J. KERWIN.

SURFACE GRINDER.

APPLICATION FILED OCT. 10, 1910.

1,004,276.

Patented Sept. 26, 1911.

4 SHEETS—SHEET 1.

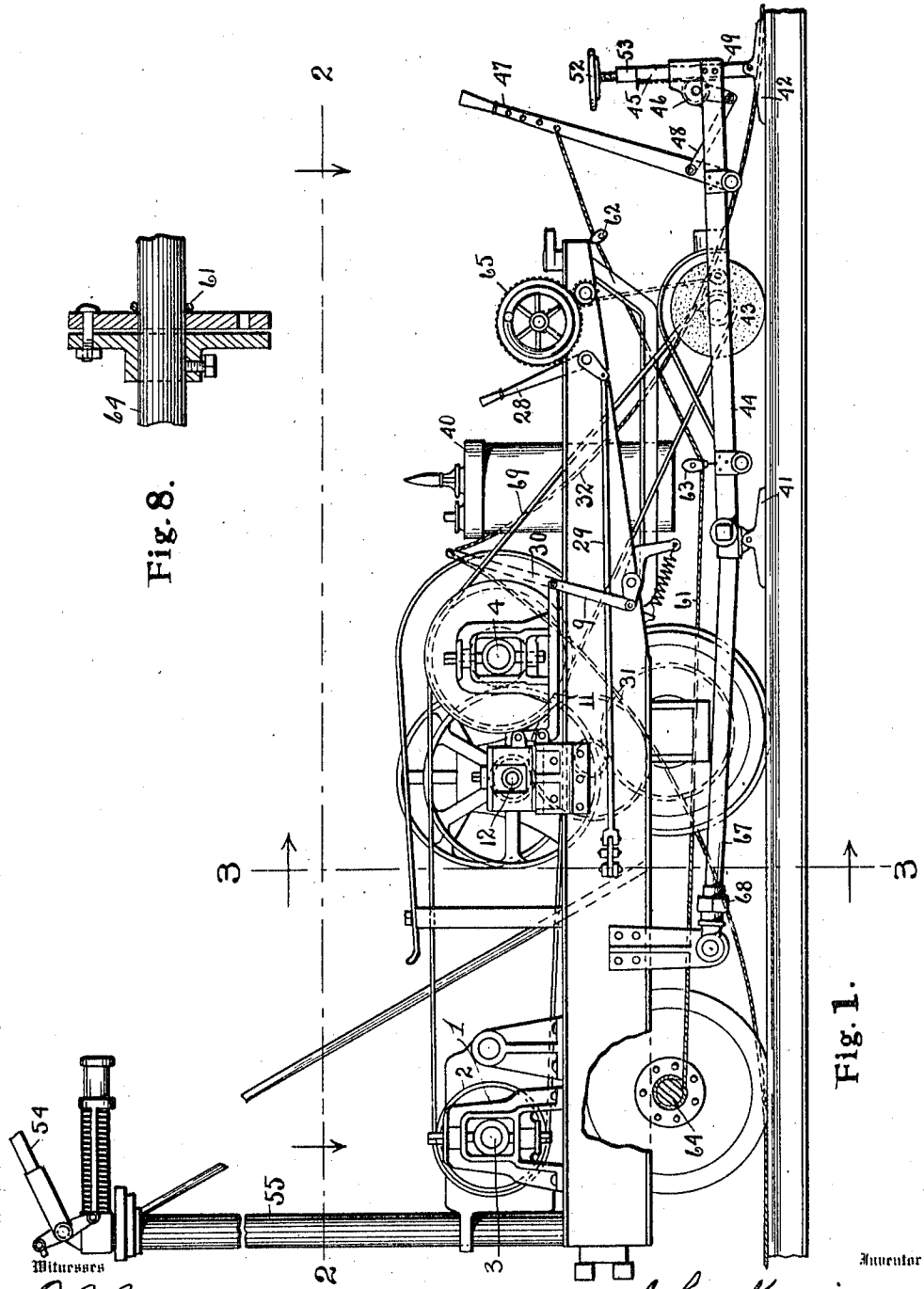

Fig. 1.

Fig. 8.

