July 17, 1934. K. LEANDER 1,966,930

SWINGING GRINDER

Filed March 28, 1932

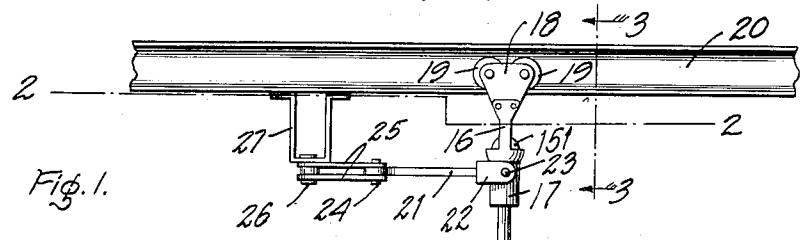


Fig. 1.

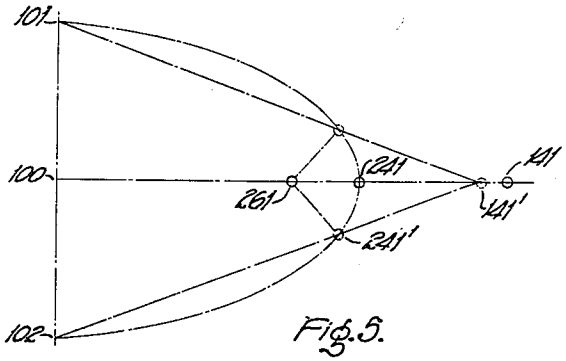
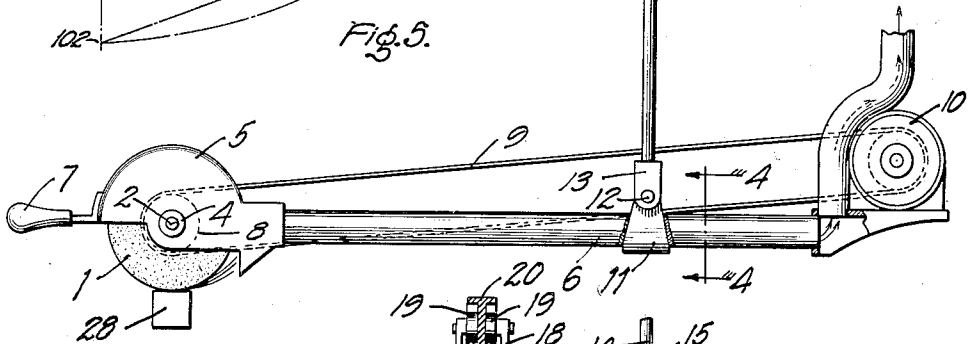


Fig. 5.



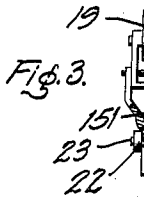


Fig. 3.

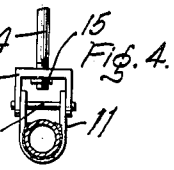


Fig. 4.

Fig. 2.

INVENTOR:
KNUT LEANDER,
by Albert G. Wood
HIS ATTORNEYS

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SWINGING GRINDER

Knut Leander, Albany, N. Y., assignor to Ludlum Steel Co., Watervliet, N. Y., a corporation of New Jersey

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11 Claims. (Cl. 51—99)

My invention relates to grinders mounted in a swinging frame and more particularly to a device of this character in which the grinding wheel, when the frame is swung, will have a predetermined line or locus of movement other than the usual circular arc about the center of suspension.

In the manufacture of steel, and particularly alloy steel, it is generally desirable and in most instances necessary to grind the billets in order to remove the scale and other defects from the surface thereof. To prevent the covering up of defects in the steel by the action of the abrasive wheel the grinding is generally done transversely instead of longitudinally of the billet. Billets vary considerably in length and where the length exceeds one or two feet considerable effort is required upon the part of the operator to pull the frame while holding the wheel in line with the billet. That is to say, while the billets are approximately straight, the wheel carrying frame normally swings in a circular arc about its point of suspension and, therefore, when the frame is swung to the right or left, a distance of two or three feet (depending upon the distance between the wheel and the point of suspension of the frame) the wheel tends to swing away from the billet and the operator must pull the entire frame forward in order to hold the abrasive wheel over the billet.

One of the objects of my invention, therefore, is to provide a suspension device for a grinder of this character which will cause the center of the abrasive wheel to move either to the left or to the right of its normal position in a substantially straight line instead of a circular arc and this without the exercise of unusual muscular effort on the part of the operator.

My invention, therefore, includes the novel elements and the combinations and arrangements thereof described below and illustrated in the accompanying drawing in which—

Fig. 1 is a side elevation view of my invention;

Fig. 2 is a plan view partially in section in the plane 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional view in the plane 3—3 of Fig. 1;

Fig. 4 is a fragmentary sectional view in the plane 4—4 of Fig. 1; and

Fig. 5 illustrates diagrammatically the method of determining the pivotal point of the links which determine the amount of movement of the upper end of the support from the frame.

