tread of the wheel may be re-surfaced by grinding down the periphery 9 of the tread to the dotted circle 11, which it will be noted, corresponds in radius to the lowest portion of the flat surface 8. The present invention re-

lates to an improved mechanism for grinding down this tread 9 to eliminate the flat spot 8.

Referring again to Fig. 2, 12 indicates a rotary grinding wheel, formed of emery, carborundum or other suitable abrasive. This grinding wheel is mounted to rotate in a plane parallel to that in which the car wheel rotates, and the angle of its grinding surface 13 corresponds to, but is oppositely disposed relative to the tread 5 of wheel 1, and the width of grinding wheel 12 is substantially the same, or somewhat greater than, the effective width of the tread 5, that is the portion which rolls on the upper surface of the rail. The mechanism hereinafter to be described, is adapted to support and drive this grinding wheel 12 so that it will simultaneously rotate on its own axis and revolve about the axis of the wheel 1 and axle 2 so as to successively grind down all portions of the periphery 9 of tread 5 until the flat spot 8 has been removed.

The parts of this mechanism are carried by a normally stationary frame 14, comprising a bracket 15 for supporting the driving motor 16, and a cylindrical housing 17 adapted to surround the journal 3 of the axle 2. The motor 16 may be conveniently suspended from the bracket 15 by having its base 18 bolted to this bracket, as at 19.

A portion of the hollow cylindrical housing 17 is interiorly threaded, as at 20, and a hollow, substantially cylindrical, sleeve 21 is exteriorly threaded to engage with these threads 20 in housing 17. A portion of the inner surface of sleeve 21 is formed with a series of gear teeth 22, thereby forming a very wide inner annular gear. A short shaft 23, having a hand wheel 24 at its outer end, is journaled in a bearing 25 in frame 14, and carries a pinion 26 keyed to its inner end, which meshes with the internal gear teeth 22 in sleeve 21. It will be noted that by manually rotating the hand wheel 24, the pinion 26 will rotate the sleeve 21, which, through its screw threaded engagement with the relatively stationary housing 17 will cause the sleeve 21 to move longitudinally through the housing. The relatively wide internal gear 22 permits this longitudinal movement of sleeve 21 to take place without causing this internal gear 22 to become disengaged from the driving pinion 26. Within the opposite end of sleeve 21 is mounted a wedge ring 27 having a cylindrical outer surface to fit within the sleeve, and a conical inner surface 28. An inwardly projecting flange 29 on sleeve 21 fits a recess 30 in the end of ring 27, and an annular plate 31 is secured, as at 32, to the end of ring 27 against the opposite face of flange 29, so that the wedge ring 27 is compelled to move longitudinally with the sleeve 21, but need not share in its rotative movement. A plurality, here shown as 3, of wedges or jaws 33 have inner cylindrical surfaces 34 shaped to fit the journal 3, and outer conical surfaces inclined to correspond with the inner conical surface of ring 27. The outer, slightly reduced, portion 35 of each jaw 33 fits within a slide-way 36 in ring 27, and a bolt 37 secured in the bottom of this slide-way projects into a channel 38 in the wedge 33, the head 39 of the bolt fitting within an enlarged portion 40 of the channel 38. This prevents separation of the wedge and ring, but permits longitudinal movement of each wedge or jaw 33 through the ring 27. A cylindrical flange 41 projecting inwardly from the frame 14, concentric with housing 17, engages the larger ends of the wedges 33 to prevent longitudinal movement of the wedges in one direction through the housing 17, and pairs of fingers 42 engaging each side of each of the wedges 33, prevents rotary movement of the wedges when the sleeve 21 is rotated. When the housing 17 is placed about the journal 3 of axle 2, and the hand wheel 24 is rotated in the proper direction, the sleeve 21 will be drawn outwardly (that is away from wheel 1), and since the wedges 33 are prevented from moving longitudinally in this direction, due to their engagement with flange 41, and are also prevented from rotating with sleeve 21 by the fingers 42, the engaging conical faces of ring 27 and wedges 33 will cause these wedges or jaws to be moved radially inward against the journal 3 until they are clamped tightly thereagainst. Since the wedges 33 are arranged concentrically within the housing 17, and are simultaneously and equally moved radially within this housing, the housing 17 will be concentric with the axis 10 of the journal 3, when the housing is clamped in position, as above described. A centering screw 43 is mounted in the frame 14 in position to engage with the conical centering hole 44 in the end of axle 2. Proper adjustment of this screw 43 will position the housing 17 longitudinally of axle 2 so that grinding wheel 12 will be positioned properly over the tread 5 of wheel 1.

