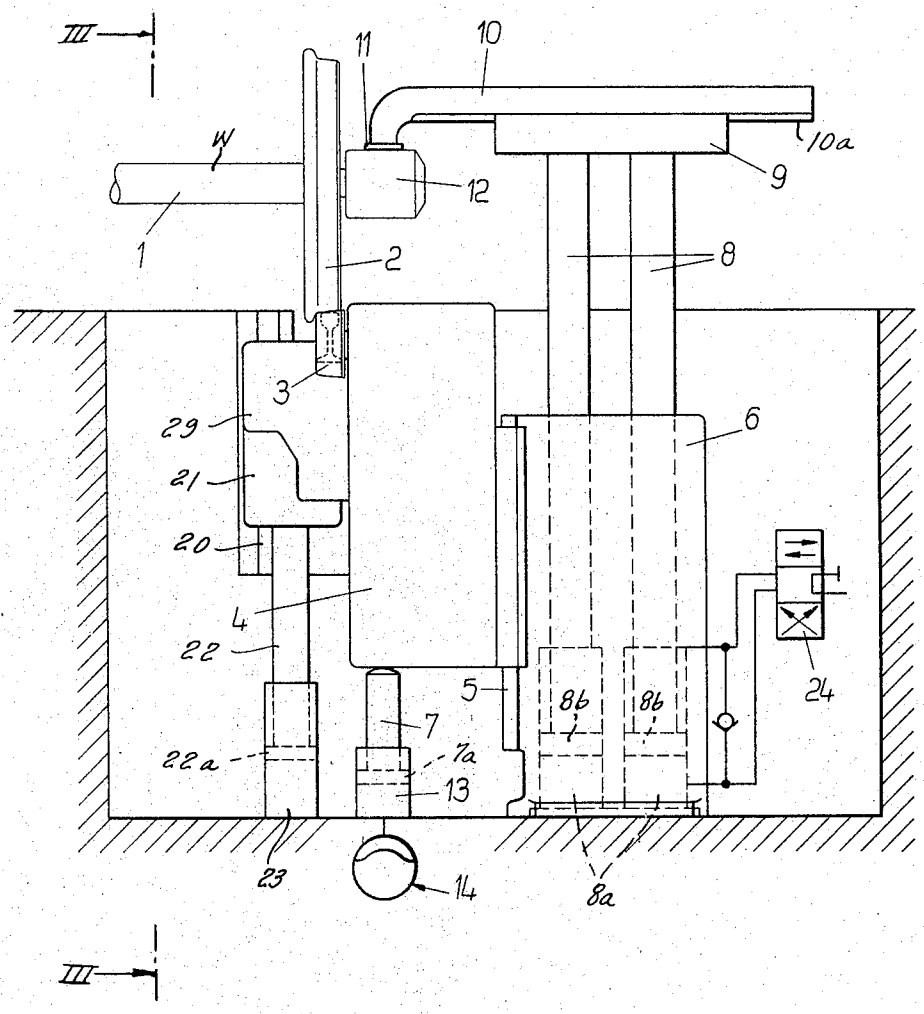
Oct. 10, 1967 T. DOMBROWSKI 3,345,890

MACHINE FOR TREATING WHEELS OF RAILROAD VEHICLES

Filed Feb. 7, 1966 4 Sheets-Sheet 1

Fig. 1



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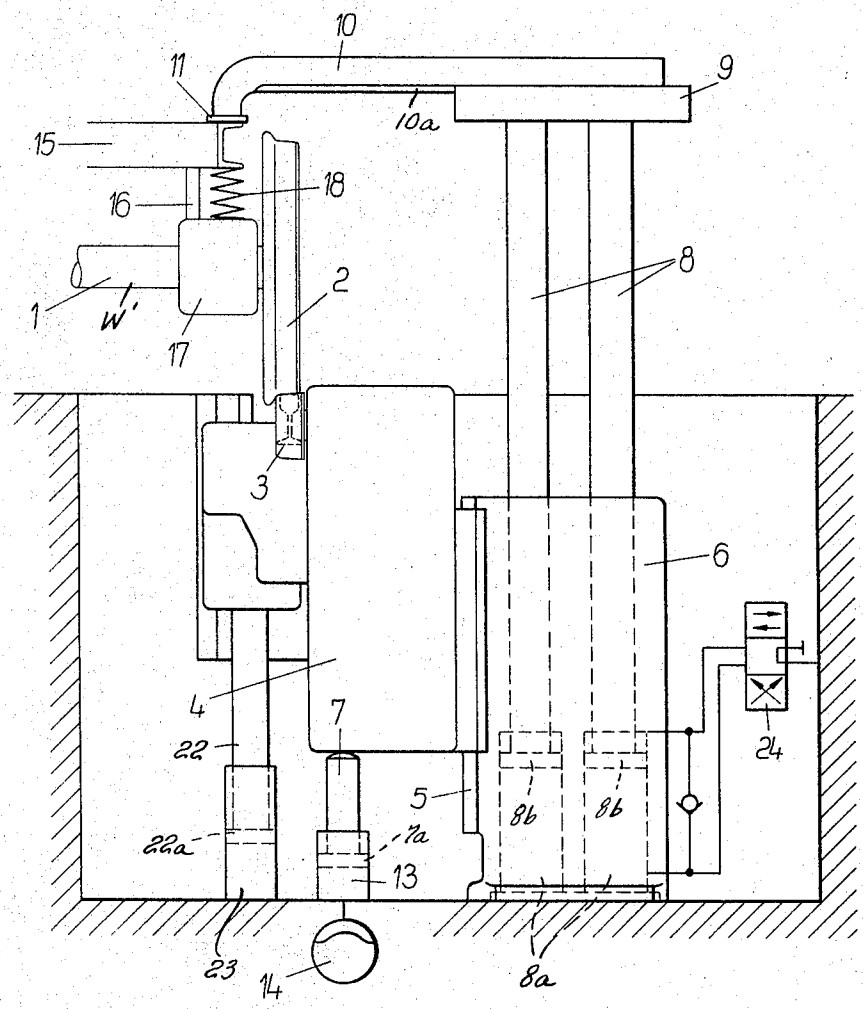