Witnesses

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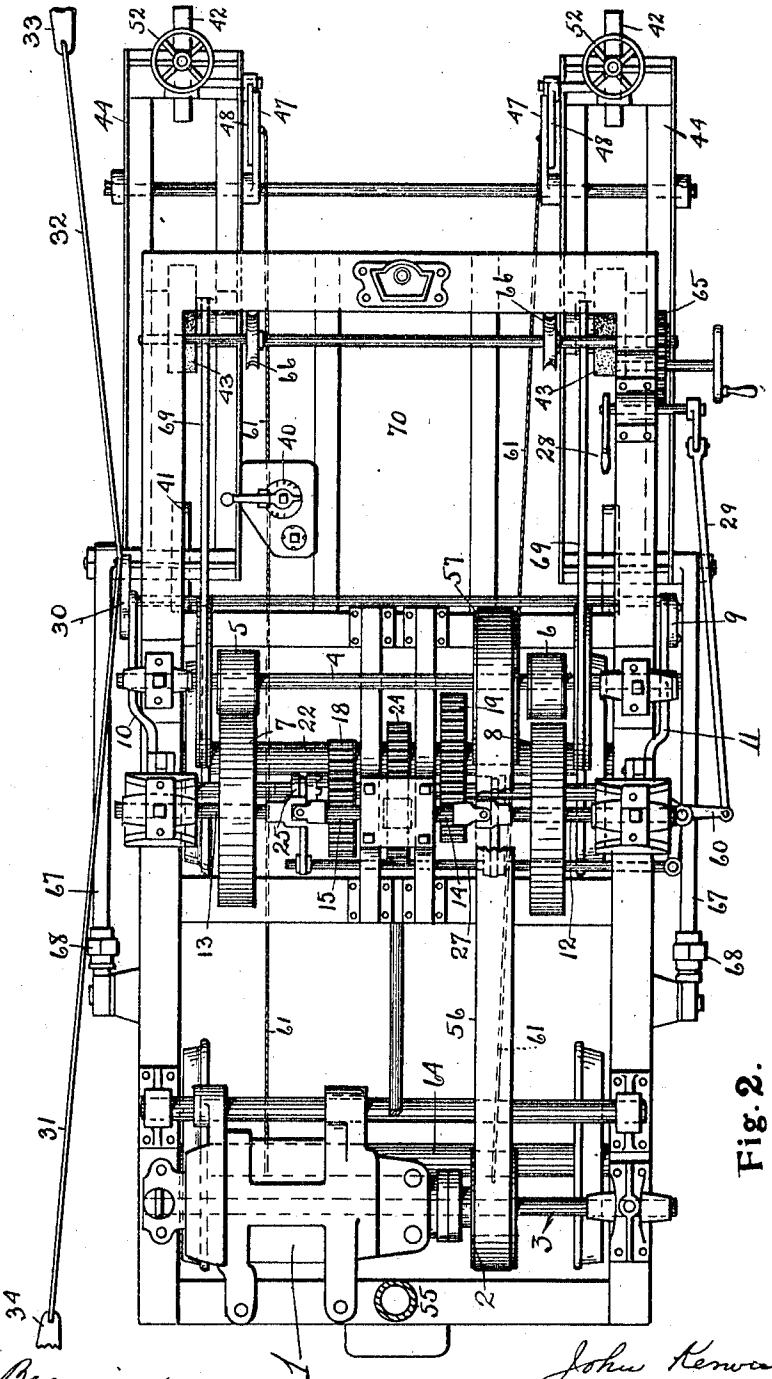

Fig. 2.

