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RAIL GRINDING DEVICE ESPECIALLY FOR RAILWAY RAILS

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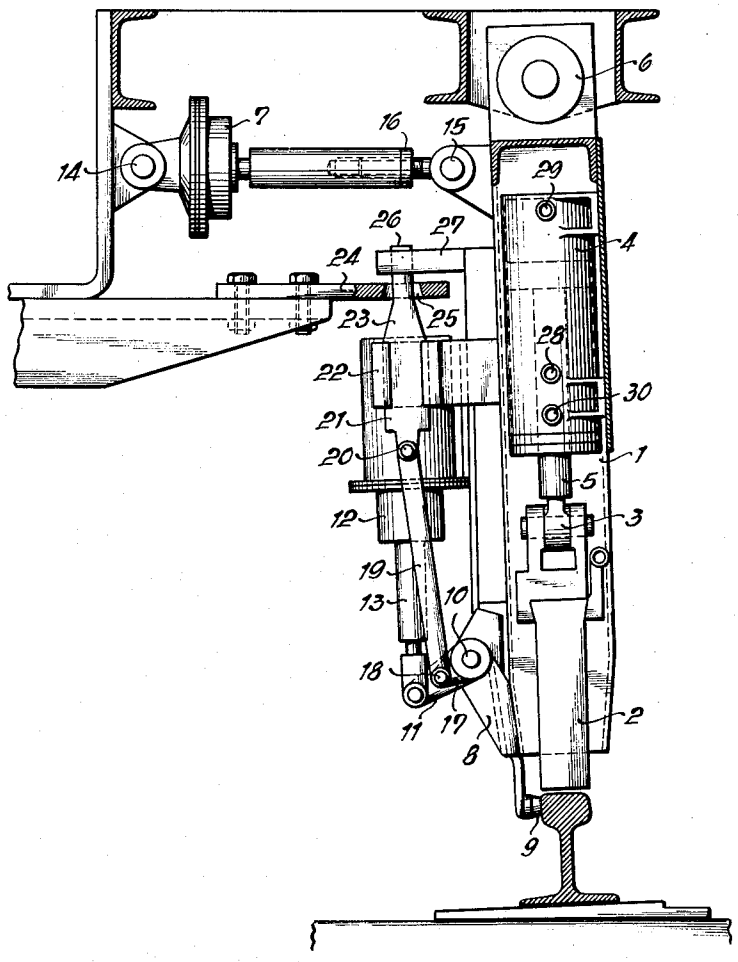

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RAIL GRINDING DEVICE ESPECIALLY FOR RAILWAY RAILS

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4 Claims. (Cl. 51—178)

The present invention concerns a rail grinding device, especially for railway rails. When grinding rails by means of grinding devices which are mounted on a vehicle driving on the respective rails, it is difficult to maintain the grinding bodies precisely over the center plane of the railway head as is indispensable for a proper grinding operation. This difficulty is caused by the fact that due to the widening of the gauge of the rails, the vehicle carrying the grinding device sways or swings from side to side.

To overcome this difficulty, it has been suggested to secure a grinding disc in its intermediate position with regard to the rail by means of a dog or guide engaging the lateral edge of the rail.

It is an object of the present invention to provide a rail grinding device which will be materially improved over heretofore known devices of this type.

It is another object of this invention to provide an improved gauge guiding device in combination with a rail grinding device which will safely maintain the grinding bodies along the center plane of the rail head even if the truck of the rail vehicle is displaced in a direction transverse to the driving direction of the vehicle and also if the vehicle truck carries out a movement along a sine curve.

It is still another object of this invention to provide a rail grinding device comprising a gauge guiding device, which will be relatively simple in construction and reliable in operation.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawing showing a transverse section through a rail grinding device according to the invention.