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MACHINE FOR TREATING WHEELS OF RAILROAD VEHICLES

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Fig. 2



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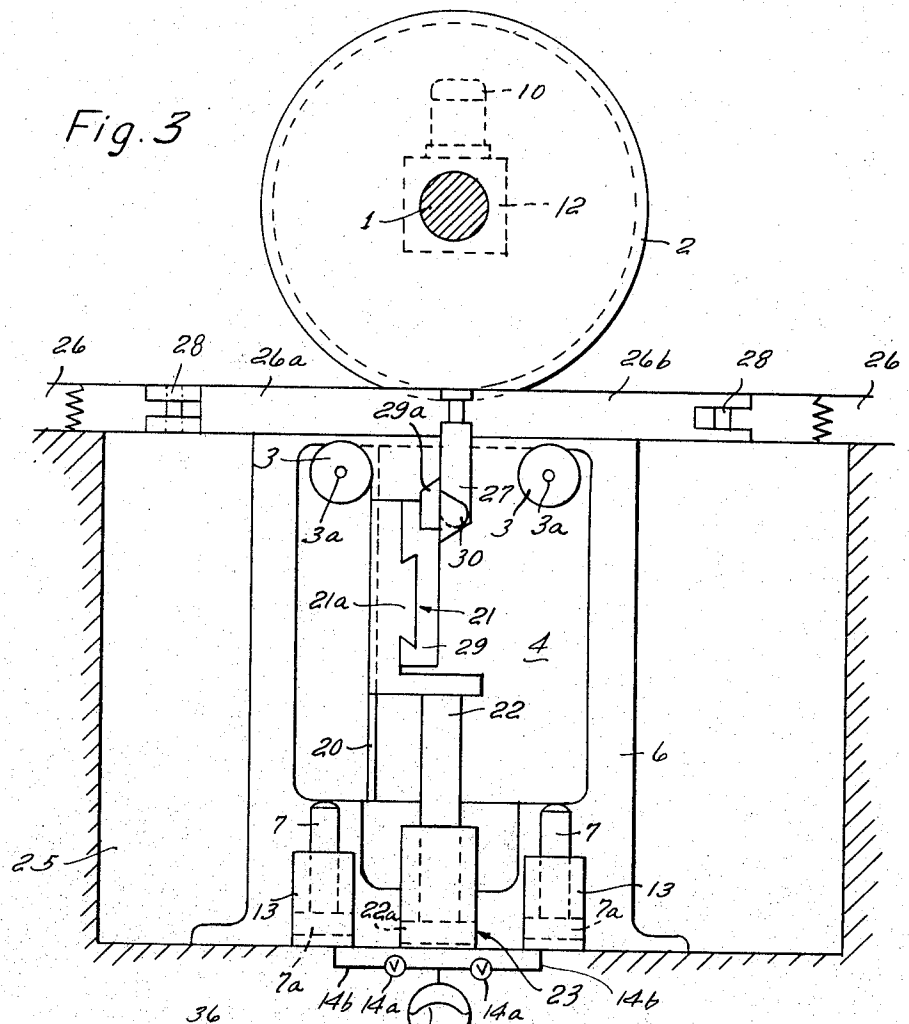
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MACHINE FOR TREATING WHEELS OF RAILROAD VEHICLES