Like reference characters indicate like parts throughout the drawing.

Referring to the drawing, 1 is an abrasive wheel mounted upon a horizontal shaft 2 having its bearings at 3 and 4 in the guard 5. The guard 5 is secured to the pipe 6 in which a partial vacuum is maintained and through which the detritus from the grinding operation is drawn. The guard 5 is provided with the usual hand grips 7 which are grasped by the operator and used to swing the grinder across the billet and hold it in contact therewith. The shaft 2 is provided with a pulley 8 driven by belt 9 from the motor 10 which is mounted on the opposite end of the pipe from the grinder.

Embracing and secured to the pipe 6, at about the center of gravity of the suspended assembly is a strap element 11. Embracing the strap element and pivotally secured thereto by means of the pin 12 is a yoke 13. The yoke 13 is in turn rigidly secured to the suspension rod 14 by a nut 15 or other suitable means. From the foregoing it will be apparent that the grinding wheel may be swung up or down about the pin 12 as a center and that when the wheel is swung either to the position 1′ or to the position 1″ about the axis of suspension of the rod 14 as a center, the rod will also turn. The upper end of the rod 14 terminates in a ball 151 which in turn is supported in a ball socket yoke 16, thereby permitting free turning movement of the rod 14 relatively to the socket. The socket member 16 is secured to a trolley element 18 provided with wheels 19 which run on the lower flange of an I-beam 20.

Rigidly secured to the upper portion of the rod 14 and below the socket yoke 16 is a collar 17. To this collar is secured a lever 21 which is provided with a yoke 22 pinned to the collar 17 at 23. Pivotally secured at 24 to the other end of the lever 21 are the links 25 the other ends of which are pivotally secured at 26 to the bracket 27 secured to the bottom of I-beam 20. The links 25 may for convenience be considered as a single link.

The operation of my device is as follows. The billet or piece 28 to be ground is placed upon a suitable support beneath the grinding wheel 1. The support for the billet (not shown) is of such height that the wheel is approximately horizontal when it is in contact with the upper surface of the billet. The billet is also placed substantially at right angles to the pipe 6 when this pipe is parallel to I-beam 20 so that when the pipe and I-beam are in these relative positions the grinding wheel 1 is at about the center of the

billet. When the operator swings the grinding wheel to the position 1' by means of the grip 7 it is obvious that the suspension rod 14 will be turned or twisted. The turning or twisting of the rod 14 will also swing the lever 21 to the position 21' (see Fig. 2) and this will swing the link 25 to the position 25'. The effect of this will be to pull the trolley mechanism 18 forward or towards the grinding wheel along the flange of the I-beam so that the ball 151 at the upper end of rod 14 will occupy the position 151'. If the grinding wheel is swung to the right along the billet to the position 1'' the lever 21 will move to the position 21'', the link 25 to the position 25'' and the ball 151 to the position 151'. From the foregoing it will be obvious that any swinging movement of the grinding wheel about the axis of rod 14 as a center will automatically produce parallel movement of the rod 14 and will pull this axis forward toward the billet thereby maintaining the center of the grinding wheel over the center of the billet. In other words the grinding wheel instead of moving in the arc of a circle will move in an approximately straight line. During such movement the plane of the grinding wheel extends transversely of the path of its movement and its axis remains substantially parallel to the surface of the work thereby producing a line contact between the grinding wheel and the work.

In Fig. 5 I have illustrated diagrammatically the method by which the links 21 and 25 may be designed to produce the parallel movement of the bar 14. The points 100, 101 and 102 are projections of the points 1, 1' and 1'' of Fig. 2 and indicating the central position and the extreme right and left positions of the grinding wheel 1. It is desired that the center of the grinding wheel 1 always be over the center of the billet therefore the center of the wheel must move along the line 101—102. As the wheel is swung along the billet, the trolley device 18 is moved forwardly toward the billet and therefore point 141, which is the projection of the axis of the rod 14, moves forwardly along the line 100—141. By assuming the length of the lever 21 we can then readily ascertain the length of the links 25 and the position of their pivotal connection 26 to produce the desired locus of movement of the wheel 1 as follows. Assume any point on the line 101—102, such as 102, and from this point as a center with a radius equal to the distance 100—141 strike an arc which will intersect the line 100—141 at the point 141' indicating the position to which the axis of the rod 14 must move when the grinding wheel is over the center of the billet at point 102. Connect the point 102 with the point 141' and then with the point 141' as a center and with a radius equal to the assumed length of the lever 21, which in the diagrammatic illustration is the distance 141—241, strike an arc intersecting the line 102—141 at the point 241' which will indicate the position of the pivotal connection 24. By assuming various other points along the line 101—102 indicating intermediate positions of the grinding wheel we can plot the locus of movement of the pivotal connection 241 which will be an elliptical arc. For all practical purposes this elliptical arc may be assumed to approximate a circle whose center can be determined by trial to be the point 261 which will indicate the position at which the fixed pivotal connection 26 must be placed to produce the desired movement of the grinding wheel along the billet, and the distance 241—261 will indicate the length of the links 25.

