Nov. 3, 1964 E. KRÜGER 3,154,892

APPARATUS FOR GRINDING RAILS

Filed March 4, 1963 2 Sheets-Sheet 1

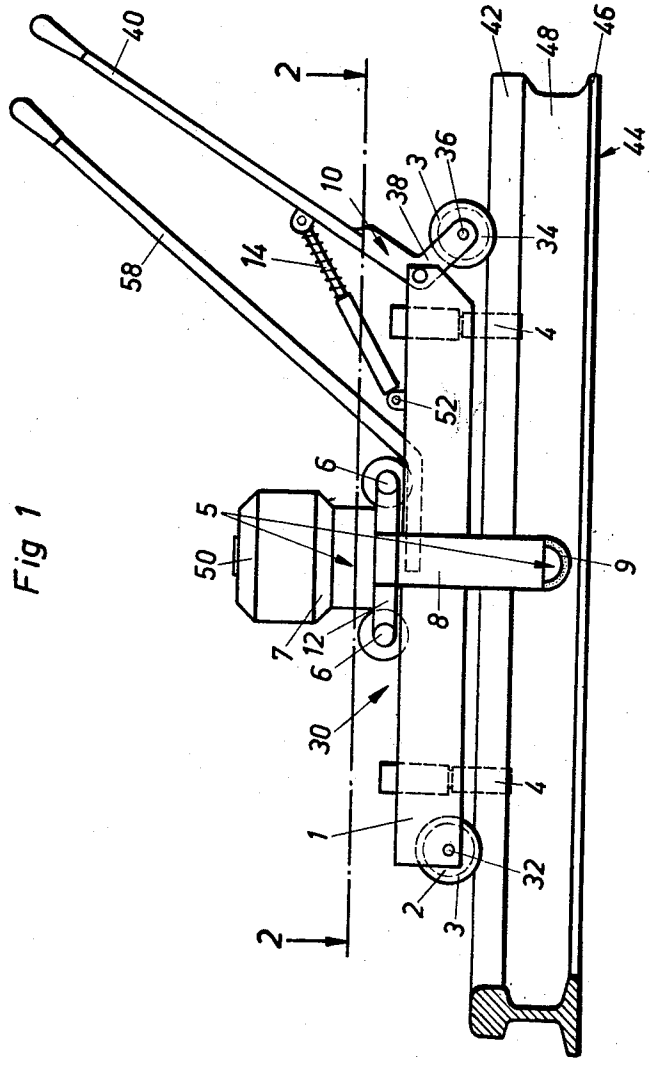


Fig 1

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Fig 2

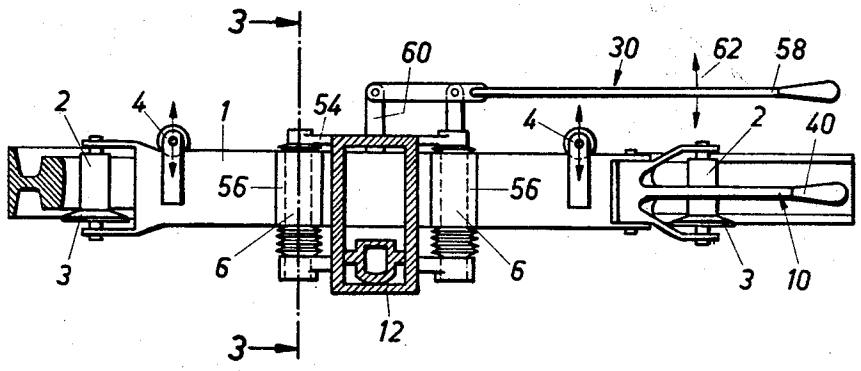
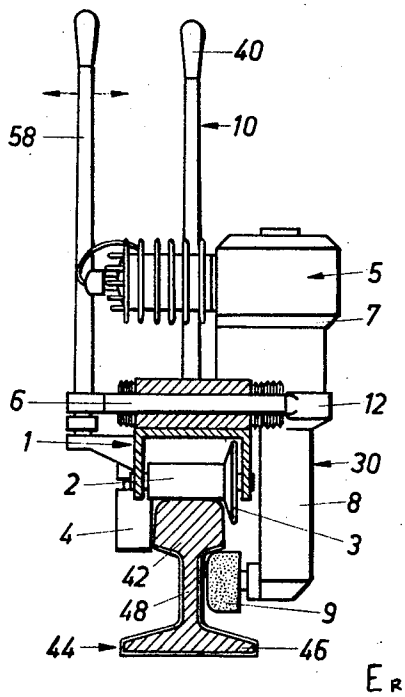


Fig 3



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United States Patent Office 3,154,892 Patented Nov. 3, 1964

3,154,892

APPARATUS FOR GRINDING RAILS

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Filed Mar. 4, 1963, Ser. No. 262,568
Claims priority, application Germany Mar. 13, 1962
5 Claims. (Cl. 51—178)

This invention relates in general to an apparatus for treating rails or tracks, and in particular to a new and useful apparatus for grinding rails which includes a carriage which is adapted to ride over a rail structure and support a grinding machine with means on the carriage for adjusting the grinder for shifting the grinding element in directions parallel to the longitudinal axis of the rail structure and in vertical directions.