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Fig. 3



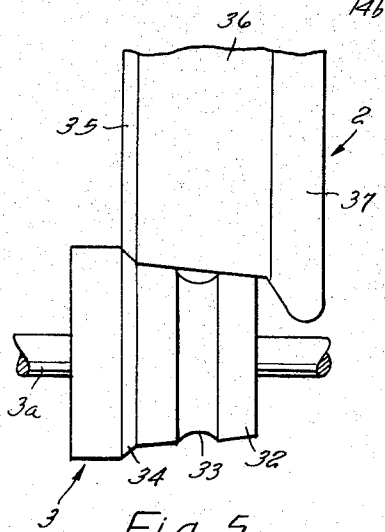


Fig. 5

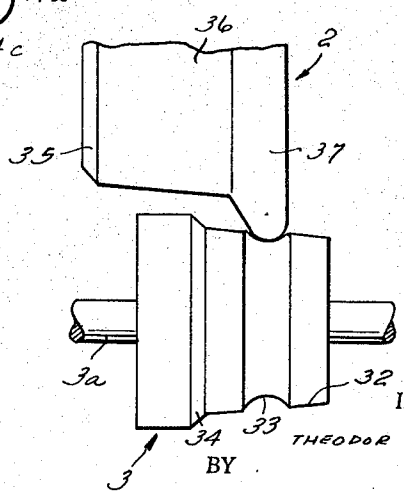


Fig. 6

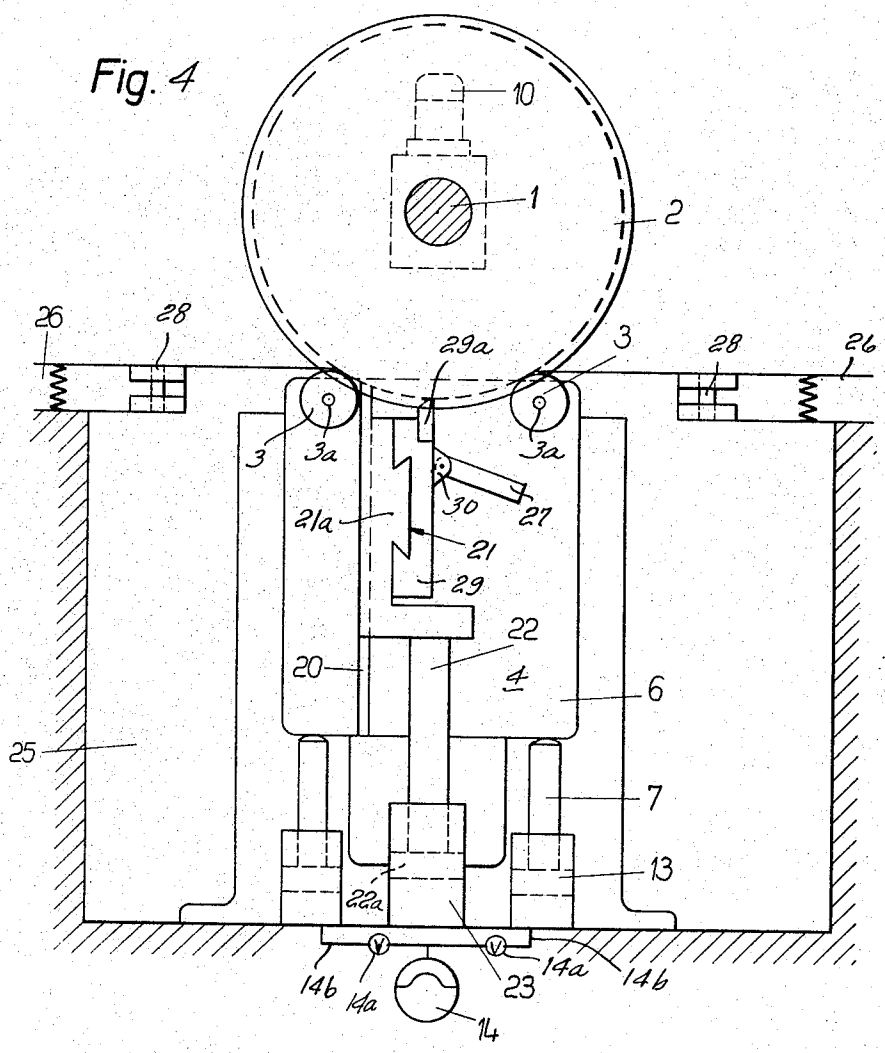
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Fig. 4



