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ABRASIVE BELT GRINDER

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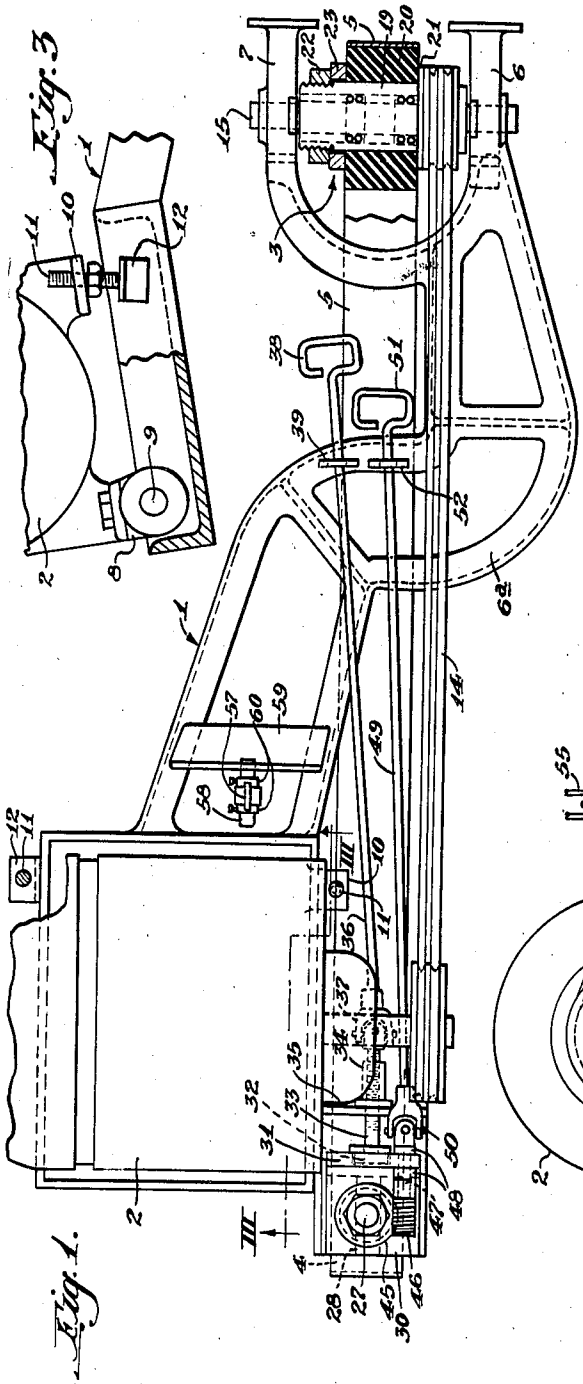


Fig. 3

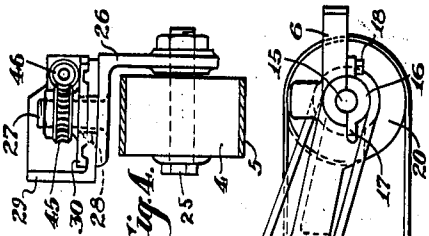


Fig. 4.

Fig. 1.

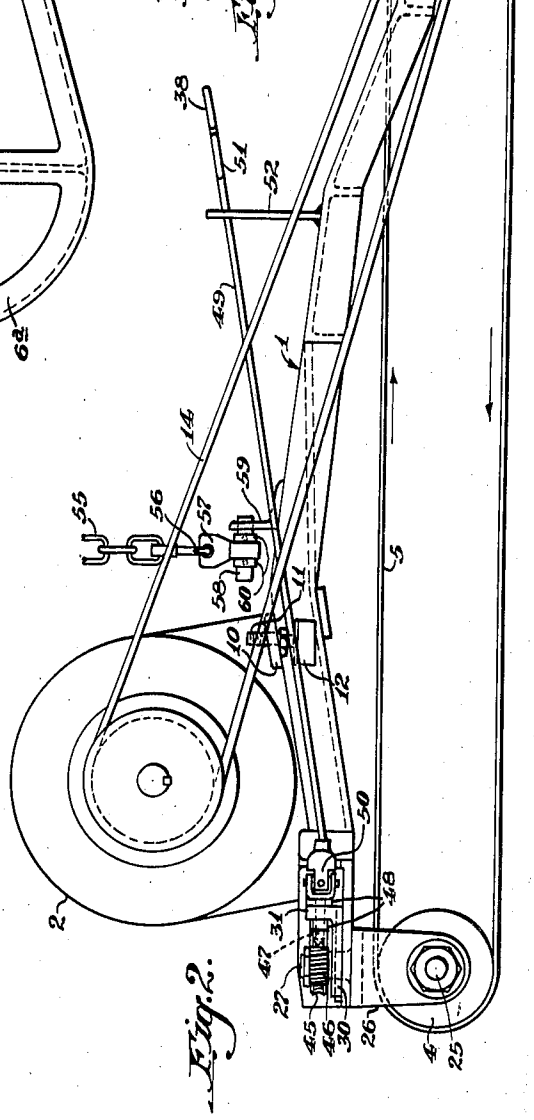


Fig. 2.