Witnesses

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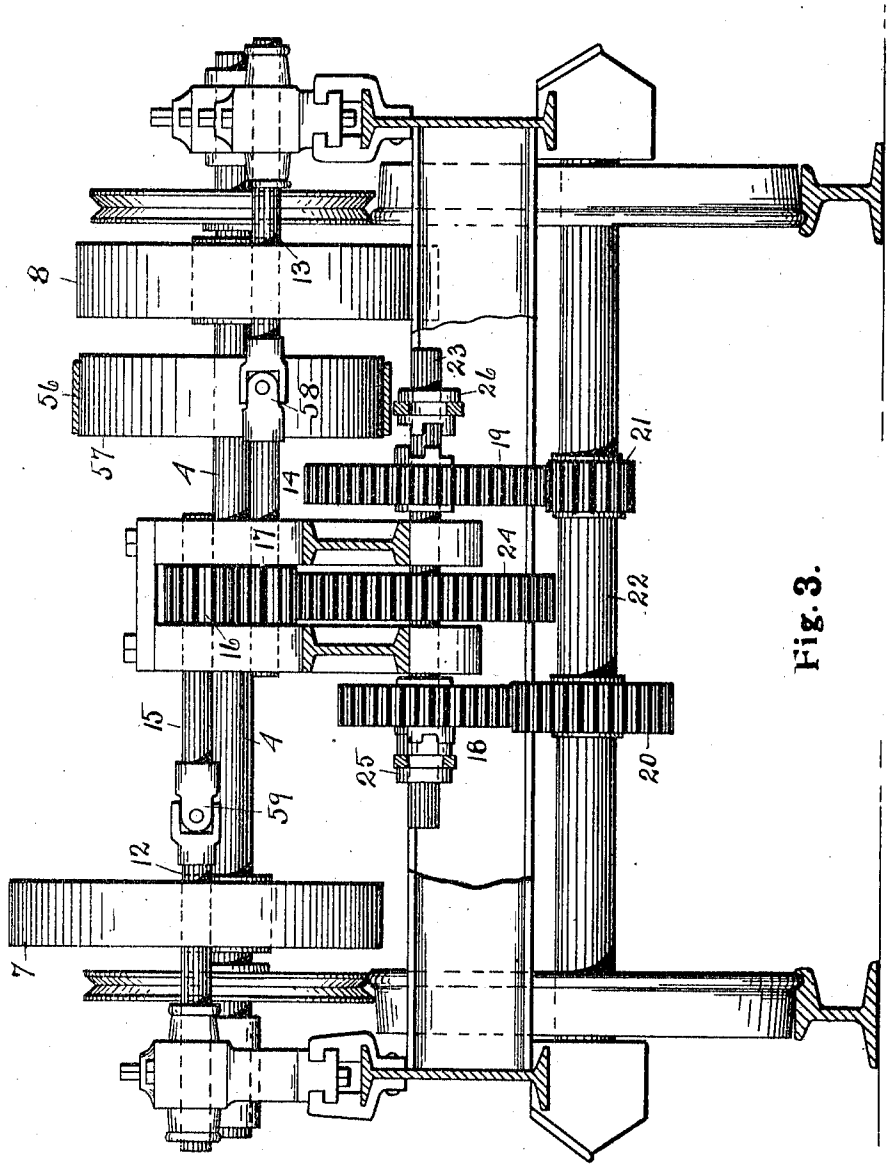

Fig. 3.

Witnesses

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4 SHEETS—SHEET 4.

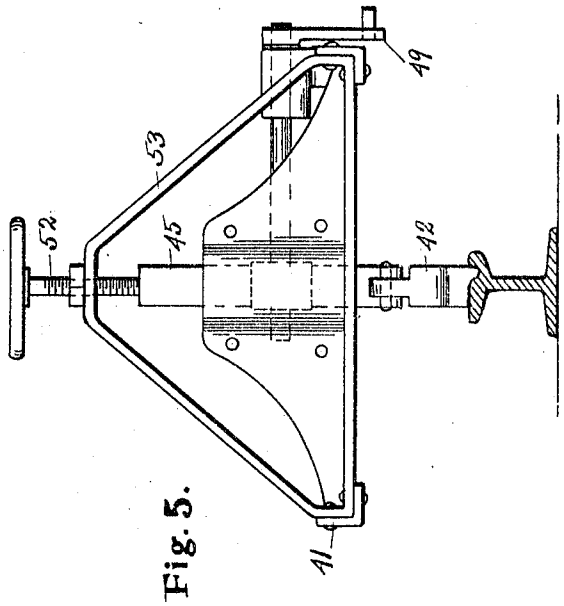

Fig. 5.

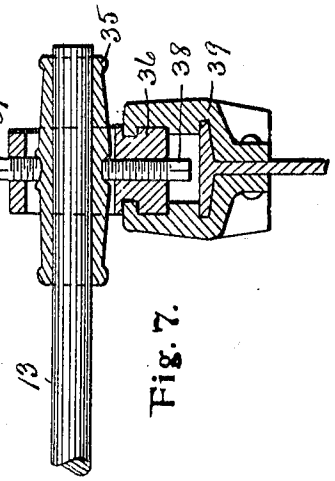

Fig. 7.

