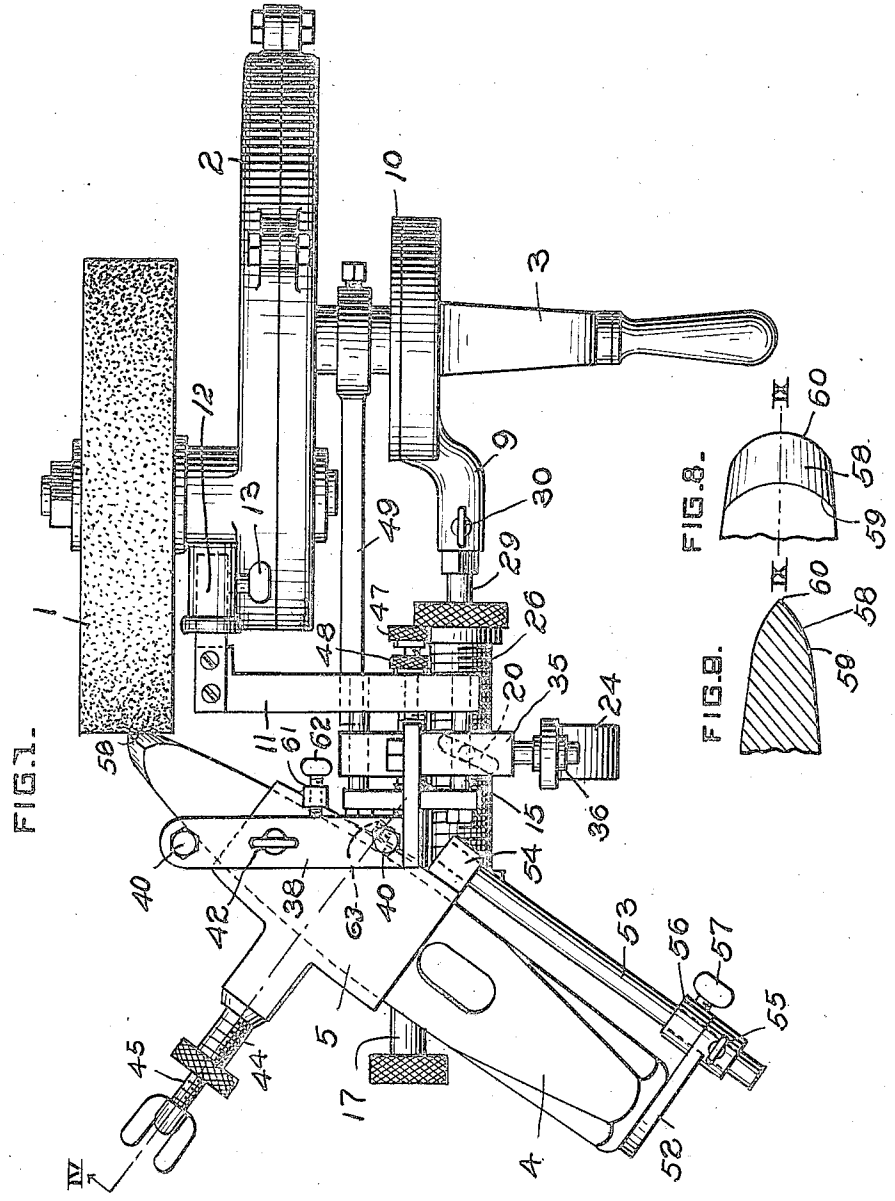
Feb. 27, 1923. 1,446,640

L. J. COONEY

GRINDING MACHINE

Filed Aug. 31, 1921 3 sheets-sheet 1



INVENTOR
Lawrence J. Cooney
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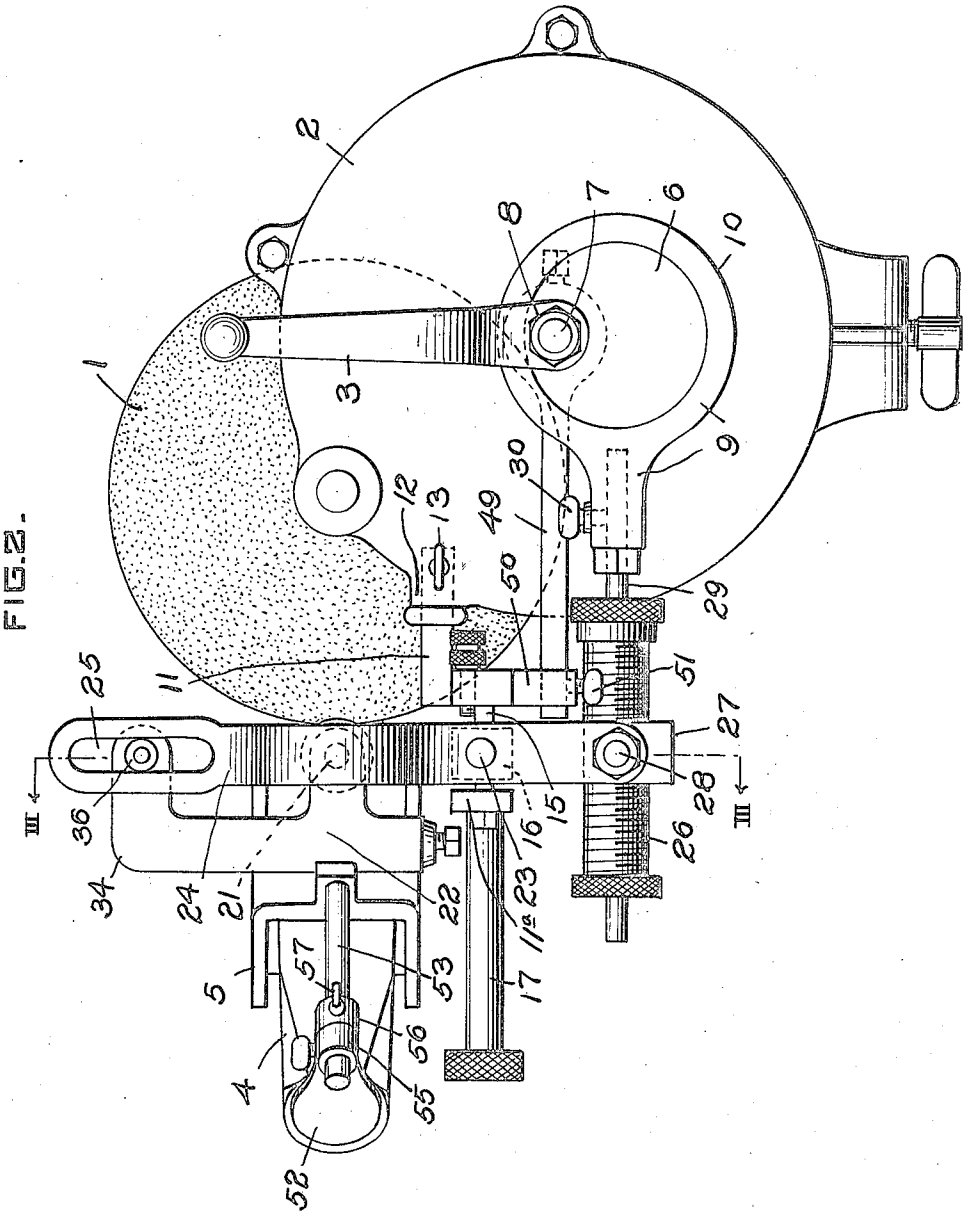
