ABSTRACT OF THE DISCLOSURE

A manual snagging grinder suspended in a position to locate the wheel over the work, such as a billet, and to remove surface material therefrom. The grinding wheel is supported on a frame for vertical swinging motion and for horizontal rocking motion. The vertical motion is controlled by power means, such as a pneumatic cylinder. The rocking motion is on an axis substantially through the point of contact of the grinding wheel with the work.

BACKGROUND OF THE INVENTION

This invention relates to improvements in manual snagging grinders used in foundries and steel mills.

The oxide layer and surface defects must be removed from billets and slabs before cold rolling or other forming operations. Grinders for this purpose in use heretofore comprise an elongated frame, with a grinding wheel mounted at one end and a motor for driving the wheel mounted at the other end of the frame. The frame is suspended from an overhead trolley by a chain hoist that is attached about midway of the length of the frame. A pair of handle bars project outwardly from the grinding wheel end and the operator stands between the bars to control the position of the grinder. The operator must apply his weight to the handle bars to force the wheel against the workpiece with sufficient pressure to remove the surface defects. The removal of deep occlusions or surface cracks often requires tilting of the grinder to allow the edge of the wheel to cut into the desired area. The operator tilts the grinder by wiping the wheel face across the work which is a heavy and a laborious operation.

Grinders provided heretofore for such use have been unsatisfactory for several reasons, including:
(a) the great amount of force required to hold the wheel in contact with the work;
(b) the necessity for lifting the entire swing frame and wheel every time the operator puts the wheel on the work or removes it;
(c) the chain hoist suspension system requires that the operator swing the entire grinder in the direction he wants it to move until sufficient drift is established to move the trolley that supports the hoist; and
(d) the drive fails to utilize maximum efficiency.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide an improved manual snagging grinder.

Another object is to provide a snagging grinder that can be manually displaced transversely and longitudinally of the worktable without swinging the grinder vertically.

A further object of this invention is to provide a snagging grinder that is manually operated but does not depend on the physical forces applied by the operator either for control or for adequate grinding pressure.

A still further object of this invention is to provide a snagging grinder that can be manually tilted without wiping the wheel on the workpiece.

These objects are accomplished, according to a preferred embodiment of the invention, by suspending the grinding wheel and motor assembly from a rigid column. The upper end of the column is rigidly secured to an overhead carriage that is mounted on rails for movement in one direction. The carriage rails are provided on a trolley that is mounted on overhead tracks for movement in a direction at right angles to the carriage rails. The wheel and motor assembly is pivotally mounted on the column for vertical swinging movement about an axis that is offset rearwardly of the column. Tilting of the wheel and motor assembly is provided by a journal bearing and a shaft that is journaled for rotation in the bearing. The tilt axis passes through the zone of contact between the periphery of the wheel and the surface of the workpiece. The grinding wheel is mounted on one end of said journaled shaft and the motor is mounted on the opposite end. A pneumatic cylinder is connected between the motor and wheel assembly and the column for swinging the wheel and motor assembly in response to controls on the handle bars held by the operator.

DESCRIPTION OF THE DRAWINGS

This preferred embodiment is illustrated in the accompanying drawings, in which:

FIG. 1 is a side elevational view of the new snagging grinder;
FIG. 2 is a diagrammatic view of the wheel in its relation to the work;
FIG. 3 is a front elevation of the grinder;
FIG. 4 is a top plan view thereof, with the suspension column broken away;
FIG. 5 is a side elevation at the side opposite from FIG. 1; and
FIG. 6 is a bottom plan view, with parts broken away.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

In the embodiment of the invention as illustrated in the drawings, an upright column, generally indicated at 1, forms a support for the grinder. This column, which is in the form of a frame having spaced side members 2, is suitably braced and provided with a cap plate 3. A trolley 4 is seated upon the cap plate 3 with a depending journal pin 5 extending downwardly therefrom through a journal bearing in the cap plate and in a plate 6 provided in the column 1, thereby forming a journal mounting of the trolley on the column to allow swiveling movement with respect to each other.

The trolley 4 has rollers 7 mounted in a track 8 in a second trolley 9. The trolley 9 is mounted on rollers 10 in a track 11 that extends transversely of the direction of the track 8 so as to allow universal movement of the grinding assembly bodily to locate the grinder in a desired position with respect to the work. The track 11 is shown as supported by posts 12 (FIG. 3).

The lower ends of the side members 2 of the column 1 are turned rearwardly and downwardly to form a pair of arms 13. These arms 13 are spaced apart to be disposed on opposite sides of a sleeve 14. The sleeve 14 has an arm 15 extending downwardly therefrom intermediate the arms 13 and lengthwise of the latter, being connected thereto by a journal pin 16. Mounted in the sleeve 14 is a frame. In this embodiment of the invention, the frame is in the form of an elongated shaft 17 which extends through the sleeve 14 on opposite sides of the latter. Other shapes may be utilized for the frame than the form shown.