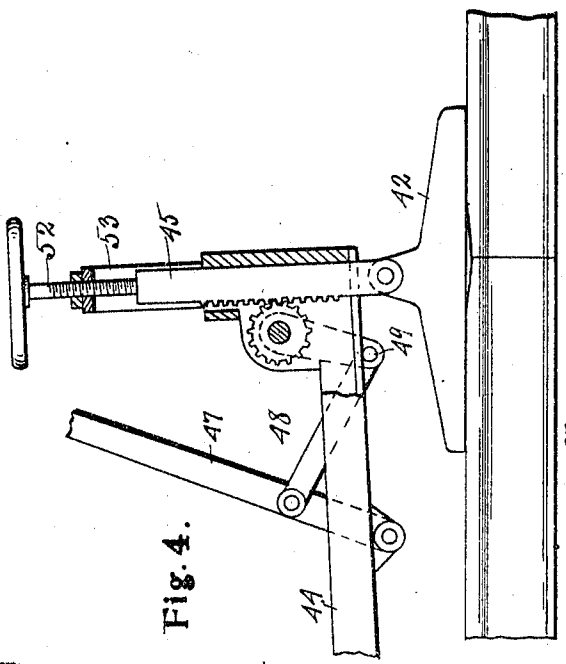

Fig. 4.

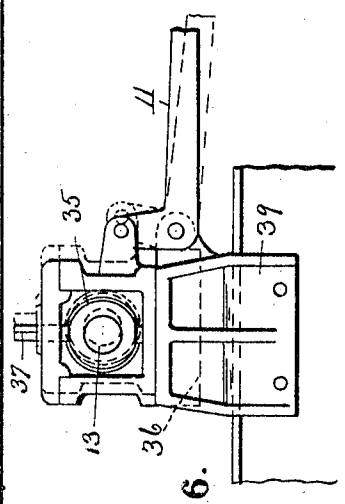

Fig. 6.

Witnesses

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UNITED STATES PATENT OFFICE.

JOHN KERWIN, OF DETROIT, MICHIGAN.

SURFACE-GRINDER.

1,004,276. Specification of Letters Patent. **Patented Sept. 26, 1911.**

Application filed October 10, 1910. Serial No. 586,165.

To all whom it may concern:

Be it known that I, JOHN KERWIN, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Surface-Grinders, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to surface grinders, and it has for its object an improved machine for grinding an approximately plane surface, but one which purposely deviates from a plane surface and is slightly and regularly curved.

One special object of the machine is to grind the surface of railway rails or tramway rails, to avoid the troubles and dangers incident to a sharply sunken place in a line of rails; such a sunken place as is illustrated in Figure 4 of the accompanying drawings. Such sunken places frequently occur in tramway rails, at the meeting end of rails and sometimes in other places along the course of the track and are the cause of a further destruction of the rail because of the pounding incident to the drop of the car wheel into the sunken surface, and may sometimes be the cause of derailing the car, and the object of this invention is to produce a long and gradual approach to the bottom of the sunken surface by grinding the approaches thereto for a distance of several feet on each side of the depressed point.

The machine consists essentially of a motor truck which moves backward and forward adjacent to the place of grinding. A carriage mounted on shoes, which is driven backward and forward by the motor truck over the place of grinding, carrying the grinding wheel backward and forward along the track for such space as may be desired to be ground out on either side of the depression. Connected with these two trucks are devices which produce a gradual change in the elevation of the grinding wheel with respect to the guide shoes of the carriage, which carries the grinding wheel, and thereby cuts from the surface of the rail that part which must be removed to change the sharp depression to a broad depression with long gradual approaches to the deepest part thereof; other incidental appliances are used in connection with the truck and the carriage for the convenient use of the device, throwing it out of action and into action and throwing the truck out of its condition of a grinder driving machine into a condition of a transportation machine.

In the drawings:—Fig. 1, is a side elevation of the entire structure, truck, grinding car and attachments. Fig. 2, is a plan view of the structure. Fig. 3, is a cross section at the line 3—3 of Fig. 1. Fig. 4, is a side elevation of the front part of the grinding wheel carriage. Fig. 5, is a front elevation of one shoe of the grinding wheel carriage. Fig. 6, is a side elevation of a shifting bearing used on the main truck. Fig. 7, is a section longitudinal of the shaft of the bearing shown in elevation in Fig. 6. Fig. 8, is a cross section of the rear axle of the truck showing the drum on which is wound a cord that regulates the grinding wheel with respect to the front shoe.

