July 4, 1939. W. T. BITLER ET AL 2,164,491

WHEEL GRINDING MACHINE

Filed May 17, 1938 3 Sheets-Sheet 1

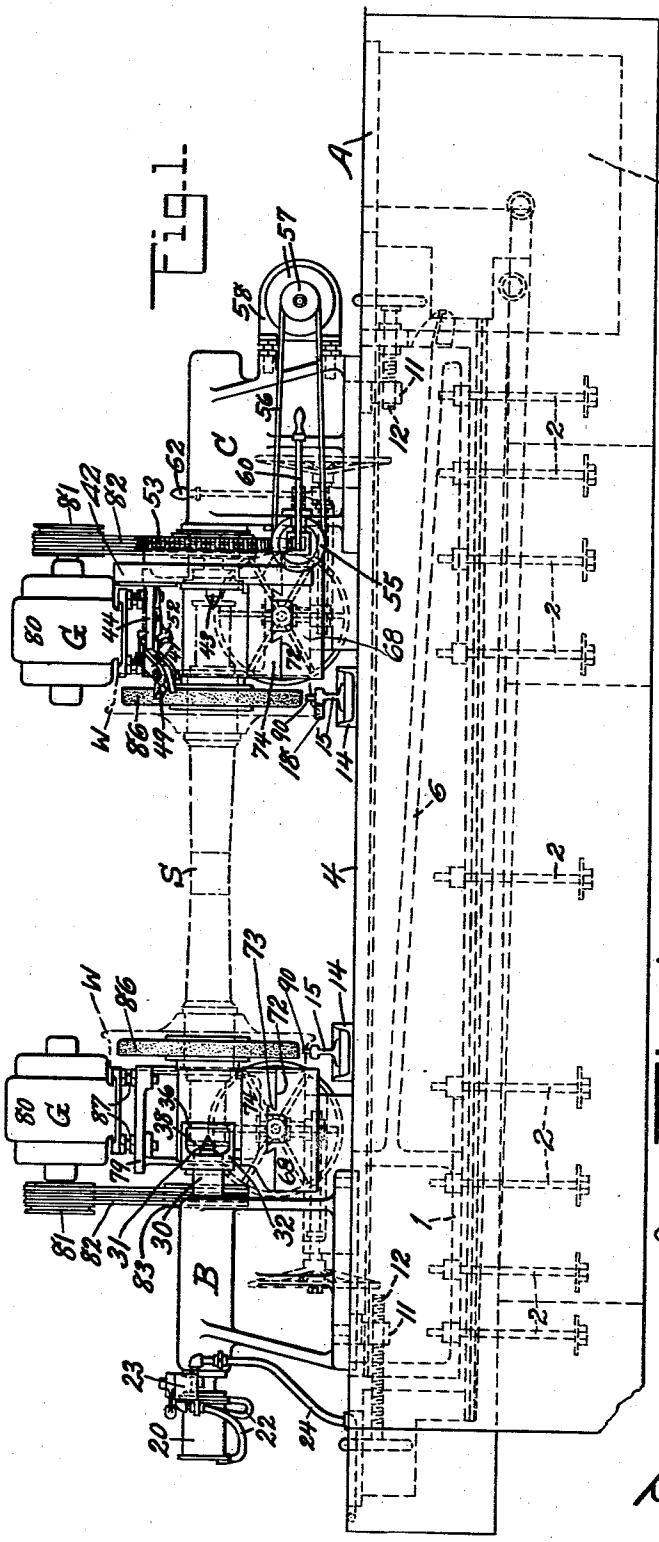

Fig. 1.

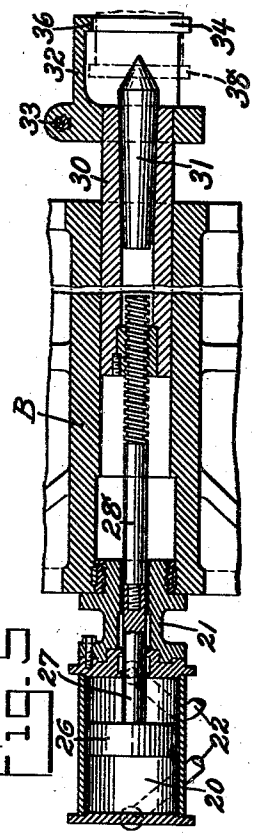

Fig. 5.

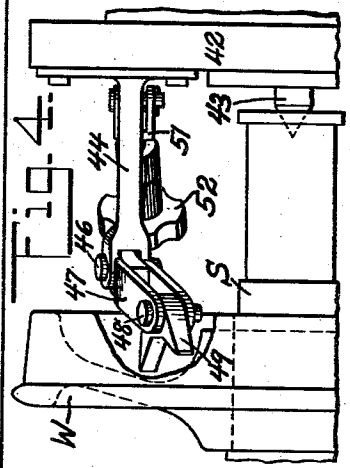

Fig. 4.