General arrangement

According to the present invention, the upper end of the rail grinding device is pivotally suspended on the vehicle carrying the grinding device and more specifically is tiltable about a substantially horizontal axis extending in the driving direction of the vehicle and in the longitudinal center plane of the rail. Advantageously, by means of a pressure exerting device, for instance a diaphragm cylinder or a pressure spring, the grinding device is resiliently pressed outwardly or inwardly while a gauge guiding arm engages the inner or outer edge of the rail. It is advantageous to suspend the pressure exerting device by means of joints between the truck of the vehicle and the frame of the grinding device.

The gauge guiding arm which preferably by means of an exchangeable sliding member engages the lateral surface of the rail may be tiltably mounted on the grinding device and may be tilted upwardly and downwardly by means of air under pressure. The upper end of the gauge guiding arm which is tiltably journalled on the grinding device is provided with a lever connected thereto at an angle and having its free end arranged so that it can be

moved upwardly or downwardly by means of a pressure fluid cylinder.

A further feature of the invention consists in an arresting device which automatically becomes effective when the gauge guiding arm is moved away from the rail and which blocks the grinding device in a certain tilted-out position. This arresting or locking device consists preferably of an arm mounted on the gauge guiding arm and automatically movable together with the latter. The arm of said locking device is connected by means of a linkage with a bar or latch slidable in a guide and tapering at its upper end. When the gauge guiding arm is tilted away from the rail, the said bar or latch is introduced into an opening which tapers in conformity with the taper of the latch end and thus locks the grinding device.

According to a particularly advantageous embodiment of the invention, the pressure cylinder for the piston having connected thereto a grinding block, is provided with a pressure fluid discharge opening which latter is released by said piston when said piston reaches a certain lower end position, so that the pressure fluid such as air under pressure above the piston can be exhausted through said pressure fluid discharge opening whereby a controlling device associated with said pressure fluid discharge opening is actuated.

Structural arrangement

Referring now to the drawing in deail, the grinding device shown therein comprises a frame **1** of profile iron, which frame is so designed that its cross section tapers toward the bottom of the device. The outer lateral surface of the frame is covered by sheet metal and is provided with recesses or apertures for installing and exchanging the grinding slide blocks **2**, which recesses or apertures also allow a careful observation of the grinding process proper. The grinding slide block **2** which effects the grinding is provided with a dovetail portion **2***a* at that end thereof which is clamped into a holder **3**. This dovetail portion prevents the grinding block **2** from falling out of the holder **3**. The holder **3** is connected to sliding members which are displaceable in vertical direction in the frame **1**. Arranged above each holder **3** is a double acting pressure fluid cylinder **4** the pressure piston **5** of which is connected by means of a piston rod **5***a* with the holder **3** and is adapted to move the latter upwardly and downwardly.

The frame **1** is pivotally suspended on the vehicle carrying the grinding device and is tiltable about a substantially horizontal shaft **6** having its longitudinal extension in the driving direction of the vehicle. The frame **1** is resiliently pressed outwardly by means of a diaphragm cylinder **7** actuated by air under pressure. The extent to which the frame **1** may be tilted is limited by a gauge guiding arm **8** which by means of an exchangeable sliding piece **9** of hard metal or the like engages the inner lateral surface of the rail. This gauge guiding arm **8** is tiltable about a shaft **10** connected to the frame **1**. The upper end of the gauge guiding arm **8** carries a lever **11** forming with arm **8** a crank lever having its free end by means of a piston rod **13** pivotally connected with a pressure piston (not shown) reciprocably mounted in a pressure cylinder **12**. By means of the air under pressure in cylinder **12**, the gauge guiding arm **8** is pressed against the frame **1** serving as abutment, while the sliding member **9** is pressed against the inner side of the rail.

The pressure at which the guiding member **9** is pressed against the rail may be varied by varying the pressure of the air in the diaphragm cylinder **7**. Inasmuch as air is compressible, the diaphragm cylinder **7** acts like a spring so that the entire grinding device can resiliently move laterally in the manner of a pendulum. One end of the

diaphragm cylinder system 7 is connected through a joint 14 with the frame of the vehicle carrying the grinding device, whereas the other end of the diaphragm cylinder system 7 is mounted in the bearing or joint 15 connected to the frame 1.