A revoluble supporting frame 45 has a hollow cylindrical portion 46 which surrounds the cylindrical housing 17. Preferably, bronze bushings 47 and 48 are interposed between the normally stationary sleeve or housing 17 and the rotatable sleeve or frame 46. A large gear 49 is fixed rigidly on one end of sleeve 46 and meshes with a pinion 50 on the shaft 51 of motor 16. Obviously, rotation of the motor shaft 51 will cause the revoluble frame 45 to travel around the axis 10. An annular gear 52, somewhat smaller than gear 49, is mounted for free rotation upon the outer surface of sleeve 46, a bronze bushing 53 being interposed therebetween. As here shown, the annular gear 52 is in the form of a double gear, one-half of which meshes with a gear or pinion 54 secured to motor-shaft 51. The gear 54 is somewhat

larger than pinion 50, so that annular gear 52 will be rotated somewhat faster than gear 49, but in the same direction.

A cylindrical drum or frame 55 is mounted in a corresponding cylindrical socket 56 in the outer portion of frame 45, so that the axis of the drum 55 will be parallel to the axis 10 of housing 17 and wheel 1. A shaft 57, journalled in bearings 58 and 59 in drum 55, carries the grinding wheel 12 at one end and a pinion 60 at the other end. The shaft 57 is mounted near one peripheral edge of drum 55 so that it is eccentric to the axis of the drum, but parallel thereto. A stud 61, projecting concentrically from one end of drum 55, carries a pinion 62 which is freely rotatable and meshes with the pinion 60 on the end of shaft 57. An intermediate idler gear or pinion 63, mounted on a stud 64 projecting from the frame 45, meshes with the pinion 62 and also with the annular gear 52. A sector of a worm wheel 65 is formed in a portion of the outer surface of drum 55, and a worm 66 meshes with this sector. Worm 66 is mounted on a shaft 67, between bearings 68 and 69 projecting from frame 45, and there is a hand wheel 70 on the upper end of shaft 67, by which it may be rotated manually, as desired.

It will be noted that by rotating the hand wheel 70, the drum 55 may be oscillated through a wide arc within the supporting frame 45. In this way the shaft 57, and the grinding wheel 12 carried thereby, may be swung from an extreme outer position, as shown in solid lines in Fig. 1, to an inner position, such as shown in dotted lines in that figure, and it will be noted that the dotted line position is closer to the axis 10 of the supporting frame 17 and wheel 1, than is the outer solid line position. This serves to adjust the grinding wheel 12 substantially radially with respect to the axis of the wheel in order to accommodate different sizes of wheels or to determine the amount that is ground from any one wheel. It will be noted that rotation of drum 55 does not affect the position of pinion 62, which is mounted concentric therewith, and that the pinion 60 on shaft 57 is revolved bodily about the axis of the drum 55 so that it always meshes properly with pinion 62. In other words, the train of driving gears 54, 52, 63, 62, and 60, through which the grinding wheel 12 is rapidly rotated from the motor 16, is always in proper engagement no matter what the rotative position of drum 55 in frame 45 may be.

The drum 55 forms a substantially closed container for lubricating oil, the drum having an accessible filling opening in one end, normally closed by plug 71. This oil has direct access to the inner ends of bearings 58 and 59 of the grinder shaft 57, also through oil-holes 72 and 73 leading to these bearings. An oil passage 74, drilled in stud 61, leads to the bearing surface for pinion 62. An oil hole 75 in the periphery of drum 55 communicates, in any adjusted position of the drum, with an arcuate groove 76 in frame 45. Another oil passage 77 in sleeve 46 leads to the annular space 78 between this sleeve and housing 17. This space 78 is supplied with oil from groove 76 through a suitable tubing 79 connecting with passage 77. Oil is fed from space 78 to the inner ends of bearings 47 and 48, and through passages 80 oil is conducted to the bearing between annular gear 52 and the frame 45. An oil passage 81 in stud 64 conducts oil to the bearing for pinion 63, the oil being drawn from groove 76 through tubing 82. Since the drum or container 55 is continually revolving about the axis 10, there will be a continual splashing of the oil within this drum, forcing oil through the passages, above described, to the several bearings for the relatively rotating members.