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WHEEL GRINDING MACHINE

Filed May 17, 1938 3 Sheets-Sheet 2

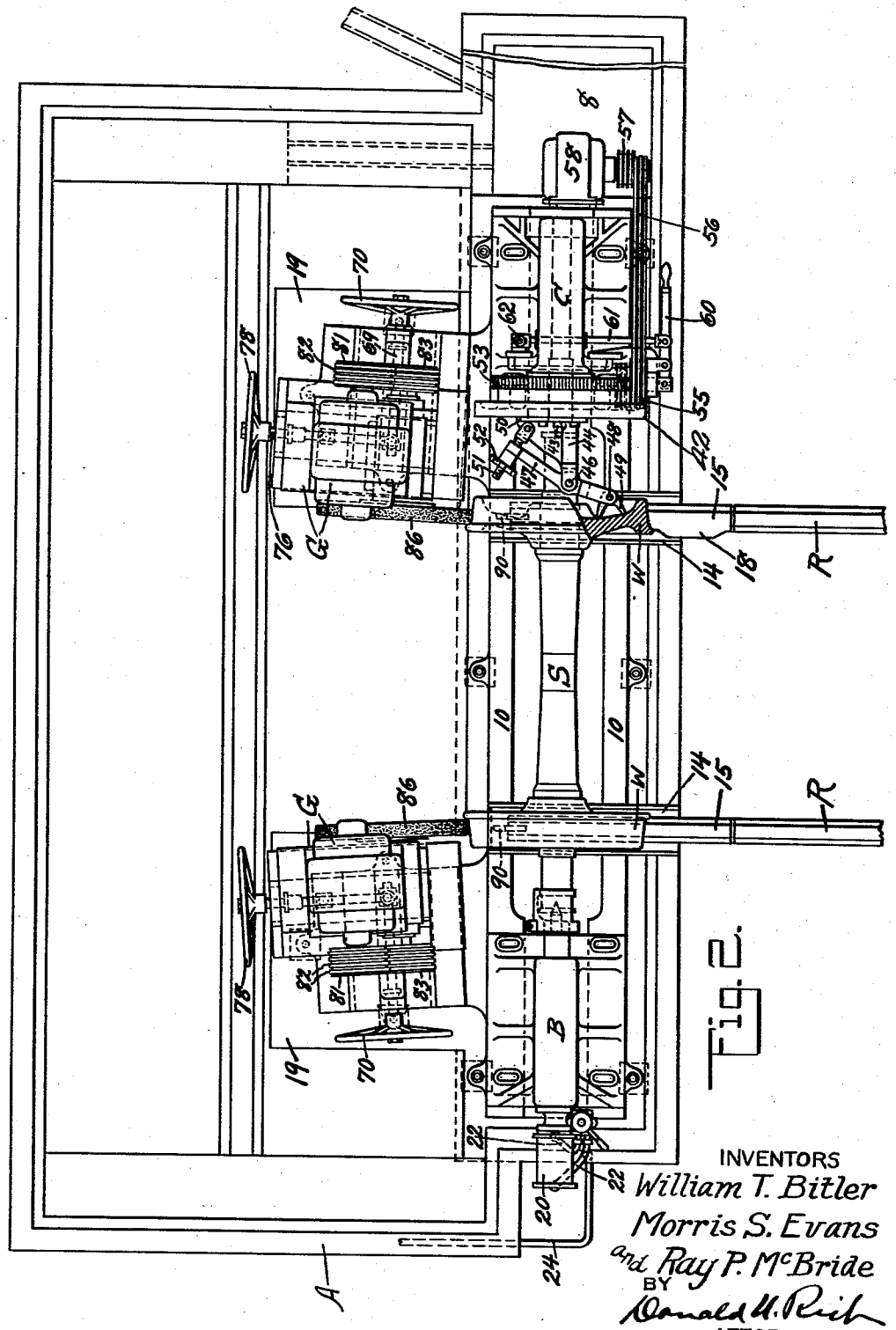

Fig. 2.