The starting position for the stroke of the diaphragm cylinder system and thus the angle of deviation of the frame 1 is variable by turning the threaded bolt 16 provided with a counter nut.

The upper end of the gauge guiding arm 8 has positively connected thereto a lever 17 so that the latter is automatically movable together with the arm 8. The lever 17 is connected through a joint 18 with a linkage 19 which in its turn through the intervention of a joint 20 is adapted to displace a latch 21 in a guide 22 having a dovetail-shaped cross section. The upper end 23 of the latch 21 tapers as is clearly apparent from the drawing. Above said tapering portion 23 of latch 21 there is arranged an abutment bracket 24 fixedly connected to the vehicle truck. Said abutment bracket 24 is provided with a passage 25 the lateral walls of which taper in conformity with the taper of the tapering portion 23. The tapered portion 23 of the latch 21 is provided with a narrow extension 26 which extends through the passage 25 and is displaceably arranged in a guiding arm 27 above the bracket 24.

When the gauge guiding arm 8 is tilted upwardly away from the frame 1 and the rail, which is effected by a spring force following the venting of the pressure cylinder, the arm 17 by means of the linkage 19 moves the latch 21 in its guide 22 upwardly until the walls of the tapering portion 23 engage the side walls of the passage 25 whereby the grinding device is locked in its respective position so that it is now rigidly suspended in the vehicle truck.

When the arm is tilted downwardly, the extension 26 slides in the passage 25 of the bracket 24 with such a play that the grinding device can move laterally in pendulum fashion to a sufficient extent.

The pressure cylinder 4 arranged above the grinding block 2 is provided with a discharge opening 28 for the air under pressure. This discharge opening 28 is located at such a level that it is relieved by the piston 5 when the latter has reached a certain end position so that the air under pressure above the piston 5 can be exhausted and the grinding block 2 is not pressed any longer against the rail. In this way, the grinding device will be automatically put out of operation when the grinding block 2 breaks or is greatly worn. The air under pressure passing through the discharge opening 28 may be taken advantage of for actuating a control device (not shown), for instance an air pressure switch with signalling lamp.

The actuation of the air pressure members 4, 7, 12 may be effected from a control valve arranged at a control board. At the start of the grinding operation, first the pressure cylinder 12 is filled with air under pressure. As a result thereof, the piston rod 13 is moved downwardly and by means of the lever 11 tilts the gauge guiding arm 8 downwardly until the latter engages the frame 1. Thereupon air under pressure is conveyed to the diaphragm cylinder 7 and causes the frame 1 to tilt outwardly until the sliding member 9 engages the inner side of the rail and until the device has thus reached its proper gauging position at which the grinding block 2 is located precisely over the central plane of the rail head. Finally through the air pressure inlet 29 air under pressure is conveyed into the grinding block pressure cylinder 4 whereby the grinding block 2 is pressed against the rail.

When turning off the grinding device, first the upper pressure chamber of the cylinder 4 is vented through the inlet 29 and the lower pressure chamber above the connection 30 is acted upon by air under pressure so that the grinding block 2 is lifted. Thereupon, the air under pressure is discharged from the pressure cylinder 12 and the diaphragm cylinder 7. Consequently the gauge guiding arm 8 tilts away from the frame 1 and the rail in a lateral direction upwardly and automatically turns the lever 17 about its pivot 10. The linkage 19 connected with the lever 17 moves the latch 21 upwardly so that the tapered end 23 of the latch will rest in the passage 25 and will thereby arrest the device.

It is to be understood that the invention is not limited to the embodiment described above and shown in the drawing. Thus, instead of the pressure or diaphragm cylinder above referred to, any other type of pressure exerting devices may be employed without affecting the fundamental principle of the invention. Also the parts described which serve as power transmission from the pressure or diaphragm cylinders to the members to be actuated thereby may be replaced by other power transmitting means.

It is also to be understood that the present invention comprises any modifications within the scope of the appended claims.