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United States Patent Office 3,345,890 Patented Oct. 10, 1967

3,345,890

MACHINE FOR TREATING WHEELS OF RAILROAD VEHICLES

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Claims priority, application Germany, Feb. 12, 1965, H 55,142
14 Claims. (Cl. 82—8)

The present invention relates to a machine for treating the wheels of railroad vehicles. More particularly, the invention relates to a machine which can turn, or otherwise remove material from, the rims and flanges of wheels on wheel assemblies without necessitating dismantling of such assemblies. Still more particularly, the invention relates to a machine which treats the wheels while the wheels remain mounted an their axle and while the wheels are caused to rotate with reference to one or more material removing tools.

It is well known that the rims and flanges of wheels on railroad vehicles must be treated from time to time to eliminate such unevennesses which develop due to deformation resulting from strong impact of a hard object against the wheels, from extensive wear in response to prolonged rubbing and rolling contact with the rails or brakes, and/or from eccentricity of wheels. As a rule, each modern railroad vehicle is equipped with so-called multiple-wear wheels which can be turned from time to time to eliminate shoulders which develop on the rims in response to engagement with the brakes and/or other unevennesses. Conventional machines which are used for turning of railroad wheels are normally mounted in pits below the level of rails and are equipped with two pairs of driving rollers which can move up and down to support and to rotate both wheels of a wheel assembly at a time while a cutter removes material first from the rim and, if necessary, from the flange of the respective wheel. The thickness of shavings which can be removed from revolving wheels depends on the torque which can be transmitted by the driving rollers. The magnitude of such torque depends on the pressure between the wheels and the driving rollers and on the coefficient of friction.

The weight of a locomotive or of a loaded freight car normally suffices to insure satisfactory engagement between the wheels and the driving rollers. However, when such conventional apparatus are called upon to treat the wheels of empty passenger coaches or empty freight cars, it happens again and again that the weight of the vehicle does not suffice to insure satisfactory transmission of torque. The problem is even more acute when a wheel assembly (which includes two wheels, two journal boxes and an axle) is detached from the remainder of the vehicle and is treated subsequent to such detachment. The weight of a wheel assembly is relatively small (when compared with the weight of a normal locomotive) so that the treatment of wheels progresses very slowly because the tools cannot remove too much material at a time without risking slippage of driving rollers, excessive vibration and noise, breakage of tools and other inconveniences.

Accordingly, it is an important object of the invention to provide a novel machine which can treat both wheels of a wheel assembly at a time and which is constructed and assembled in such a way that it can compensate for insufficient weight of a wheel assembly in order to insure that the wheels will rotate with the driving rollers even when the tools which treat the rims and/or the flanges remove relatively thick shavings from the peripheral surfaces of such parts.

Another object of the invention is to provide a machine

of the just outlined characteristics which may be used for treatment of both wheels of a wheel assembly at a time, regardless of whether the wheel assembly is detached from or remains mounted in a railroad vehicle.

A further object of the invention is to provide a machine of the above outlined characteristics which is capable of insuring satisfactory rotation of wheels on wheel assemblies of the type wherein the journal boxes are located between the wheels or vice versa.

An additional object of the instant invention is to provide a novel system of clamping units which may be utilized in the improved machine to transmit stresses to a wheel assembly in a sense to retain the wheels in satisfactory motion receiving engagement with the driving rollers.