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WHEEL GRINDING MACHINE

Filed May 17, 1938 3 Sheets-Sheet 3

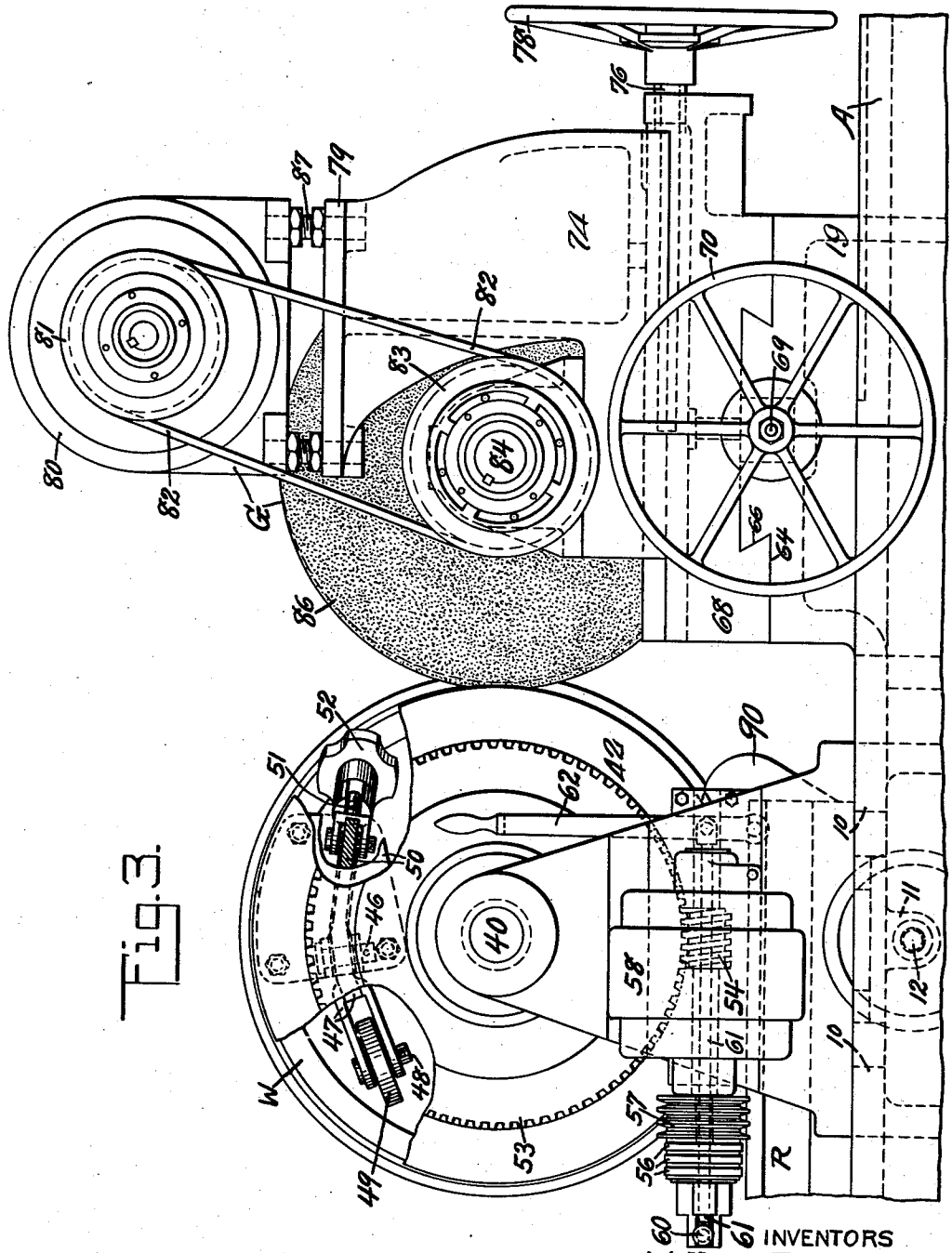

Fig. 3.

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UNITED STATES PATENT OFFICE

2,164,491

WHEEL GRINDING MACHINE

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Application May 17, 1938, Serial No. 208,476

15 Claims. (Cl. 51—51)

This invention relates to grinders in general and in particular to wheel grinding machines adapted for use on railway wheels.

In the past grinding machines have been built which ground wheels either alone or when mounted upon their axis but these machines have all been extremely slow in operation due to the large amount of time and effort necessary to mount the wheel in preparation for grinding. The majority, if not all, of these earlier machines were so constructed that harmful vibrations were set up causing corrugations in the tread surface and leaving the wheel in nearly as bad condition as it was before the grinding operation, with the result that a considerable number of machines were built using a friction grinding block which was of necessity extremely slow and inefficient since it does not insure a precisely true cylindrical surface. It is an object, therefore, of the present invention to provide a grinding machine with the component parts so constructed and arranged as to practically eliminate harmful vibrations.

A further object of the invention is the provision of a machine in which a pair of wheels may be ground after being pressed upon the supporting axle.

A still further object of the invention is the provision of a grinding machine in which the axle and wheel pair may be rolled into the machine and supported at the axle center for rotation during grinding.