The structure comprises a truck frame on which there is mounted a motor 1 regulated by a controller 40 and actuated by electric current received from the main line by a conductor carried along trolley pole 54 and post 55. A belt wheel 2 on the motor shaft 3 transmits power by means of a belt 56 to a master wheel 57 on shaft 4, which is a counter-shaft to the motor shaft 2. On the counter-shaft 4 are friction wheels 5 and 6, one of which is arranged to be brought into and thrown out of contact with friction wheel 7 on driving shaft 13 and the other of which 6 is arranged to be brought into and thrown out of contact with friction wheel 8 on shaft 12. The bearings of both shafts 12 and 13 are journaled in movable bearings. The shaft 13 is connected by universal joint 58 to the shaft 14 which is journaled in fixed bearings and has mounted upon it a spur gear that meshes directly with large spur gear 24. The shaft 12 is connected by a universal joint 59 with a shaft 15 journaled in fixed bearings upon which is mounted a spur gear 16 that meshes with spur gear 17 and thus indirectly with the larger gear 24. When the friction wheel 5 is brought into frictional engagement with the friction wheel 7 the large gear 24 and its shaft are in condition to turn in one direction and when the wheels 5 and 7 are thrown out of engagement and the wheels 6 and 8 are brought into

engagement the mechanism is in condition to produce a revolution of the wheel 24 in the opposite direction. The wheels 7 and 8 are the shifting wheels and to this end each is mounted in a shifting bearing, all of which is shown in detail in Figs. 6 and 7 and consists of the fixed member 39 which acts as a track for the sliding frame 36 which slides on the member 39, and which sliding frame 36 carries a self-alining bearing 35 held in place vertically by set screws 37 and 38 which engage through the frame of the sliding frame 36. The amount of travel of the bearing is extremely slight, being only so much as is required to break the frictional engagement of the two wheels and make it when driving action is required. The sliding member 36 is actuated by a link 10 actuating the bearing for wheel 7, and link 11 actuating the bearing for wheel 8. These links engage with crank terminals of a rock shaft 9 which is itself actuated by some object separate from the car and arranged at the side of the track on which the car runs. As shown in the present drawings and as I prefer to use this shifting actuating object, I erect on the rock shaft 9 an actuating lever 30, to which I attach cords 31 and 32 running to weights 33 and 44 that are thrown onto the ground in the proper position to shift the lever when the car has run to its desired limit in either one or the other direction as the case may be, the weight acting to shift the lever on its fulcrum which is the rock shaft 9, and actuating the links and through said links actuating the shifting bearings of the wheels 7 and 8. As these cords may be made of any desired length and the weights may be readily and quickly placed, the amount of travel of the car can be regulated very easily.

The shaft of wheel 24 carries two driving pinions 18 and 19, both of which mesh with pinions upon the axles of the truck, the smaller wheel 18 meshing with a comparatively large wheel 20, and the larger wheel 19 meshing with a smaller pinion 21. Both of the wheels 18 and 19 are mounted to run loose on the shaft of the wheel 24, but with each is a clutch mounted to rotate with the shaft and adapted to be brought into clutching relation with the wheel by a hand lever 28 which actuates link 29, and this in turn actuates the clutch rod 27 to which the link 29 is coupled by an angled lever 60. When the clutch 25 is in engagement with the wheel 18 and the clutch 26 is disengaged from the wheel 19 the structure is in condition for a slow back and forward motion, such slow motion being suitable for the grinding operation. When the clutch 25 is disengaged from the wheel 18 and the clutch 26 brought into engagement with the wheel 19 the structure is in condition for a more rapid movement suitable for transportation of the device along the track. The grinding is accomplished by means of an abrading wheel 43 journaled on the side frame bar 44 which is pivotally supported on a shoe 41 and adjustably supported with reference to a shoe 42. Above the shoe 42 rises a stem 45 or frame shown on an enlarged scale in Figs. 4 and 5 and this stem 45 is provided with a rack in which meshes the toothed lever 49, a lever mounted in suitable bearings in the frame which is secured to the end of the side member 44. The end of the lever 49, (the toothed end being equivalent to the portion of a wheel) engaging the rack on the standard member 45 is actuated by a lever 47 that is pivoted to the side bar 44 and connected by link 48 to the end of the lever 49. This lever 47 is connected by a cord to the rear axle of the truck; the cord 61 runs over sheaves 62 and 63 for unwinding and rewinding in the reverse direction on the axle 64 as the truck moves backward and forward; the action of the cord in winding pulls the lever 47 and causes the toothed part of the lever 49 to move along the rack lifting the abrading wheel 43. The extreme lift is at the time when the truck has receded to the limit of its travel and the cord is wound to its limit, and on the return movement of the car the weight of the side members 43 and the wheel held by it and the entire structure supported on the pivot causes the abrading wheel to drop as fast as the cord will allow it to drop, and it therefore reaches the limit of its drop when the cord is entirely unwound from the rear axle and is now ready to be rewound in the opposite direction. Therefore, in setting the machine it is brought to place the wheel 43 directly over the deepest part that is to be cut or the deepest part to which the approaches are to be made. The amount of travel corresponding to the length of the approach to be made is determined and the steepness of the grade is determined by placing the cord 61 with respect to the lever 47 as may be desired. Increased length given to the lever 47 produces a longer grade, and a shorter grade is produced by securing the cord lower down along the lever.