The present invention has particular application for the grinding of railroad tracks. One of the advantages of modern welding methods for rails is that the rail may be disassembled from the track structure for regeneration and it can be run through a roll straightener without first working down or cutting out the reinforcements and welds, respectively.

In order to avoid disturbances in the straightening operation, which may be caused by residual reinforcements of about 1 or 2 mm. in extent, unevenness of the weld, or other defects which exist on the rail web despite the modern welding methods, it is desirable to effect a grinding of the welds below the rail head and on the upper side of the rail foot. It is particularly important to provide a clean appearance of the fillet at the transition from the head of the rail to the web, and also from the web to the foot.

Up to the present time, the grinding treatment of rails has been effected with hand grinding machines which are driven by flexible shafts. The working of the weld with a hand grinding machine is particularly difficult because it is not possible to provide exact guidance, and accidental slipping of the grinding machine will always result in damage to the rail material and cause weakening of the rail structure. In addition, since the contact pressure is produced by hand, the method of operation is very strenuous and the amount of undesirable portions which are removed in a given period of time is rather limited. Thus, the operation is costly and very time-consuming and does not produce completely desirable results.

In accordance with the present invention, there is provided a structure which is adapted to be mounted directly on the rail structure to be ground. The carriage structure includes wheels which ride on the track and which support a grinding machine element in a position for working on the rail structure particularly at the location of the web of the rail between the head and the foot. The carriage is thus guided by rollers or guide pulleys, and the grinding machine is mounted for lateral adjustable movement on the frame. In addition, the frame structure is mounted to be adjusted vertically and shifted longitudinally along the rail structure for effecting a further adjustment during grinding operations. Thus, the grinder may be shifted both laterally and vertically, as desired, for effecting the proper guidance of the grinding disc during the grinding operation as the frame or carriage is advanced along the rail.

Accordingly, it is an object of the invention to provide an improved rail grinding structure for grinding a rail or track.

A further object of the invention is to provide a rail grinding apparatus which includes a rotary grinding tool which is carried on a carriage or trolley having wheels which are adapted to run over the head of the rail and in which means are provided for guiding the grinding tool along the entire lateral profile of the rail by a combination of vertical and transverse adjustments during grinding.

A further object of the invention is to provide a device for grinding rail structures which includes a carriage adapted to run over the head of the rail structure on roller elements and including means associated with the rollers for shifting the carriage vertically for adjustment purposes, and further including means carrying the machine permitting lateral or transverse shifting movement thereof for accurate positioning of the grinding disc.

A further object of the invention is to provide a method of grinding off reinforcement portions of a rail structure, preferably on the sides of the rail, particularly for finishing of the rail butt weldings, by employing a grinding tool which is guided over the rail by rollers and guide pulleys, characterized by guiding the rotary grinding tool along the entire lateral profile of the rail by a combination of vertical and transverse adjustments during the grinding.

A further object of the invention is to provide an apparatus for grinding rails which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

In the drawings:

FIG. 1 is a side elevation of a rail grinding apparatus constructed in accordance with the invention;

FIG. 2 is a section taken on the line 2—2 of FIG. 1; and

FIG. 3 is a section taken on the line 3—3 of FIG. 2.

Referring to the drawings in particular, the invention embodied therein comprises a railroad track or rail grinding apparatus generally designated 30 which comprises a frame 1 having a wheel or roller 2 rotatably mounted on fixed pins 32 at one end thereof and a roller 34 rotatably mounted on a pin 36 carried at the end of one arm 38 of a lever arm or crank element generally designated 10. The lever arm or crank element includes an upstanding handle arm portion 40 which may be manipulated by an operator of the device for raising and lowering the elevation of the frame 1 for controlling the vertical positioning of the grinding element to be described more fully hereinafter.

The pulleys or wheels 2 and 34 are such as to permit the easy rolling movement of the frame or carriage 1 over a head portion 42 of a track structure generally designated 44. The track structure 44 also includes a foot portion 46 and a web portion 48. As indicated in the embodiment of the drawings, the pulleys 2 and 34 are such that they may ride over the rail head 42 with flanges of the pulleys extending downwardly around the sides thereof. The pulleys 2 and 34 include rims or side pieces 3 which may be adjusted in order to accommodate various widths of rail heads 42. The frame 1 also carries laterally extending guide pulleys 4 which bear against the side of the head and may be shifted for the purpose of accurately aligning the frame in respect to the longitudinal axis of the rail structure 44.

In accordance with the invention, an adjustable grinding device generally designated 5 is mounted on the carriage 1 and it comprises a transmission portion 7 arranged to transmit power from a motor 50 downwardly through a depending arm portion 8 to a rotary grinding wheel or disc 9 such as by means of gears or chains (not shown).