Yet another object of the invention is the provision of a grinding machine in which the axle and wheel pair may be rolled into the machine and lifted by power means for support upon the axle center for grinding the outer surface.

These and other objects of the invention will be apparent to persons skilled in the art after a study of the following description and accompanying drawings, in which

Figure 1 is an elevational view showing the side of the machine toward which the work is rolled;

Fig. 2 is a plan view of the improved machine showing a wheel and axle assembly in position for grinding;

Fig. 3 is an end elevational view looking toward the headstock of the machine;

Fig. 4 is an enlarged view showing the drive means carried by the headstock spindle, and

Fig. 5 is an enlarged sectional view showing the power actuated means mounted upon the tailstock.

Referring now to the drawings in detail, it is seen that the machine consists generally of a massive base A, upon which is mounted tailstock B, headstock C together with its propelling means, and the grinding assemblies G. The machine base may be made in various forms without effecting the remainder of the machine materially but in any case it appears preferable that the base be made as heavy and rigid as possible to eliminate transmission of vibrations between the various units mounted thereon. In the present instance the base has been made of a single casting having lugs 1 or other means to receive securing bolts 2 by means of which it is mounted upon a concrete or other sub-base and having also a plane upper surface 4 upon which the head and tail stocks may be mounted. A web 6 is also provided slanting toward one end in order to drain water or other cooling fluid and refuse to the primary settling pit 8 in which the heavier refuse particles are precipitated. The central portion of the upper surface is eliminated in order to provide the spaced side members 10 between which a projection 11 of the head and tail stock assemblies extends to cooperate with a screw or other device 12 for moving the assembly longitudinally of the base. A pair of channels or similar members 14 are clamped to the side pieces intermediate the head and tailstocks and upon these members are mounted short rail sections 15, one of which is provided with a lug 18 secured to the inner surface of the head in order to contact the flange of a wheel and move it sidewise for a purpose later to be explained. The base is also provided with lateral projections 19 forming heavy structures upon which the grinding assemblies, later to be described, may be mounted.

The tailstock B in the present machine is mounted upon the base and formed at its upper portion with a substantially tubular portion adapted to receive the power actuated mechanism. The power actuated mechanism consists of a fluid cylinder 20 secured by means of an adapter 21 to the tailstock casting and supplied through pipes 22 from a valve 23 and main supply pipe 24. The cylinder piston 26 is carried by piston rod 27 connected to an extension piston rod 28 adjustably secured to a slide member 30 slidably mounted in the tubular upper portion of the tailstock casting. The slide member is provided with a hollow center sleeve one end of which is tapered to receive dead center 31 thus forming a reciprocable assembly which is adapted to carry on the outer end thereof a pulling member 32 clamped to the slide member

or assembly by bolt or other means 33. The pulling member is substantially cylindrical with a portion thereof removed as at 34 and is provided with a shoulder portion 36 adapted to engage the rim 38 left on the outer end of the axle (Figs. 1 and 5). It is seen that application of fluid under pressure to the cylinder will cause reciprocation of the slide member, pulling head, and dead center in unison within the tubular portion of the tailstock casting, but it is to be understood that the slide member, pulling member and dead center may be operated by hand and screw means in a manner such as is conventional on machine lathes.

The headstock C is formed of a casting mounted upon the side pieces of the base and is formed at its upper end with a portion 40 projecting to one side of the casting to rotatably receive a drive disc 42 journaled thereon by means of a shaft (not shown) and to receive the dead center 43 located substantially at the center of the drive disc 42. At some suitable point near the periphery of the drive disc 42 a bracket 44 is secured which carries at its outer end a pin 46 pivotally mounting a bar 47. The bar has its central portion substantially solid and its end portions bifurcated with one end portion pivotally carrying as at 48 a U-shaped driving dog 49 and at its other end the bifurcations are left open in order to receive therebetween a clamping mechanism. The clamping mechanism consists of a base member 50 secured to the driving disc and pivotally carrying a bolt 51 and threaded hand wheel 52 adapted to engage the bifurcated arms of the bar and permit pressure to be applied thereto to urge the driving dogs outwardly away from the drive disc 42. The shaft (not shown) which carries the drive disc 42 is also provided inward of the drive disc 42 with a worm wheel 53 adapted to be engaged by a worm 54 (Figs. 2 and 3) connected to pulley 55. The pulley 55 may be driven by a plurality of V belts 56 from the pulleys 57 carried upon the armature shaft of a wheel driving motor 58 securely mounted upon the headstock casting. In order to stop rotation of the driving disc 42 and wheel and axle assemblies a brake has been applied adjacent the pulleys 55 and this brake is preferably of the cone type actuated by a hand lever 60, which lever is also connected by rod 61 to a second hand lever 62 on the opposite side of the headstock, thus permitting operation of the brake from either side of the headstock as desired.