Filed Aug. 31, 1921 3 sheets-sheet 2

FIG. 2.



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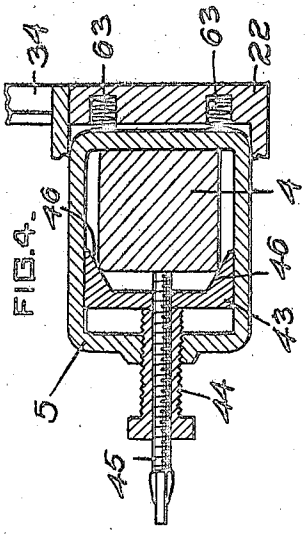

FIG. 4.

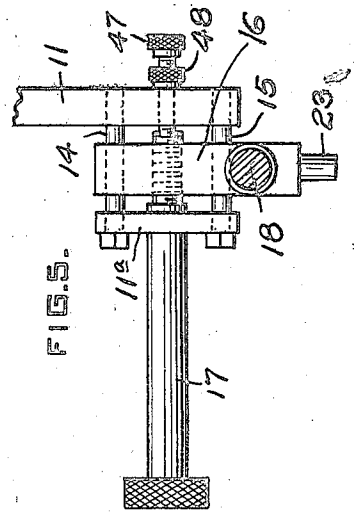

FIG. 5.