What we claim is:

1. A rail grinding arrangement mounted on a vehicle and comprising in combination: substantially horizontal shaft means supported by said vehicle and extending in driving direction thereof, said shaft means being located in substantially the center plane of the rail to be ground, a supporting member suspended on and pivotally connected to said shaft means so as to be tiltable about the same, fluid pressure operable means mounted on said supporting member, grinding means arranged for grinding engagement with the head of the rail to be ground, said grinding means being operatively connected to said fluid pressure operable means and being adapted to be pressed thereby against the rail to be ground, gauge guiding arm means pivotally supported by said supporting member and comprising bell crank lever means, one end of said bell crank lever means carrying a sliding member for laterally engaging the rail head to be ground, pressure exerting means operatively connected to the other end of said bell crank lever means for tilting the latter, and means operatively connected to said supporting member for tilting the latter about said shaft means.

2. In combination with a rail vehicle, a rail grinding device comprising in combination: substantially horizontal shaft means supported by said vehicle and extending in driving direction thereof, said shaft means being located in substantially the center plane of the rail head to be ground; a supporting member suspended on and pivotally connected to said shaft means so as to be tiltable about the same; a fluid pressure cylinder piston system mounted on said supporting member; grinding means operatively connected with said cylinder piston system and adapted selectively to be pressed against the rail head to be ground; gauge guiding arm means arranged for selective engagement with said rail along a lateral surface of the rail head to be ground; means pivotally connected to said supporting member for tilting the same about said shaft means; and arresting means operatively connected to said gauge guiding arm means and arranged automatically in response to a movement of said gauge guiding arm means away from said rail to arrest said supporting member and thereby said grinding device in a certain position, said arresting means including latch means, link means having one end thereof pivotally connected to one end of said latch means and having its other end piovtally connected to said gauge guiding arm means, and bracket means having a tapered passage and being rigidly connected to said vehicle, said latch means having a tapered portion at the other end thereof corresponding to the taper of said passage for locking engagement with said passage in response to a predetermined tilting movement of said gauge guiding arm means away from said rail head to be ground.

3. A rail grinding arrangement mounted on a vehicle and comprising in combination: substantially horizontal shaft means supported by said vehicle and extending in

driving direction thereof, said shaft means being located in substantially the center plane of the rail to be ground, a supporting member suspended on and pivotally connected to said shaft means so as to be tiltable about the same, fluid pressure operable means mounted on said supporting member, grinding means arranged for grinding engagement with the head of the rail to be ground, said grinding means being operatively connected to said fluid pressure operable means and being adapted to be pressed thereby against the rail to be ground, gauge guiding arm means pivotally supported by said supporting member and including a slidable contact member for laterally engaging the rail head to be ground, means for continuously holding said gauge guiding arm means and said supporting member in a certain adjustable relative position with regard to each other, and compressed gas operable means pivotally connected to said supporting member and continuously urging the same to tilt in a direction in which its tilting movement is limited by contact of said slidable contact member with the respective adjacent lateral surface of the rail head to be ground.

4. A rail grinding arrangement mounted on a vehicle and comprising in combination: substantially horizontal shaft means supported by said vehicle and extending in driving direction thereof, said shaft means being located in substantially the center plane of the rail to be ground, a supporting member suspended on and pivotally connected to said shaft means so as to be tiltable about the same, fluid pressure operable means mounted on said supporting member, grinding means arranged for grinding engagement with the head of the rail to be ground, said grinding means being operatively connected to said fluid pressure operable means and being adapted to be pressed thereby against the rail to be ground, gauge guiding arm means pivotally supported by said supporting member and including a slidable contact member for laterally engaging the rail head to be ground, fluid pressure operable holding means for continuously holding said gauge guiding arm means and said supporting member in a certain adjusted relative position with regard to each other, compressed gas operable means pivotally connected to said supporting member and continuously urging the same to tilt in a direction in which its tilting movement is limited by contact of said slidable contact member with the respective adjacent lateral surface of the rail head to be ground, and locking means responsive to said fluid pressure operable holding means becoming ineffective for automatically locking said supporting member in a certain position against tilting about said substantially horizontal shaft means.

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