The grinding assemblies are substantially duplicate and, therefore, a description of any one will suffice. In the present instance the base casting projections are formed on their upper surfaces with ways 64 preferably having an outwardly directed inclined portion 66 in order that the ways formed on lower grinding assembly support block 68 may be firmly held thereon for sliding movements, which sliding movements may be controlled by screw threaded shaft 69 under control of hand wheel 70. It is to be noted that the ways on the base and lower support block are formed at such an angle relative to the axis through the head and tailstock centers as to be parallel to the conical angle of the wheel tread surface being ground. This arrangement of ways 64 will cause the grinding wheels to be moved along the tread surfaces when hand wheels 70 are actuated and will result in the axes of the grinding wheels being located at an angle relative to each other and to the axis of centers of the head and tail stocks. The lower support block is formed on its upper surface with ways 72 having downwardly converging surfaces 73 all adapted to receive similarly formed surfaces on the grinding assembly base block 74 which is slidable upon the lower support block 68 under control of threaded shaft 76 and hand wheel 78. In connection with these ways 72 it is to be noted that they are at an angle of 90° relative to the ways 64 on the lower surface of the block 68 and are at an angle other than 90° to the axis of centers of the head and tail stock assemblies thus causing the grinding assembly base block 74 to move perpendicularly toward and away from the surface to be ground under control of the hand wheel 78, and along the surface under control of hand wheel 70. The grinding assembly base block 74 is preferably formed of a single casting with an upper extension 79 carrying driving motor 80, the armature shaft of which carries pulleys 81 adapted to be connected by V or other belts 82 to pulleys 83. The pulleys 83 are keyed or otherwise secured to grinder shaft 84 suitably carried in bearings upon the grinding assembly base block 74 intermediate the pulleys and grinding wheel or stone 86. In the present instance the drive motor is adjustably mounted as at 87 upon a base block in order to accommodate various length belts and preferably the pulleys are of the adjustable pitch type which will permit speed regulations being made to accommodate changing sizes of grinding stone as the latter wears down during use, thus permitting the grinding speed to be maintained substantially constant with a constant speed motor. The usual safety guards over pulleys and grinding stones are, of course, provided but in order to simplify the drawings such safety devices have been eliminated since they do not in any way affect the operation of the machine.

The operation of the machine is as follows, assuming the machine empty and the grinding assemblies retracted: The work, which in the present instance consists of an axle or shaft S carrying wheels W, is rolled into the machine along rails R and as soon as the flange of one wheel contacts the lug 18 the entire assembly will be shifted laterally on the rails toward the tailstock a sufficient distance to permit the axle or shaft end to clear the headstock center 43. The wheels in the meantime are rolling along rail sections 15 until such time as they strike stops 90 (Figs. 2 and 3) which will check the wheel and axle assembly as soon as the axle is substantially in line with but slightly below the axis of the machine centers. With the assembly in this position fluid or other power is applied to the cylinder 20 causing slide member 30 to shift bringing dead center 31 into engagement with the axle center and pushing the entire wheel and axle assembly toward the headstock center 43. Continued application of power will cause the wheel and axle assemblies to be lifted upon the headstock and tailstock centers, due to the taper thereof, until such time as they are firmly held with the axis of the shaft or axle and machine centers coinciding and the wheels are supported clear of the rail sections 15. The assembly is now supported upon the machine centers for rotation and an operator may now swing the clamping mechanism onto the bar 47 after which rotation of the hand wheel 52 will cause the points of the driving dog 49 to be urged outwardly against the web of the wheel which is usually rough and in most cases has lettering or other insignia thereon, thus giving a good driving con-