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ABRASIVE BELT GRINDER

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7 Claims. (Cl. 51—147)

The invention relates to belt grinders of the type that includes a presser roll around which a grinding or polishing belt is driven, the moving belt being brought into contact with work to be treated by pressing the roll against it.

Such belt grinders are usually constructed to do a particular type of work, as for example, to grind or polish the entire, or portions of, flat metal such as plates, sheets and the like, and when so constructed they are incapable of being used effectively to grind other types of work such as metal tubing and other curved or irregularly shaped articles. Also, as usually constructed, considerable time is required to replace grinding belts, which must be done at frequent intervals, and to substitute new or different presser rolls.

Objects of the invention are to provide a belt grinder which is compact in form and may be suspended at its center and easily manipulated to grind various types of work; which is provided with simple and effective means for adjusting the tension on the grinding belt and for causing it to track, such adjusting means being readily manipulated by a workman while he is using the grinder; and which is equipped with a presser roll that is so constructed and mounted that grinding belts may be quickly replaced and that new or different presser rolls may be quickly substituted.

The invention is illustrated in the accompanying drawing of which Fig. 1 is a plan view of the improved belt grinder, a portion of the presser roll being shown in horizontal central section; Fig. 2 a side view of the grinder; Fig. 3 a vertical sectional view, taken on the broken line III—III of Fig. 1, showing the mounting of a driving motor; and Fig. 4 an elevation of the lower left end of the grinder as seen in Fig. 2.

Having reference to the illustrative embodiment of the invention, the several main parts of the grinder are mounted upon and borne by a horizontally disposed frame 1. These parts include a driving motor 2 at the rear end of the frame, a presser roll structure 3 on the front and an idler roll 4 on the rear end of the frame. Extending around both the presser and idler rolls there is a replaceable grinding belt 5 whose upper and lower strands are parallel to each other and normally lie in substantially horizontal planes, although in the operation of the grinder its front end is usually lowered somewhat to cause the presser roll to bear upon work that is being ground, and the grinder as a whole may be tilted or turned about its longitudinal axis. Extending from the motor to the presser roll are means for driving the latter, such means preferably consisting of a pair of V-belts 14.

To construct the grinder in compact form so that its overall length is not greater than that of the grinding belt, motor 2 is preferably mounted as shown upon the top of frame 1, and as a consequence thereof driving belt 14 inclines downwardly from the motor to the presser roll and crosses the plane of the upper strand of grinding belt 5. Adequately to support the presser roll at the front end of frame 1, a portion 6a of the frame between the motor and presser roll is offset laterally as shown in Fig. 1 to extend between the upper and lower strands of the driving belt as shown in Fig. 2, and beyond such offset portion the front end of the frame is provided with a pair of yoke arms 6 and 7 which engage and support the ends of the presser roll structure.

As seen particularly in Fig. 3, motor 2 is mounted on a bracket 8, the left side of which is pivotally mounted at 9 on the rear of frame 1. The right side of bracket 8 is supported by a plate 10 through which there extends threaded pins 11 whose lower ends are rigidly supported by brackets 12 attached to the sides of frame 1. Below plate 10 each pin 11 is provided with a nut which may be screwed upwardly on the pins to elevate the right end of the motor such amount as may be necessary to tighten drive belt 14.

The presser roll structure 3 is preferably borne by a spindle 15 whose ends are clamped upon yoke arms 6 and 7 in such a way that the spindle may be quickly detached. As seen in Fig. 2, the bottom of each yoke arm is provided with a semi-cylindrical groove for receiving the spindle which is retained in place by a clamp 16 provided at one end with a projection or detent 17 that extends into a lateral recess formed in frame 1 and which is attached to the frame by a bolt 18 at its other end.

The presser roll structure includes a sleeve 19 which is rotatably mounted, preferably by ball bearings, upon spindle 15. On this sleeve there is an annular presser roll 20, one end of which bears against a shoulder 21 formed on the sleeve. The presser roll is formed of a compressible and somewhat yielding material such as rubber, disks of leather, or other suitable materials. If formed of rubber for grinding purposes, the rubber preferably has a hardness of 60° to 70° durometer gauge reading which is the gauge customarily used in testing the hardness of rubber. If the presser roll is formed of disks of leather, the adjacent faces of annular pieces thereof may be cemented to each other. The outer end of sleeve

19 is threaded to receive a nut 22 which is screwed upon the spindle, and through a ring 23 clamps the presser roll between it and shoulder 21. Also, by such endwise compression of the roll it is expanded radially to grip the sleeve, the net result being that rotation of the sleeve causes the presser foot to rotate with it to drive the grinding belt. As shown, spindle 19 is provided with pulleys for receiving driving belts 14.