When the grinding is accomplished and it is desired to move the entire machine to another place of work, the abrading wheels and the shoes 41 and 42 are lifted bodily from the track by means of a hand wheel 65 and lifting chains on the drums 66. If it is desired to grind out a high place the lever 47 is thrown out of action by detaching the cord from it and the connection of the rack and the wheel are made substantially rigid by means of the hand screw 52 which passes through a yoke part of the frame 43 that supports the wheel ended lever 49, and when the end of the hand screw 52 and the rack 45 are in engagement the

grinding wheel cannot rise with respect to the shoe 42 and it therefore will grind off a high spot on the track. The car which carries the abrading wheel 43 is held in substantially rigid connection with respect to the main car by adjustable side bars 67. These are heavy rigid bars which hold the car in place with respect to the truck, but are adjustable by turnbuckle 68 to tighten the belt 69. 70 indicates a platform for the driver of the car. In operation, however, no driver need be on the car as the working of the machine is entirely automatic after it has been once adjusted and needs only supervision until its work is accomplished.

What I claim is:—

1. A surface grinder, having in combination a truck, a motor mounted thereon and adapted to drive the same, a carriage, an abrading wheel journaled in said carriage, means for rotating said wheel, mechanism for reversing the travel of said truck, and means actuated by the truck axle for raising and lowering the abrading wheel, substantially as described.

2. A surface grinder, having in combination a truck, a motor mounted thereon and adapted to drive the same, means external to the truck for reversing the travel of the truck, a carriage, an abrading wheel journaled therein and rotatively driven, and means actuated by a moving part of the main truck for raising and lowering the said carriage and abrading wheel, substantially as described.

3. A surface grinder, having in combination a truck, a motor mounted thereon and adapted to drive the same, shoes adapted to slide along the rail, a carriage supported by said shoes, an abrading wheel journaled in said carriage, means for rotating said abrading wheel, and means for actuating said carriage so as to produce a gradual change in elevation with respect to said shoes, substantially as described.

4. In a surface grinder, the combination of a carriage, an abrading wheel journaled in said carriage and rotatively driven, a support for said carriage in pivotal connection therewith, a second support for said frame in vertically movable connection therewith, means for reciprocating the carriage and means for simultaneously actuating the carriage vertically with respect to said second support, substantially as described.

5. A surface grinder having in combination a truck, a motor mounted thereon and adapted to drive the same, a shoe adapted to slide along the rail, a rod pivotally connecting said shoe to the truck, a carriage pivotally connected with said shoe, an abrading wheel journaled in said carriage means for sliding said shoe along the track, means for automatically oscillating said carriage and abrading wheel, means for driving said abrading wheel, and means for raising said rod, shoe carriage and abrading wheel when desired.

6. A surface grinder having in combination, a truck, a motor mounted thereon and adapted to drive the same, an abrading-wheel truck, a carriage adapted to oscillate vertically with respect to said abrading-wheel truck, and means actuated by a moving member on the motor-truck adapted to oscillate said carriage, substantially as described.