tact. Power is now supplied the driving motor 58 which will rotate the wheel and axle assembly through the worm drive, drive disc and driving dog. The grinding motors are now started if idle and hand wheel 78 operated to bring the grinding stone 86 into contact with the wheel tread surface preferably adjacent the wheel flange. The hand wheel 78 may be operated to advance the stone perpendicularly to the wheel tread surface so long as is necessary to bring the wheel surface to a true circle concentric with the axle axis. As soon as the grinding stone has been advanced by hand wheel 78 the necessary amount, then hand wheel 70 may be operated causing the grinding stone to move along the tread surface of the wheel since the ways 64 are substantially parallel to the tread surface. It is, of course, obvious that the grinding stone may be shifted back and forth along the tread surface during its advancement toward the wheel but in practice the procedure set forth above has been found most desirable since the wheel and axle assemblies, when in use, ride upon the surface closely adjacent the flange and, therefore, this portion should be the portion receiving the greatest amount of grinding to obtain a true surface. After completion of the grinding operation the hand wheel 78 is operated retracting the grinding stones, the power is cut off from wheel driving motor 58 and the brake applied by means of either hand lever 60 or 62 which are so operated as to stop the clamping mechanism so as to be readily accessible to an operator who will release the locking dog by loosening hand wheel 52. As soon as the clamping mechanism has been released fluid pressure or other power will be applied to the cylinder 20 retracting the dead center and permitting the wheel and axle assembly to drop down upon the rail sections 15. Continued application of power to the cylinder will cause the pulling member 32 to engage the rim on the axle or shaft pulling the entire assembly toward the tailstock a sufficient distance for the opposite end of the axle to clear the headstock center which will, of course, lower the wheels onto the rails. The ground wheel and axle assembly may now be rolled out of the machine along rail sections 15 and supply rails R, such movement being permitted since the axle ends are clear of both centers and the cut out portion of the pulling member is toward the side of the machine that the work is supplied to and removed from. It is obvious that slightly different steps may be taken in supplying and removing work from the machine, such as the application of power to the cylinder during or prior to the loosening of the clamping mechanism by an operator. In case wheel and axle assemblies having a different gauge are to be ground, then it is only necessary that one of the rail sections and either the headstock or tailstock be shifted along the base plate to accommodate the different assemblies. In practice it has been found that by metering the power input to the wheel grinding motors it is possible to grind the wheels to substantially identical circumferences, but it is obvious this is not the only means of so controlling the grinding operation.

While the machine and its operation has been described more or less in detail, it is obvious that modifications, rearrangements of parts and different operations will suggest themselves to persons skilled in the art and all such modifications, rearrangements of parts and different operations are contemplated as fall within the scope of the following claims:

What is claimed is:

1. A machine for grinding a pair of wheels when mounted upon an axle comprising in combination, a tailstock having a center shiftable relative thereto, a headstock provided with a center located substantially in alignment with the axis of a rotatable gear carried by the headstock, power means to drive the rotatable gear, fluid pressure means to shift the tailstock center toward the headstock center to lift the wheels and axle and support the same with the axle axis substantially in alignment with the axis of said centers, means providing a driving engagement between the gear and at least one of the wheels whereby said power means may rotate the wheels and axle about the axle axis, grinding means engageable with the rotating wheels to grind the same, and means carried adjacent said tailstock center to pull the wheels and axle clear of the headstock center after the grinding of the wheels, said last named means being operable by said fluid pressure means.

2. A machine for grinding a pair of wheels when mounted upon an axle comprising in combination, a tailstock having a shiftable assembly mounted thereon and carrying a center, a headstock provided with a center located substantially in alignment with the axis of a rotatable gear carried by the headstock, power means to drive the rotatable gear, fluid pressure means to move the shiftable assembly with the associated center toward the headstock center to lift the wheels and axle and support the same with the axle axis substantially in alignment with the axis of said centers, means providing a driving engagement between said gear and one of the wheels whereby said power means may rotate the wheels and axle about the axle axis, grinding means engageable with the rotating wheels to grind the same, and means carried by said shiftable assembly adjacent the tailstock center to pull the axle clear of the headstock center after the grinding of the wheels, said means being operable with a shoulder intermediate said tailstock and headstock centers and adapted to engage said axle only after a predetermined movement of the assembly sufficient to disengage the tailstock center from the axle.

3. An assembly for grinding wheels when mounted upon their axles comprising in combination, a tailstock having a reciprocable assembly mounted thereon and provided with a center, a headstock provided with a center the axis of which is substantially in alignment with the axis of the tailstock center, means to shift the reciprocable assembly and associated center toward the headstock center to lift the shaft and support the axle with its axis substantially in coincidence with the axis of the centers, power actuated means providing a driving engagement with at least one of the wheels for rotating the wheels and axle about the axle axis, and means carried by said assembly adjacent the tailstock center to pull the shaft axle clear of the headstock center upon reverse movement of the reciprocable assembly, said means being provided with a portion spaced from said tailstock center and positioned between said tailstock center and head stock center and adapted to engage said axle after a predetermined movement of the reciprocable assembly.

4. In a machine for grinding a pair of wheels when mounted upon their axle comprising in the

combination, a tailstock having a reciprocable assembly mounted thereon and provided with a center, a headstock provided with a center the axis of which is substantially in alignment with the axis of the tailstock center, power actuated means providing a driving engagement with at least one of said wheels for rotating the wheels and axle about the axle axis, fluid pressure means to move the reciprocable assembly and associated center toward the headstock center to support the axle with its axis substantially in coincidence with the axis of the centers, and pulling means carried by said reciprocable assembly adjacent the tailstock center and operable upon reverse movement of the reciprocable assembly under control of the fluid pressure means to pull the axle clear of the headstock center.