When it becomes necessary or desirable to replace a presser roll, it is only necessary to remove the two clamping nuts 18 to detach the brackets 16 from the lower sides of arms 6 and 7, after which the pressure roll structure may be removed from the yoke arms. Presser roll 20 may then be removed from the face of sleeve 19 and a new or different roll substituted for it by merely removing nut 22 from the sleeve.

Provision is made for adjusting the position of idler roll 4 to vary the distance between its axis and that of the presser roll so that grinding belt 5 may be maintained under proper tension, and provision is also made for adjusting the axis of the idler roll 4 in a horizontal plane to control the tracking of the grinding belt. For these purposes, idler roll 4 is mounted on the spindle 25 (Figs. 2 and 4) which is supported by the vertical leg of an L-shaped bracket 26 whose horizontal leg is connected to a vertical stub shaft 27 which extends through a slot 28 formed in a rear extension 29 of frame 1. Shaft 27 is rotatably mounted in a carriage 30 which is supported on frame extension 29 for horizontal movements in a plane parallel to the strands of the grinding belt. The forward end of carriage 30 is provided with an upwardly extending flange 31 having a pocket in which there is rotatably mounted a head 32 of a rod 33 which is threaded to engage threads formed in a sleeve 34 attached to a vertical flange 35 of frame 1. The forward end of rod 33 is attached to the rear end of a control rod 36 by a universal coupling 37. The other end of rod 36 extends to the front of the grinder where it is provided with a handle 38 in a position for ready engagement by a workman standing at the front of and operating the grinder. By rotating rod 36, whose outer end is positioned by a bracket 39, carriage 30 may be moved longitudinally of the grinder to tighten or loosen the grinding belt.

For adjusting the axis of idler roll 4 in a horizontal plane to cause the grinding belt to track, shaft 27 is provided with a worm wheel 45 which is engaged by a worm 46 attached to a short shaft 47 which is rotatably mounted in flange 31 of carriage 30, shaft 47 being held against longitudinal movement by collars 48 attached to it, one on each side of flange 31. The forward end of shaft 47 is connected to the rear end of an operating rod 49 by a universal coupling 50 so that rotation of rod 49 drives worm gear 46 to rotate worm 45 and spindle 27 to which it is attached. The vertical axis of stub shaft 27 is perpendicular to the plane of the strands of the grinding belt and lies midway between the ends of idler roll 4, and as a consequence thereof a maximum adjustment of the axis of the idler roll may be effected by a minimum turning of shaft 27. Like rod 36, the forward end of rod 49 extends to the front end of the grinder and is provided with a handle 51 for engagement by a workman who is operating the grinder at its front end. This operating rod is held in a convenient operating position by a bracket 52.

The entire grinder is preferably supported by being suspended centrally by a single flexible support, such as a chain 55, so that a workman standing in front of the grinder and engaging the front ends of yoke arms 6 and 7, or suitable handles attached to them, can readily manipulate the grinder, as by raising and lowering the presser roll and by turning the grinder on its longitudinal axis so that the planes of the strands of the grinding belt are inclined to the horizontal. The upper end of chain 55 may be fixed or it may be connected to an overhead trolley adapted to move in any desired direction or directions. Its lower end is provided with a hook 56 that engages an eye 57 mounted on a pin 58 which is attached to a bracket 59 secured to frame 1. The lower portion of eye 57 is mounted for longitudinal adjustment upon pin 58, it being held in its desired longitudinal position by collars 60 positioned one on each side of the eye member by suitable set screws. By variably positioning eye 57 longitudinally upon pin 58 the unbalanced weight of the grinder in front of its point of suspension may be varied according to the character of the grinding being done. If it is desired to do only light grinding or polishing, the grinder may be suspended at or near its center of gravity so that the operator need not hold the forward end of the grinder up to avoid applying too much pressure. On the other hand, when heavy grinding is being done the point of suspension may be shifted rearwardly of the grinder so that its unbalanced weight relieves the workman of unnecessary application of pressure.

In the operation of the belt grinder, motor 2 is driven to cause grinding belt 5 to move in the direction indicated by the arrows shown on Fig. 2. An operator standing in front of the grinder engages the forward ends of yoke arms 6 and 7, or suitable handles attached to it, and manipulates the grinder as desired. He may readily elevate or lower the presser roll, or turn its axis at any desired angle to the horizontal to grind flat, curved or irregular surfaces, and while operating the grinder he may, by turning control rods 36 and 49, adjust the tension of grinding belt 5 and adjust the axis of idler roll 4 to cause the grinding belt properly to track.