In the operation of grinders of this general character which have hitherto been used and in which the grinder is supported on a chain or other device, when the grinder is moved along an ingot, the support moves as a pendulum thereby causing the center of gravity of the frame and grinder to be raised and thereby requiring considerable effort on the part of the operator. My invention overcomes the foregoing difficulty and reduces the work required on the part of the operator to the slight frictional work necessary to move an easy rolling trolley back and forth a few inches.

While I have described my invention in its preferred embodiment it is to be understood that the drawing is merely illustrative and that by appropriately proportioning the length of the lever 21 and the link 25 the center of the grinding wheel may be made to follow a predetermined line, curved or straight. It is also to be understood that the words which I have used are words of description rather than of limitation and that changes within the purview of the appended claims may be made without departing from the true scope and spirit of my invention in its broader aspects.

What I claim is:

1. In a grinder, a frame, a grinding wheel mounted thereon, an upper supporting member, an element supported on said member on which said frame is mounted, and associated means for causing said wheel to describe a predetermined line other than an arc of a circle when swung about the axis of said element, the plane of the grinding wheel extending transversely of its path of movement and its axis remaining substantially parallel to the surface of the work during such movement.

2. In a grinder, a frame, a grinding wheel mounted thereon, an upper supporting member, an element supported on said member on which said frame is mounted, and associated means for causing said wheel to describe a substantially straight line when swung about the axis of said element, the plane of the grinding wheel extending transversely of its path of movement and its axis remaining substantially parallel to the surface of the work during such movement.

3. In a grinder, a frame, a grinding wheel mounted thereon, an upper supporting member, a second member movable therealong, a substantially rigid element rotatably mounted on said second member, said frame being pivotally mounted on said element to permit swinging movement in a substantially vertical plane only, and associated means for producing parallel movement of said element when said wheel is swung about the axis thereof.

4. In a grinder, a frame, a grinding wheel mounted thereon, an upper supporting member, a second member movable therealong, a substantially rigid element rotatably mounted on said second member, means for supporting said frame on the lower end of said element constructed and arranged to permit swinging movement of said frame in a vertical plane with respect to said element and to cause said element to turn with the frame when swung in a horizontal plane, and associated means responsive to the turning movement of said element for causing said grinding wheel to describe a substantially straight line when swung about the axis of said element.

5. In a grinder, a frame, a grinding wheel

mounted thereon, an upper track constituting a support, a trolley movable therealong, a substantially rigid element rotatably mounted on said trolley, means for supporting said frame on the lower end of said element and constructed and arranged to permit swinging movement of said frame in a vertical plane with respect to said element and to cause said element to turn with the frame when swung in a horizontal plane, and associated means responsive to the turning movement of said element for causing said grinding wheel to describe a substantially straight line when swung about the axis of said element.

6. In a grinder, a frame, a grinding wheel mounted thereon, an upper supporting member, a substantially rigid element movably supported on said member on which said frame is mounted, and associated means for causing said wheel to describe a predetermined line other than an arc of a circle when swung about the axis of said element.

7. In a grinder, a frame, a grinding wheel mounted thereon, an upper supporting member, a substantially rigid element movably supported on said member on which said frame is mounted, and associated means for causing said wheel to describe a substantially straight line when swung about the axis of said element.

8. In a grinder, a swingingly mounted frame, a grinding wheel mounted thereon, a support for said frame, and associated means responsive to a swinging movement of said grinding wheel for causing the same to describe a substantially straight line when swung about the axis of said support, the plane of the grinding wheel extending transversely of its path of movement and its axis remaining substantially parallel to the surface of the work during such movement.

9. In a grinder, an upper supporting member, an element suspended therefrom, a frame supported on said element, a grinding wheel supported on said frame, and means responsive to a swinging movement of said grinding wheel about the axis of said element for causing said grinding wheel to move in a substantially straight line.

10. In a grinder, an upper supporting member, a rod suspended therefrom, a frame supported on said rod, a grinding wheel supported on said frame, and means responsive to a turning movement of said rod for causing said grinding wheel to move in a substantially straight line.

11. In a grinder, an upper supporting member, a rod suspended therefrom, a frame supported on said rod, a grinding wheel supported on said frame, and means responsive to a turning movement of said rod for moving said rod parallel to itself and said grinding wheel in a substantially straight line.

KNUT LEANDER.