7. In a surface grinder for rails, an abrading wheel carriage, an abrading wheel rotatively driven, journaled therein, shoe supports therefor having an extended surface contact along the rail, pivotal connections between the abrading wheel and one of said shoe supports, vertically adjustable connections between said abrading wheel and another of said shoe supports, a lever adapted to control said adjustable connections, and means for automatically actuating said lever, substantially as described.

8. A surface grinder, having in combination a truck, a motor mounted thereon and adapted to drive the same, a carriage, shoe supports for said carriage adapted to extend on said rail at sufficient length to bridge any irregularities or corrugations therein, an abrading wheel journaled in said carriage and rotatively driven, means for sliding said shoe supports back and forth along the rail and means for actuating said abrading-wheel carriage to produce a gradual elevation thereof with respect to said shoe supports, substantially as described.

9. A surface grinder, having in combination a truck adapted to travel back and forth, a motor mounted thereon and adapted to drive the same, a carriage supported so as to be capable of raising and lowering, and a cord winding over one of the rotating members of the truck and thereby adapted to gradually raise said carriage, and an abrading-wheel journaled in said carriage and rotatively driven, substantially as described.

10. In a surface grinder, the combination of a carriage, a rotatively driven abrading-wheel mounted thereon, said carriage being pivotally supported, means for moving said carriage along the rail, a lever having suitable connections to said carriage adapted to raise and lower the same, a cord adapted to be attached to said lever at different distances from its fulcrum point and means for automatically actuating said cord, substantially as described.

11. In a surface grinder, a carriage having a rotatively driven abrading-wheel attached thereto, means for moving said carriage along the rail, means for automatically raising and lowering said abrading-wheel carriage and manually operated

means fixing the vertical adjustment of said carriage, substantially as described.

12. In a surface grinder, the combination of an abrading-wheel truck adapted to travel along the rail, a carriage connected therewith and capable of vertical movement, a rotatively driven abrading-wheel journaled therein, means for automatically raising and lowering said carriage with respect to said truck, means for adjusting said carriage vertically and fixing its position, when desired, and means for raising or lowering the entire truck when desired, substantially as described.

13. In a surface grinder, the combination of a car-truck, an abrading-wheel truck pivotally connected therewith, a carriage adapted to be moved vertically with respect to said truck, a rotatively driven abrading-wheel carried by said carriage, automatic means for gradually raising and lowering said carriage, and manually operated means for raising said abrading-wheel truck, when desired, comprising a drum on the car-truck having a chain winding therein, said chain connected with said abrading-wheel truck, and means for rotating said drum, substantially as described.

14. In combination with a car truck, a carriage having an abrading-wheel, shoe supports pivoted to the same at one end, shoe supports disposed at the other end of said carriage, a stem rising from said last-mentioned support to which said carriage is adjustably connected, a rack on said stem, a lever pivoted to said carriage and having a toothed terminal adapted to engage said rack, a second lever pivoted to said carriage, a link connecting said levers, and means for operating said lever, substantially as described.

15. In combination with a car truck, a carriage having an abrading wheel journaled therein, a shoe support pivoted thereto at one end, a shoe support at the other end having a rising vertical stem, the said carriage being slidably connected to said stem, a lever pivoted to said stem having a terminal engaging said stem and thereby adapted to gradually lift and lower said carriage, a second lever pivoted to said carriage a link connecting the two levers, and a member adapted to travel a given distance and adapted to actuate said second lever attachable to said member at different distances from the said link, substantially as described.

16. In combination with a car truck, a carriage having an abrading wheel, a shoe pivoted to one end of said carriage, a shoe at the other end of said carriage, a vertical stem having a rack portion rising therefrom, said carriage slidably connected to said stem, a lever having a toothed terminal engaging said rack portion and said lever pivoted to said carriage, a second lever pivoted to said carriage, a link connecting the two levers, and a cord adapted to be attached at different distances on said second lever from the link, the said cord being adapted to wind on one of the rotating members of said car truck, substantially as described.

17. A surface grinder, having in combination a truck, a motor mounted thereon and adapted to drive the same, a carriage connected with the truck, a rotatively driven abrading-wheel journaled in said carriage, automatic means for reversing the travel of the truck, and automatic means for gradually raising and lowering said carriage as the same travels along the surface with the truck, substantially as described.

In testimony whereof, I sign this specification in the presence of two witnesses.

JOHN KERWIN.

Witnesses:
CHARLES F. BURTON,
VIRGINIA C. SPRATT.