In operation, the wheel 1 to be ground and its axle 2 are mounted on suitable "horses" or other supporting means, so that the axle 2 is substantially horizontal. The grinding mechanism or unit, hereinabove described, is then swung into position, preferably by means of a crane, so that the housing 17 is positioned about the end 3 of axle 2. If not already properly adjusted, the screw 43 will be moved in or out until, when in engagement with the centering hole 44 in the end of the axle, the grinding wheel 12 will be properly positioned above the tread 5 of the wheel 1. Hand wheel 24 is now manipulated to move the wedges or jaws 33 into firm engagement with the journal 3 of axle 2, and the grinding unit is now supported by the axle 2 and properly centered therearound. Hand wheel 70 is now manipulated to oscillate the drum 55 until the grinding wheel 12 is brought into proper grinding relation with the tread 5 of the wheel 1. Electric current is now supplied through suitable connections (not here shown) to the motor 16. Rotation of motor shaft 51 will, through gears 50 and 49, cause the revoluble frame 45 and all of the mechanism carried thereby, to revolve bodily about the axis of wheel 1. At the same time, grinding wheel 12 will be rotated rapidly on its own axis by means of the train of gearing 54, 52, 63, 62 and 60. It will be noted that the grinding wheel 12 has a planetary movement about the axis 10 so that it will successively grind equally on all portions of the periphery 9 of tread 5 (except the flat portion 8) until the circular contour of the tread has been restored. Of course, the diameter of the wheel 1 will be slightly reduced, but this is permissible within certain limits. Grinding wheel 12 is adjusted inwardly, when

necessary, by further manipulation of hand wheel 70.

We claim:

1. A car-wheel grinder comprising a supporting frame, means for centering the frame with respect to the axis of the wheel, a rotary grinder mounted on the frame for bodily revolution about this axis, means for rotating the grinder on its own axis, a container for oil which revolves with the grinder about the axis of the wheel, and means for conducting oil from this container to the several bearings for the rotating parts.

2. A car-wheel grinder comprising a supporting frame, means for securing the frame in centered position with respect to the axis of the wheel, a revoluble frame mounted on the supporting frame for movement about the axis of the wheel, a hollow cylindrical drum mounted in the revoluble frame for rotary adjustment about its own axis, a gear rotatable on the axis of the drum, an annular gear centered about the axis of the revoluble frame, gear connections between the annular gear and the first named gear, a shaft rotatable in the drum parallel to but eccentric to the axis of the drum, a gear on this shaft meshing with the first named gear, a grinding disc mounted on the shaft in position to engage the tread of the wheel, means for adjusting the drum about its own axis and holding it in adjusted position, means for rotating the annular frame and annular gear, and means for conducting oil from the interior of the drum to the several bearings between the relatively rotating parts.

3. A car-wheel grinder comprising a cylindrical supporting frame adapted to surround and be supported by the journal end of the car-wheel axle, a revoluble frame mounted on the cylindrical frame, a rotatable grinding mechanism carried by the revoluble frame in position to engage the tread of the wheel, a motor mechanism mounted on the supporting frame, and separate driving connections between the motor mechanism and the revoluble frame and the grinding mechanism for rotating the grinding mechanism about its own axis and for revolving the revoluble frame about the supporting frame.

4. A car-wheel grinder comprising a cylindrical supporting frame adapted to surround and be supported by the journal end of the car-wheel axis, a revoluble frame mounted on the cylindrical frame, a rotatable grinding mechanism carried by the revoluble frame in position to engage the tread of the wheel, a motor mechanism mounted on the supporting frame, a fixed gear on the revoluble frame, an annular gear rotatably journaled on the revoluble frame, a gear train connecting the annular gear with the grinding mechanism, and gears driven by the motor mechanism engaging respectively the fixed gear and the annular gear.

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