5. In a machine for grinding a pair of wheels when mounted upon their axle comprising in the combination, a tailstock having a reciprocable assembly mounted thereon and provided with a center, a headstock provided with a center the axis of which is substantially in alignment with the axis of the tailstock center, fluid pressure means to move the reciprocable assembly and associated center toward the headstock center to support the axle with its axis substantially in coincidence with the axis of the centers, power actuated means providing a driving engagement with at least one of said wheels for rotating the wheels and axle about the axle axis and pulling means carried by said reciprocable assembly adjacent the tailstock center and operable upon reverse movement of the reciprocable assembly under control of the fluid pressure means to pull the axle clear of the headstock center, said pulling means having a portion spaced from the tailstock center and located between said center and the headstock center and being engageable with the axle only after a predetermined movement of the reciprocable assembly thereby permitting the tailstock center to clear the axle.

6. A machine for grinding a pair of wheels when mounted upon their axle comprising in combination, a tailstock having a shiftable assembly mounted thereon and carrying a center, a headstock provided with a center having its axis located substantially in alignment with the axis of a rotatable gear carried by the headstock and with the axis of the tailstock center, power means adapted to drive the rotatable gear, means to move the shiftable assembly with the center toward the headstock center to lift the wheels and axle for support with the axis of the axle substantially in alignment with the axis of said centers, means located to one side of the headstock center and providing a driving engagement between one wheel and the rotatable gear whereby said power means may rotate the wheels and axle about the axis of the centers, grinding means engageable with the wheels to grind the same, and pulling means carried by said shiftable assembly to pull the axle clear of the headstock center after the grinding of the wheels, said pulling means having a shoulder spaced from the tailstock, center and engaging the axle after a predetermined movement of the shiftable assembly sufficient to allow the tailstock center to clear the axle.

7. An assembly for grinding wheels when mounted upon their axles comprising, in combination, a pair of rails along which the wheel pairs may be rolled, a tailstock located on one side of the rails and having a shiftable assembly mounted thereon carrying a center, a headstock located on the opposite side of the rails and provided with a center having its axis substantially in alignment with the axis of the tailstock center and with the axis of a rotatable disc carried by the headstock, means on at least one rail to shift the wheels and axle laterally on the rails away from the headstock center to clear the same as the wheels and axle roll along the rails toward said center, means to move the shiftable assembly with the tailstock center toward the headstock center to engage the axle centers and lift the wheels and axle clear of the rails for rotation about the axis of said centers, said tailstock center engaging the axle and forcing the same into engagement with the headstock center, power means adapted to drive the rotatable disc, means providing a driving engagement between one wheel and the rotatable disc whereby said power means may rotate the wheels and axle, grinding means engageable with the wheels during their rotation to grind the same, and pulling means carried by said shiftable assembly to pull the axle clear of the headstock center after the grinding of the wheels, said pulling means engaging the axle after a predetermined movement of the assembly sufficient to allow the tailstock center to clear the axle.

8. An assembly for grinding wheels when mounted upon their axles comprising in combination, a pair of rails along which the wheel pairs may be rolled, a tailstock located on one side of the rails and having a shiftable assembly mounted thereon carrying a center, a headstock located on the opposite side of the rails and provided with a center having its axis substantially in alignment with the axis of the tailstock center and with the axis of a rotatable disc carried by the headstock, means on at least one rail to shift the wheels and axle laterally on the rails away from the headstock center to clear the same as the wheels and axle roll along the rails toward said centers, means to move the shiftable assembly with the tailstock center toward the headstock center to engage the axle centers and lift the wheels and axle clear of the rails for rotation about the axis of said centers, said tailstock center engaging the axle and forcing the same into engagement with the headstock center, power means adapted to drive the rotatable disc, gripping means located at one side of the disc and engageable with the web of the adjacent wheel whereby said power means may rotate the wheels and axle, grinding means engageable with the wheels during their rotation to grind the same, brake means adapted to stop movement of the disc and gripping means at any predetermined position, and pulling means carried by said shiftable assembly to pull the axle clear of the headstock center after the grinding of the wheels, said pulling means engaging the axle after a predetermined movement of the assembly sufficient to allow the tailstock center to clear the axle.

9. An assembly for grinding wheels when mounted upon their axles comprising in combination, a pair of rails along which the wheel pairs may be rolled, a tailstock located on one side of the rails and having a shiftable assembly mounted thereon carrying a center, a headstock located on the opposite side of the rails and provided with a center having its axis substantially in alignment with the axis of the tailstock center, a projection on one rail to shift the wheels and axle laterally on the rails as they roll to-

ward the axis of centers in order that the axle may clear the centers, means to move the shiftable assembly and center toward the axle to force the centers into engagement with the axle centers thereby lifting the wheels clear of the rails for rotation about the axis of the centers, grinding means engageable with the wheels to grind certain surfaces of the same, a power driven member, and gripping means carried by said member and movable into engagement with the web of a wheel whereby said wheels and axle may be rotated about the axis of the centers.