Still another object of the invention is to provide a machine for turning the wheels of wheel assemblies in railroad vehicles which is constructed and assembled in such a way that the turning of wheels requires much less time than in presently known turning machines.

An additional object of my invention is to provide a novel control system which regulates the operation of moving parts in the improved machine and to construct and assemble the control system in such a way that each wheel of a wheel assembly can be pressed against the corresponding set of driving rollers with an accurately determined force such as is best suited for rapid removal of material from the rims and flanges of the wheels.

An ancillary object of the present invention is to provide very simple stress transmitting devices which may be utilized in the improved machine when the latter is to treat the wheels of wheel assemblies wherein the journal boxes are located between the wheels.

Briefly stated, one feature of my present invention resides in the provision of a pit-mounted machine for treating the wheels of wheel assemblies on railroad vehicles (either while the assemblies are detached from or while such assemblies remain connected to the vehicles). In its elementary form, the improved machine comprises a pair of vertically reciprocable slides or similar supports, one for each wheel of a wheel assembly, two sets of driving rollers each mounted on one of the supports, a drive for rotating the rollers whereby the rollers drive the corresponding wheels when they are allowed to engage the wheels, first displacing means for moving the supports up and down so that the rollers may engage the respective wheels of a wheel assembly when the supports are caused to move upwardly so that the weight of the assembly rests on the rollers, a pair of ground-supported clamping units, one for each wheel of a wheel assembly, and second displacing means for moving the clamping units up and down so that, while moving downwardly, each clamping unit may engage the wheel assembly in the region of the respective wheel in order to press the wheels against the corresponding rollers. This insures that the rollers can transmit a very high torque despite the fact that the turning tools remove relatively thick shavings from the revolving wheels and irrespective of the exact weight of the wheel assembly and of all parts which are supported thereby, i.e., regardless of whether the wheel assembly is mounted in or detached from a locomotive, coach, freight car or another railroad vehicle.

If the journal boxes of the wheel assembly are located between the wheels, the jaws of the clamping units preferably straddle the wheels and may transmit stresses through the intermediary of suitable wedges or analogous stress transmitting devices which are placed onto the journal boxes. If the wheels are located between the journal boxes, the jaws of the clamping units may engage the journal boxes without interposition of stress transmitting devices.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved machine itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawings, in which:

FIG. 1 is a somewhat schematic side elevational view of one-half of a pit-mounted wheel turning machine which embodies one form of my invention and which is shown in the process of treating the wheels of an assembly wherein the wheels are located between the journal boxes so that the clamping units can be moved into direct engagement with the journal boxes;

FIG. 2 is a similar view of one-half of a pit-mounted machine which is about to treat the wheels of an assembly wherein the journal boxes are located between the wheels;

FIG. 3 is a section as seen in the direction of arrows from the line III—III of FIG. 1 and illustrates a wheel assembly before the wheels are actually engaged by the driving rollers;

FIG. 4 is a similar section and illustrates the driving rollers in actual driving engagement with the wheels;

FIG. 5 is an enlarged fragmentary side elevational view of a wheel and illustrates the manner in which a driving roller can support the rim of the wheel; and

FIG. 6 is a similar fragmentary side elevational view and illustrates the manner in which the driving roller can engage and support the flange of the wheel.

Referring first to FIGS. 1 and 3, there is shown one half of a machine which is mounted in a pit **25** and serves to turn the flanges and rims of wheels **2** on wheel assemblies W of the type comprising an axle **1**, two wheels **2** and two journal boxes **12**. In the embodiment of FIGS. 1 and 3, the wheels **2** are located between the journal boxes **12**. The pit **25** forms part of a twin or dual pit whose halves are located below the wheels **2** when the assembly W is caused to advance to a level above the machine. Thus, the second pit **25** is located to the left of FIG. 1 below the left-hand wheel (not shown) of the assembly W. However, it is clear that the pit can consist of a single excavation which then extends along the full length of the axle **1**.

FIGS. 1 and 3 show one of the rails **26** which support the assembly W during travel to and from the actual treating or working station. This rail **26** comprises two portions **26***a*, **26***b* which can extend across the pit **25** of FIGS. 1 and 3 and are swingable about vertical pivots **28** toward and away from the observer of FIG. 3.