When it becomes necessary to replace a grinding belt, which must be done at frequent intervals ranging from about one-half to one and one-half hours, it is only necessary to relieve the tension on the belt by turning control rod 36 to move carriage 30 and idler roll 4 carried by it toward the presser roll, after which the used belt may be removed laterally from the idler and presser rolls and another substituted for it.

According to the provisions of the patent statutes we have explained the principle and operation of our invention, and have illustrated and described what we now consider to be its best embodiment. However, we desire to have it understood that, within the scope of the appended claims, our invention may be practiced by other forms of belt grinders than that specifically illustrated and described.

We claim:

1. A belt grinder comprising a horizontally disposed frame, a motor mounted on the top of the frame, a presser roll rotatably mounted on the front end of the frame, an idler roll rotatably mounted on the bottom of the rear end of the frame, a horizontally disposed grinding belt extending around both of said rolls, and a downwardly inclined driving belt extending from said motor to one end of said presser roll, a portion

of said frame between said motor and presser roll being offset laterally to extend between the upper and lower strands of said driving belt, and the front end of said frame being provided with yoke arms for engaging the ends of said presser roll, one of said arms extending between the upper and lower strands of said grinding belt.

2. A belt grinder comprising a horizontally disposed frame, a motor mounted on the frame, presser and idler rolls mounted on the opposite ends of the frame and having their axes extending substantially parallel to each other, a grinding belt extending around both of said rolls, means extending from said motor to said presser roll for driving the latter, and means for adjusting the axis of rotation of said idler roll in a plane parallel to those of the strands of said belt and around an axis perpendicular to said belt planes which latter axis is midway between the ends of the idler roll.

3. A belt grinder comprising a horizontally disposed frame, a motor borne by said frame, a presser roll rotatably mounted on a horizontal axis at the front of said frame, means extending from said motor to said roll for driving the latter, an idler roll carriage mounted on the rear of said frame for horizontal movements longitudinally thereof, a bracket borne by said carriage for rotary movements on a vertical axis, an idler roll borne by said bracket for rotation on a horizontal axis, said axis of rotation of said bracket being perpendicular to the axis of rotation of the idler roll and lying midway between the ends thereof, a grinding belt extending around both of said rolls, means for moving said carriage to vary the spacing of the axes of said rolls, and means for rotating said bracket about its said vertical axis to control the tracking of said belt.

4. A belt grinder comprising a horizontally disposed frame, a motor borne by said frame, a presser roll rotatably mounted on a horizontal axis at the front of said frame, means extending from said motor to said roll for driving the latter, an idler roll carriage mounted on the rear of said frame for horizontal movements longitudinally thereof, a bracket borne by said carriage for rotary movements on a vertical axis, an idler roll borne by said bracket for rotation on a horizontal axis, said axis of rotation of said bracket being perpendicular to the axis of rotation of the idler roll and lying midway between the ends thereof, a grinding belt extending around both of said rolls, means for moving said carriage to vary the spacing of the axes of said rolls, and means for rotating said bracket about its said vertical axis to control the tracking of said belt, each of the two last-mentioned means being provided with operating members that extend to the front of said frame.

5. A belt grinder comprising a frame equipped with a driving motor, an idler roll rotatably borne by the frame, a spindle detachably connected at its ends to said frame, a sleeve rotatably mounted on said spindle, an annular presser roll mounted on said sleeve for rotation therewith and bodily removable therefrom, a grinding belt extending around said idler and presser rolls, and means extending from said motor to one end of said sleeve for rotating the sleeve and presser roll to drive said belt.

6. A belt grinder comprising a frame equipped with a driving motor, an idler roll rotatably borne by the frame, a spindle detachably connected at its ends to said frame, a sleeve rotatably mounted on said spindle and provided with a shoulder, an annular compressible presser roll mounted on said sleeve and bearing at one end against said shoulder, a ring threadably engaging said sleeve and clamping said presser roll between it and said shoulder and upon the face of the spindle, a grinding belt extending around said idler and presser rolls, and means extending from said motor to the end of said sleeve adjacent to the shoulder thereon for rotating the sleeve and presser roll to drive said belt.

7. A belt grinder comprising a horizontally disposed frame, a motor borne by the rear end of the frame, a presser roll rotatably mounted on the front end of the frame, an idler roll rotatably mounted on the rear end of the frame, a grinding belt extending around both of said rolls, means extending from said motor to said presser roll for driving the latter, a suspension bracket attached to the frame near the center of gravity of the grinder, and a single-point suspension member mounted on said bracket for adjustment longitudinally of the grinder.

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