On one end portion of the frame 17 is mounted a drive motor 18, beneath the frame, by bracket 19 fixed to the shaft 17 and supporting a mounting plate 20. A second mounting plate 21 has the motor 18 mounted directly thereon. This mounting plate 21 is pivotally supported at 22 on one end portion of the mounting plate 20. The opposite end portion of the mounting plate 21 is adjustable.
connected with the mounting plate 20 as by adjusting bolts 23. Thus, the position of the motor 18 can be adjusted with respect to the frame 17 so as to vary the tension on the driving belts connected thereto. The motor is thus supported beneath the end portion of the grinder frame, aiding in balancing the assembly.

The top end portion of the shaft forming the frame 17 supports a grinding wheel 24. This wheel 24 is mounted on a spindle 25 journaled at one end portion thereof in bearings 26. The grinding wheel 24 is free for assembly or disassembly at the opposite end of the spindle 25, being fixed to the shaft during operation, but will slide from the opposite end when replacement is desired. The spindle 25 is driven by the motor 18 through one or more belts 27 extending over pulleys on the armature shaft of the motor and on the spindle 25.

The wheel 24 is enclosed within a guard 28 which is shown as forming a support for the bearings 26 on which the arbor 25 is mounted, as for example by a yoke 29 with an end portion of the shaft forming the frame 17 so as to support the wheel assembly on the adjacent end of the frame.

The guard 28 covers the upper portion of the wheel 24, as illustrated in FIGS. 1 and 5. One side of the guard 28 is open, having a cover door 30 hinged to the guard at 31 and capable of swinging out of the path of the wheel 24 when the latter is removed from the shaft or spindle 25. Normally, the door 30 would be held closed during operation of the wheel by a bolt-type latch 32 on the guard 28.

The grinding wheel 24 has a surface portion adapted to bear upon the billet B or other work supported on a table T in the usual manner. A spark shield is shown at 33 supported beneath the arm 15 in the path of trajectory of sparks from the grinding surface of the wheel 24 to deflect the sparks and increase the tendency to extinguish thereof. This shield 33 is mounted in an oblique position for the purpose and also has a downturned edge portion at its lower end to stop the flow of sparks toward the motor 18.

A manipulative handle is shown at 34. This handle is connected with the guard 28 and is used by the operator for raising and lowering the grinder as well as for tilting the latter, as hereinafter described.

The grinder assembly, including the frame 17 with the motor 18 and wheel 24, is supported in a substantially balanced position on the journal pin 16. The raising and lowering of the frame 17 with respect to the pin 16 is accomplished by a pneumatic cylinder 35 connected at one end with a bracket 36 on the column 1 and at the opposite end with a point below the frame 17.

By expanding or contracting the pneumatic cylinder 35, the grinding wheel 24 can be moved downward into contact with the work under pneumatic pressure or lifted from contact therewith. Air under pressure is supplied to the cylinder 35 through a line 38. This supply is controlled in amplitude by a throttle valve 39 mounted within convenient reach of the operator, as for example on the handle 34. Under normal operating conditions no air pressure is applied to the cylinder while grinding. Dead weight does all the work and air is applied to the cylinder only to lift the wheel off the work. However, air pressure may be applied downward to obtain greater pressure or it may be applied upward to partially relieve the dead weight.

In the operation of the grinder, the machine is brought into proper relation to the billet or other work positioned on the table T by appropriate movement of the trolleys 4 and 9. Since there is a rigid connection between the column 1 and the trolley 4, the application of a horizontal force on the guard 28 by the operator causes a corresponding movement of one or both trolleys. The wheels 24 is driven through the belts 27 and spindle 25 from the motor 18. The operator grasps the handle 34 for moving the rotating wheel into contact with the work and for manipulating the grinder.

The downward swinging movement of the wheel may be accomplished either by the pressure exerted by the operator on the handle 34 or by manipulation of the pneumatic cylinder 35, or both. This downward swinging movement is a vertical rocking action about the axis of the pin 16 and will vary with the wearing of the wheel, as well as the depth of penetration into the surface of the work.

Frequently, due to irregularities or other reasons, it is necessary to dig into the surface of the work in order to remove the outer surface therefrom or a deep imperfection. This requires a tilting of the wheel 24, as illustrated schematically in FIG. 2. This tilting action is accomplished by the operator through manipulation of the handle 34 rotating the frame 17 in the sleeve 14 about an axis A (FIG. 1) which extends obliquely lengthwise of the frame 17 through the length of the shaft forming this frame.

The mounting of the sleeve 14 is such that this axis A extends substantially through the grinding surface of the wheel at the point of contact with the work, as will be apparent from the dotted line shown in FIG. 1. Therefore, no great labor is required in thus swinging the grinding assembly to obtain this twisting movement and angular displacement of the wheel with respect to the work during its operation. Moreover, the tilt axis allows a swinging of the wheel to increase the unit pressure and to grind on the edge of the wheel, as will also be apparent from FIG. 2.