Since the improved machine comprises two mirror symmetrical parts or halves whose construction and mode of operation are identical, it suffices to describe the part which is shown in FIGS. 1 and 3. This part comprises a main carrier or housing **6** which is mounted on the bottom wall of the pit **25** and is provided with vertical ways **5** for a first slide or support **4** which carries a set of driving rollers **3** each rotatable about a horizontal axis. The support **4** is movable up and down along the ways **5** by a hydraulic displacing device which includes two piston rods **7** whose pistons **7***a* are reciprocable in upright cylinders **13** mounted on the bottom wall of the pit **25** at a level below the support **4**.

A pivotable auxiliary supporting member or prop **27** is mounted on a second slide or tool holder **29** carried by a third slide **21** which is reciprocable along vertical ways **20** provided on the support **4**. The tool holder **29** is movable along ways **21***a* on the slide **21**, the ways **21***a* being parallel with the axle **1**. The tool holder **29** also supports a turning tool **29***a* which can be moved upwardly in response to displacement of the slide **21** so as to remove material from the rim or from the flange of the wheel **2**.

When the wheel assembly W is advanced to the working station, the rail portions **26***a*, **26***b* assume the positions shown in FIG. 3 and the support **4** is moved to its lower end position. The rail portions **26***a*, **26***b* define between themselves a gap which receives the prop **27** whose head **27***a* then engages the rim of the wheel **2**. By slightly raising the slide **21**, the operator can lift the wheel **2** above the rail **26** so that the rail portions **26***a*, **26***b* may be swung away. The support **4** is then raised (see FIG. 4) and the slide **21** is lowered so that the head **27***a* moves to a level below the wheel **2** and the latter rests solely on the driving rollers **3**. By pivoting the prop **27** to the idle position of FIG. 4 and by thereupon raising the slide **21**, the operator can move the tip of the tool **29***a* into engagement with the wheel **2**. Also, by shifting the tool holder **29** along the ways **21***a* of the slide **21**, the operator can place the tool **29***a* into registry with the rim or with the flange of the wheel **2**.

As shown in FIGS. 3 and 4, the machine comprises a further ground-supported cylinder **23** which accommodates a piston **22***a* whose piston rod **22** can raise the slide **21** along the ways **20** together with the tool holder **29**, prop **27** and tool **29***a*.

In accordance with an important feature of my invention, the housing **6** further carries a second support or crosshead **9** for a horizontally reciprocable clamping unit **10** having a jaw **11** which can transmit stresses to the journal box **12** in order to maintain the wheel **2** in requisite motion-receiving engagement with the driving rollers **3**. The unit **10** is provided with one or more guide rails **10***a* which can slide in complementary grooves of the support **9** and are parallel with the axle **1** so that the jaw **11** may be shifted toward and away from registry with the journal box **12**.

The displacing means for moving the clamping unit **10** up and down comprises two hydraulic cylinders **8***a* which are installed in or form part of the housing **6**, two pistons **8***b* which are reciprocable in the cylinders **8***a*, and two upright piston rods **8** which are connected with the pistons **8***b* and support **9**.

Referring again to FIGS. 3 and 4, the prop **27** is hinged at **30** so that it may turn about a horizontal pivot axis (compare FIGS. 3 and 4). Instead of actually engaging the wheel **2**, the prop **27** may serve as an abutment for the free ends of the rail portions **26***a*, **26***b* and is lowered when the weight of the assembly W is transferred onto the driving rollers **3** in response to raising of the support **4** by the piston rods **7**.

The motor or motors which drive the shafts **3***a* of the rollers **3** are accommodated in the support **4**. For example, the rollers **3** may be driven by a single electric motor.

FIG. 5 illustrates the manner in which a driving roller **3** can support the rim **36** of a wheel **2**. The rim **36** is of slightly conical shape and is engaged by a complementary frustoconical portion **32** of the roller **3**. The flange **37** of the wheel **32** is adjacent to the smaller-diameter end of the frustoconical portion **32** and the roller **3** further comprises a strongly conical portion **34** which rolls along a complementary conical portion **35** of the wheel **2**.

By shifting the roller **3** axially of the shaft **3***a*, the flange **37** may register with and can thereupon enter a circumferential groove **33** in the frustoconical portion **32**, see FIG. 6. The tool **29***a* is then free to treat the rim **36**. In the position of FIG. 5, the roller **3** does not interfere with removal of material from the flange **37**.