10. An assembly for grinding wheels when mounted upon their axles comprising in combination, a pair of rails along which the wheel pairs may be rolled, a tailstock located on one side of the rails and having a shiftable assembly mounted thereon carrying a center, a headstock located on the opposite side of the rails and provided with a center having its axis substantially in alignment with the axis of the tailstock center, a projection on one rail to shift the wheels and axle laterally on the rails as they roll toward the axis of centers in order that the axle may clear the centers, means to move the shiftable assembly and center toward the axle to force the centers into engagement with the axle centers thereby lifting the wheels clear of the rails for rotation about the axis of the centers, grinding means engageable with the wheels to grind certain surfaces of the same, a power driven member, and gripping means carried by said member and movable into engagement with the web of a wheel whereby said wheels and axle may be rotated about the axis of the centers, said gripping means consisting of a lever carrying prongs adapted to engage roughened areas on the wheel web and urged thereagainst by a screw device applying force to the lever.

11. An assembly for grinding wheels when mounted upon their axles comprising in combination, a pair of rails along which the wheel pairs may be rolled, a tailstock located on one side of the rails and having a shiftable assembly mounted thereon carrying a center, a headstock located on the opposite side of the rails and provided with a center having its axis substantially in alignment with the axis of the tailstock center, a projection on one rail to shift the wheels and axle laterally on the rails as they roll toward the axis of centers in order that the axle may clear the centers, means to move the shiftable assembly and center toward the axle to force the centers into engagement with the axle centers thereby lifting the wheels clear of the rails for rotation about the axis of the centers, grinding means engageable with the wheels to grind certain surfaces of the same, a power driven member, gripping means carried by said member and movable into engagement with the web of a wheel whereby said wheels and axle may be rotated about the axis of the centers, said gripping means consisting of a lever pivoted to the power the driven member and carrying at one end means to engage roughened areas on the wheel web and being urged thereagainst by a power applying device connected to the said power driven member, and pulling means carried by said shiftable assembly to pull the wheels and axle clear of the headstock center and gripping means.

12. A machine for grinding wheels when mounted upon an axle comprising in combination, a tailstock having a center, a headstock provided with a center having its axis substantially in alignment with the axis of the tailstock center, means to shift at least one center toward the other to support the wheels and axle for rotation about the axis, a power driven member carried by the headstock, gripping means carried by said member and movable into engagement with the web of a wheel whereby said wheels and axles may be rotated about the axis of the centers, grinding means movable into engagement with the rotating wheels to grind the same, said gripping means consisting of a lever pivoted upon the power driven member and carrying at one end means to engage insignia on the wheel web, said last named means being urged into engagement with the insignia by a power applying device carried by the power driven member and operating upon the lever at the opposite end of the lever from the insignia engaging means.

13. A machine for grinding wheels when mounted upon an axle comprising in part the combination of a headstock, a tailstock, centers carried by said head and tail stocks to support the axle for rotation, a power driven member, gripping means carried by the power driven member and movable into engagement with the side of a wheel whereby the wheel and axle may be rotated by the power driven member, said gripping means consisting of a lever pivoted intermediate its ends to said power driven membr, prongs pivotally connected to one end of the lever and engageable with roughened areas of the wheel side, and power applying means operating upon the opposite end of the lever to force the prongs into engagement with the roughened areas.

14. A machine for grinding wheels when mounted upon an axle comprising in part the combination of a headstock, a tailstock, centers carried by said head and tail stocks to support the axle for rotation, a power driven member, gripping means carried by the power driven member and movable into engagement with the side of a wheel whereby the wheel and axle may be rotated by the power driven member, said gripping means consisting of a lever pivoted intermediate its ends to said power driven member, prongs pivotally connected to one end of the lever and engageable with roughened areas of the wheel side, and a screw device pivotally connected to the power driven member and removably engaging the opposite end of the lever to force the prongs into engagement with the said roughened areas.

15. A machine for grinding wheels when mounted upon an axle comprising in part the combination of a headstock, a tailstock, centers carried by said head and tail stocks to support the axle for rotation, a power driven member, gripping means carried by the power driven member and movable independently of the driven member into engagement with the side of a wheel whereby the wheel and axle may be rotated by the power driven member, said gripping means consisting of a pressure applying device pivotally carried by the power driven member and engageable with roughened areas on the side of the wheel adjacent the power driven member.

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