The mounting of the grinder assembly according to this invention eliminates the objections encountered heretofore in the use of chain falls which are used with most swing grinders. Moreover, a more balanced assembly is provided by locating the drive motor beneath the mounting frame which is on an oblique angle. This angular disposition of the supporting frame with its axis passing substantially through the point of contact between the wheel and the work allows angular swinging movement without bodily lifting of the frame and without dragging the wheel across the work.

Where high cost metals are involved, the loss of metal in the conditioning operations is important and sometimes more important than the man-hours needed to do the conditioning. More precise spotting is required to prevent excessive metal loss. Practical spotting under these conditions is possible with this machine with a substantial saving in metal as compared with other machines heretofore in use because considerably less physical force is required of the operator.

The construction here provided makes possible high wheel pressures to utilize high horsepower and hence a high rate of stock removal. This is accomplished with very little labor on the part of the operator.

While the invention has been illustrated and described in one embodiment, it is recognized that variations and changes may be made therein without departing from the invention as set forth in the claims.

I claim:
1. A manual snagging grinder comprising an elongated frame, a grinding wheel having an axis of rotation transverse to said frame and a surface portion for engaging work at a point below the axis of rotation, means mounting the grinding wheel operatively on one end portion of the frame, a drive motor mounted on the opposite end portion of the frame and operatively connected with the grinding wheel, means mounted said frame for turning movement about an axis extending longitudinally of the frame substantially through the point of work engagement of the surface of the grinding wheel and for manipulating mounting means, and means for supporting said mounting means so as to permit positioning of said grinding wheel with respect to the work.
2. A manual snagging grinder according to claim 1, wherein said supporting means includes a pair of spaced support arms, said mounting means includes a sleeve intermediate said drive motor and said grinding wheel,
said sleeve being pivotally connected between said support arms.  
3. A manual snagging grinder according to claim 2, including means for mounting said drive motor beneath said frame.  
4. A manual snagging grinder according to claim 2, wherein said supporting means includes a first trolley, a track mounted on said first trolley, a second trolley mounted in said track for movement in a direction transverse to the movement of said first trolley and a means for pivotally supporting said spaced arms about a vertical axis.  
5. A manual snagging grinder according to claim 2, including a fluid power means operatively connected between said frame and said support arms for raising and lowering said frame.  
6. A manual snagging grinder comprising an elongated frame, a grinding wheel having an axis of rotation transverse to said frame and a grinding surface for engaging work at a point below the axis of rotation, means for mounting said wheel operatively on one end of said frame, a drive motor operatively connected to said grinding wheel, means for mounting said drive motor on the opposite end, a pair of spaced support arms, each arm having a lower portion turned rearwardly and downwardly, a sleeve being intermediate said drive motor and said grinding wheel, said sleeve journaling said frame on an axis extending longitudinally of said frame substantially through the point for engaging work for turning movement about the longitudinal axis, means pivotally mounting said sleeve between the lower portion of said spaced arms, and means for supporting said spaced arms.  
7. A manual snagging grinder according to claim 6, including a fluid power means operatively connected between said frame and said support arms for raising and lowering said frame.  
8. A manual snagging grinder according to claim 6, wherein said supporting means includes a first trolley, a track mounted on said first trolley, a second trolley mounted on said track for movement in a direction transverse to movement of said first trolley, and means for pivotally supporting said spaced arms about a vertical axis.  
9. A manual snagging grinder according to claim 6, further comprising a guard for said grinding wheel being attached to said frame, and a handle connected to said guard for manually manipulating said grinding wheel.  
10. A manual snagging grinder comprising an elongated frame, a grinding wheel having an axis of rotation transverse to said frame and a grinding surface for engaging work at a point below the axis of rotation, means for mounting said wheel operatively at one end of said frame, a drive motor operatively connected to said grinding wheel, means for mounting said drive motor beneath said frame at the opposite end, a pair of spaced support arms, each arm having a lower portion turned rearwardly and downwardly, a sleeve being intermediate said drive motor and said grinding wheel, said sleeve journaling said frame on an axis extending longitudinally of said frame substantially through the point for engaging work for turning movement of said frame about the longitudinal axis, a sleeve extension projecting downwardly intermediate the lower portion of said arms and connected to said sleeve, a journal pin connecting said sleeve extension between the lower portion of said arms for pivotal movement of said frame, a fluid power means operatively connected between said frame and said support arms for vertically rocking said grinding wheel about said journal pin, a guard for said grinding wheel being attached to said frame, and a handle connected to said guard for manually manipulating said grinding wheel and means for supporting said spaced arms for pivotal movement about a vertical axis.

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