It will be seen that the conical portions **33**, **34** (in cooperation with similar conical portions of driving rollers **3** which engage and support the second wheel **2**) hold the assembly W against any axial displacement during removal of material by the tools **29***a*. When the flanges **37** enter the grooves **33** of the corresponding rollers **3**, the assembly W is again held against axial movement.

The hydraulic control system of the machine comprises a pressure tank **14** which may be connected with the lower chambers of the cylinders **13** by means of valves **14***a* installed in connecting conduits **14***b* so that the support **4** and the rollers **3** may actually "float" to follow the outline

of an eccentric wheel 2. This insures that both rollers 3 remain in continuous driving engagement with the wheel 2 even if the rim 36 or the flange 37 exhibits flat surface portions, shoulders, excessively worn-down surface portions or other defects. The pressure tank 14 may comprise two compartments which are separated by a diaphragm 14c and the lower of which is filled with strongly compressed nitrogen or other suitable gas. The upper compartment is filled with oil or another hydraulic fluid and is connected with the lower chambers of the cylinders 13 when the valves 14a are open.

The valves which admit or permit discharge of oil from the lower chambers of the cylinders 13 in order to raise or lower the support 4 are not shown in the drawings. A distributor valve 24 (see FIG. 1) is used to regulate the flow of oil into the upper and lower chambers of the cylinders 8a in order to raise or lower the clamping unit 10. Thus, when the valve 24 admits a suitable pressure medium into the upper chambers of the cylinders 8a, the jaw 11 of the clamping unit 10 moves downwardly and bears against the journal box 12 in order to insure that the wheel 2 is properly biased against the driving rollers 3. The valve 24 can regulate the pressure in the cylinders 8a so that the stresses transmitted by the unit 10 are fully controlled and may be selected in dependency on the rate at which the tool 29a is fed against the wheel 2. Such feed is controlled by a valve (not shown) which admits oil into the lower chamber of the cylinder 23 so that the slide 21 moves upwardly and raises the tool.

FIG. 2 illustrates one half of a somewhat modified machine which comprises all the elements of the heretofore described machine and is further provided with a stress transmitting device 16. Such device is necessary because the machine of FIG. 2 is illustrated in the process of treating the wheels 2 of an assembly W' wherein the journal boxes 17 are located between the wheels. The assembly W' is assumed to be mounted in a railroad vehicle having a frame member 15 which can be directly engaged by the jaw 11. Of course, the unit 10 has been shifted along the support 9 so that it overlies and straddles the wheel 2 and its jaw 11 is located at a level above the journal box 17. The device 16 is actually a wedge or another suitable distancing member which is inserted between the frame member 15 and box 17 to offset the action of the customary spring 18. Thus, the device 16 prevents the frame member 15 from moving closer to the box 17 so that the latter transmits stresses from the jaw 11 to the axle 1 and thence to the wheel 2 which bears against the driving rollers 3. The remaining parts of the machine shown in FIG. 2 are identical with the parts of the machine which is illustrated in FIGS. 1 and 3 to 6.

The operation of the machine shown in FIG. 2 is as follows:

When a locomotive or another railroad vehicle is to have its wheels turned by the tools 29a, the vehicle is driven onto the rail portions 26a whose free ends are then supported by the prop 27. The supports 4 are then lifted by admitting fluid below the pistons 7a so that the driving rollers 3 engage and lift the wheels 2 above the rail 26. In the next step, the rail portions 26a, 26b are swung aside and the rollers 3 are coupled to their motor or motors to rotate the wheels 2. The clamping units 10 are lifted sufficiently above the wheels so that their jaws 11 may be shifted above the frame member 15. By admitting oil above the pistons 8b, the operator causes the jaws 11 to descend and to bear against the frame member 15 whereby the latter transmits stresses through the distancing members 16, journal boxes 17 and axle 1 so that the wheels 2 bear against the rollers 3. The cylinders 23 receive oil below the pistons 22a so that the slides 21 rise and move the tips of the tools 29a into material removing engagement with the rims 36 or flanges 37. The valves 14a are opened so that the rollers 3 are biased against the wheels 2 and remain in contact with such wheels regardless of eventual eccentricity or other defects. The pressure between the rollers 3 and wheels 2 may be regulated by the valve 24 and/or by the valves 14a. The slides 21 and the clamping devices 10 are supported by the ground so that they need not participate in any reciprocatory movements of the parts 2 and 3. As a rule, the flanges 37 are treated after the treatment of rims 36 is completed. This is due to the fact that the flanges are normally subjected to lesser wear. The ways 20 enable the supports 4 to move with reference to the slides 21 or vice versa.