The vertical adjustment of the positioning of the grinding disc or wheel 9 may be accomplished by raising or lowering the entire frame 1, including the grinding apparatus 5, by shifting the lever 40 to thus effect shifting of the vertical height of the pin 36 which carries the pulley 34. A compression spring 14 is secured by means of a bracket 52 at its one end to the frame 1 and at its opposite end biases the lever arm 40 in a clockwise direction in order to provide a lifting force for the frame 1 which will counterbalance the weight of the grinding apparatus 5. The range of vertical adjustment is so dimensioned that the entire vertical range from the rail head 42 to the foot 46 can be covered with the grinding disc 9.

A transverse movement of the grinding disc 9 may be effected by a transverse displacement of the entire grinding unit 5 in the slide 12. For this purpose, the slide is carried on a yoke 54 which includes side arm portions 6 which are slidable in cylindrical elements 56, 56 in lateral directions. Sliding is effected by operating a lever 58 which is pivotally connected at a bracket 60 secured to the frame and which is also pivotally connected intermediate its length to the yoke 54. Movement of the lever 58 from one direction to the other, as indicated by the arrow 62, will cause an appropriate lateral shifting of the grinding apparatus 5 including the grinding disc 9.

In accordance with a preferred method of operation, the frame 1 is moved along the track structure, and during the movement thereof, the grinding disc 9 is shifted by operating the levers 58 and 40 by hand. The vertical and transverse displacement of the grinding disc 9 is effected as the grinding disc and the frame 1 are moved uniformly back and forth over the rail. Due to the fact that the lever arms 58 and 40 are very long, a very sensitive adjustment of the grinding disc may be possible by the manual manipulation of these arms. The rims 3 of the pulleys 2 and 34 and the guide pulleys 4 ensure very accurate guidance of the grinding machine and thus of the grinding disc 9, so that damage to the rail material by slipping of the grinding disc is positively prevented. In addition, the fillets of the transition from the rail head to the web and from the web to the foot can be ground easily and very accurately with the device according to the invention. Because of the weight and the firm guidance of the machine, a substantially higher grinding pressure can be exerted on the disc without any additional physical effort on the part of the grinding machine operator, so that the grinding performance is improved and the grinding time is relatively shortened as compared with prior art arrangements.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that this invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A grinding device for a rail having head, web and foot portions, comprising a frame element elongated in the direction of the longitudinal axis of the rail structure; a roller adapted to ride over the head portion of the rail rotatably mounted adjacent one end of said frame; a crank arm pivotally connected to an opposite end of said frame and including a pulley wheel arm portion extending outwardly from the pivotal connection; a pulley rotatably mounted at the end of said pulley wheel arm portion and adapted to ride over the head portion of the rail to support said frame at this end, said crank arm being rotatable to shift the angular position of said pulley wheel arm portion and hence the height of the frame at this end; a grinding machine, means on said frame supporting said grinding machine for movement backwardly and forwardly in transverse directions, said grinding machine including a depending arm portion; a disc rotatably mounted on said depending arm portion in a position to extend inwardly for grinding the rail from the head portion to the foot portion; a grinding motor arranged above said depending arm; and, transmission means connected between said motor and said disc for rotating said disc by said motor.

2. An apparatus according to claim 1, wherein said means mounting said motor for lateral shifting movement in transverse directions includes a crank arm having an elongated hand lever portion adapted to be grasped by an operator for shifting said grinding machine in a lateral direction.

3. A device for grinding rail structures and the like, comprising a frame, roller means on said frame adapted to ride over a rail structure, a grinding machine carried on said frame including a rotary disc extending downwardly from said frame and rotatably supported in a position for operating on the area of the rail between the head and foot portion thereof, means for shifting the grinding machine with the disc laterally, and means for adjusting said grinding machine with said disc vertically, said means for shifting said grinding machine laterally including a yoke formed on said frame, said grinding machine being mounted in said yoke for lateral displacement therewith, means on said frame for guiding said yoke back and forth laterally, and a crank arm pivotally connected to said frame having a portion connected to said yoke whereby rocking of said crank arm is effective to shift said yoke with said machine.

4. A device according to claim 3, wherein said crank arm is elongated to provide for a high mechanical advantage.

5. A device for grinding rail structures and the like, comprising a frame, roller means on said frame adapted to ride over a rail structure, a grinding machine carried on said frame including a rotary disc extending downwardly from said frame and rotatably supported in a position for operating on the area of the rail between the head and foot portion thereof, means for shifting the grinding machine with the disc laterally, and means for adjusting said grinding machine with said disc vertically, said means for adjusting said grinding machine with said disc vertically comprising a crank arm pivotally connected to said frame and having a small arm portion carrying at its end a roller element adapted to ride over the rail structure, and an opposite lever arm portion which may be manipulated for shifting the small arm portion carrying said roller to change the elevation of the frame.

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