A very important advantage of my improved machine is that it can rapidly complete the treatment of wheel assemblies which may but need not be mounted in a railroad vehicle. Also, the improved machine can treat wheels with damaged flanges and/or rims. The machine requires little time for a new setup, for example, when a relatively heavy locomotive is followed by a relatively light subway car, or vice versa.

Since the machine insures that the pressure between the wheels and the driving rollers suffices for transmission of driving torque irrespective of the weight of the wheel assembly, the turning tools are not likely to break and can remove relatively thick shavings to thereby reduce the time which is necessary for completion of a turning operation. The thickness of shavings varies in the course of the actual turning operation because the wear on all portions of a rim or flange is not uniform. Therefore, and in order to prevent breakage of tools, the operators of conventional wheel turning machines invariably set the tools in such a way that they remove little material at a time whereby the interval required for completion of the operation is much longer than desirable. My improved machine fully avoids such drawbacks of conventional machines, not only because the jaws 11 of the clamping devices 10 prevent upward movement of the journal boxes 12 or 17 but also because the tanks 14 compensate for eventual eccentricity of wheels so that the displacing devices for the supports 4 act not unlike cushions to maintain the driving rollers 3 in continuous motion transmitting contact with the wheels.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of my contribution to the art and, therefore, such adaptation should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is:

1. A pit-mounted machine for treating the wheels of wheel assemblies on railroad vehicles, comprising a pair of supports, one for each wheel of a wheel assembly; two sets of driving rollers each mounted on one of said supports; first displacing means for moving said supports up and down so that the rollers may engage the respective wheels from below when the supports are moved upwardly; a pair of ground-supported clamping units, one for each of said wheels; and second displacing means for moving said clamping units up and down so that, while moving downwardly, each of said units may engage the wheel assembly in the region of the respective wheel to press the wheels against the corresponding sets of rollers.

2. A machine as set forth in claim 1 for treating the wheels of wheel assemblies wherein each assembly comprises two journal boxes located between the wheels, further comprising stress-transmitting devices adapted to be placed between the journal boxes and the respective clamping units so that, while moving downwardly, such units may transmit stresses through the respective devices.

3. A machine as set forth in claim 1 for treating the wheels of wheel assemblies wherein each assembly comprises two journal boxes with the wheels located between

such journal boxes, each of said clamping units comprising a portion arranged to bear against the respective journal box when the wheels rest on the corresponding rollers and the clamping units move downwardly.

4. A machine as set forth in claim 1, further comprising two vertically reciprocable ground-supported tool holders, one for each wheel of a wheel asembly, and third displacing means for moving the tool holders up and down whereby the tools mounted on such tool holders can move into and from material removing engagement with the wheels.

5. A machine as set forth in claim 4, wherein each of said displacing means comprises at least two hydraulic cylinder and piston assemblies.

6. A machine as set forth in claim 4, wherein said tool holders are reciprocable along ways provided on the respective supports.

7. A machine as set forth in claim 1, wherein each of said clamping units is reciprocable in the axial direction of a wheel assembly on said driving rollers.

8. A machine as set forth in claim 1, wherein said first displacing means comprises a pair of cushioning means for biasing said rollers against the respective wheels.

9. A machine as set forth in claim 1, further comprising ground-supported housing means for said supports, said housing means including vertical ways for said supports.

10. A machine as set forth in claim 9, wherein said housing means comprises two separate parts, one for each of said supports.

11. A machine as set forth in claim 1, wherein said clamping units are arranged to prevent upward movement of the journal boxes of a wheel assembly on said rollers and said first displacing means comprises means for yieldably biasing the rollers upwardly and against the wheels.

12. A machine as set forth in claim 1, further comprising drive means for said rollers including a horizontal shaft for each roller, said rollers being adjustable in the axial direction of the respective shafts so that each thereof may transmit torque to the rim or flange of a wheel.

13. A machine as set forth in claim 1, wherein said clamping units are reciprocable in the axial direction of said rollers.

14. A machine as set forth in claim 1, wherein said displacing means comprises fluid-operated cylinder and piston assemblies and control means for operating said assemblies independently of each other.

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