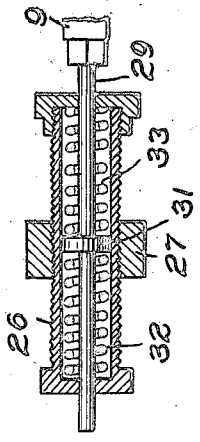

FIG. 6.

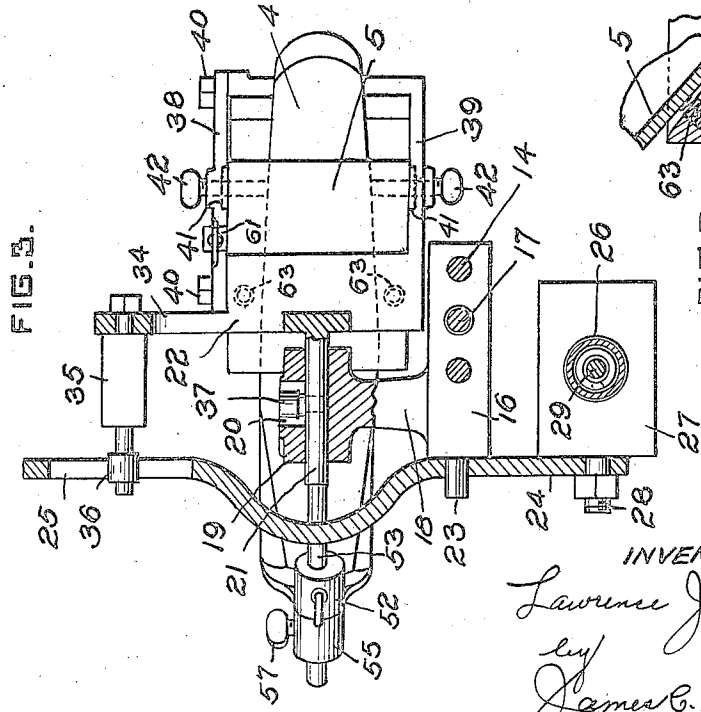

FIG. 3.

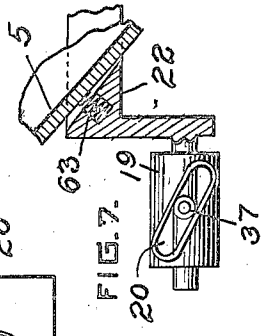

FIG. 7.

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1,446,640

UNITED STATES PATENT OFFICE.

LAWRENCE J. COONEY, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO KEYSTONE GRINDER AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

GRINDING MACHINE.

Application filed August 31, 1921. Serial No. 497,210.

To all whom it may concern:

Be it known that I, LAWRENCE J. COONEY, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have made a new and useful invention in Grinding Machines, of which the following is a specification.

The invention relates to grinding machines, and particularly to an attachment for grinding what are known as "rail cutters" or "rail chisels." Such tools are mounted upon handles and used in connection with heavy hammers for heavy cutting, acting in somewhat the same way as cold chisels. The cutting edge is formed on a curve and is formed by grinding a bevel first on one side of the tool and then on the other. These cutting edges have heretofore been ground by hand upon emery or composition wheels, and in addition to producing a cutting edge which lacks uniformity as to curve and bevel this method is expensive and tedious. The object of the present invention is the provision of an attachment which can be used with the ordinary grinding machine; which requires little skill to operate; which will grind and sharpen with rapidity and accuracy; which distributes the grinding wear across the periphery of the grinding wheel, so that there is no grooving of the wheel due to the use of the attachment; in which provision is made for insuring the grinding of the two bevels in exactly the same way; in which the surfaces ground to form the cutting edge are made convex to provide a more durable edge than one in which such surfaces are ground flat as has heretofore been the practice; and in which provision is made for centering the cutter exactly and automatically in its holder or sleeve and for securely clamping the cutter in position. These and other objects are accomplished by the improved construction, as will hereinafter appear, one embodiment of the invention being illustrated in the accompanying drawing wherein;

Figure 1 is a plan view of a grinding machine with the attachment applied thereto. Fig. 2 is a side elevation. Fig. 3 is a vertical section on the line III—III of Fig. 2. And Figs. 4, 5, 6, 7, 8 and 9 are detail views, Fig. 4 being a section on the line IV—IV of Fig. 1, Fig. 6 a section on the line VI—VI of Fig. 2, and Fig. 9 a section through the end of the chisel on the line IX—IX of Fig. 8.

Referring to the drawings, 1 is the grinder wheel, 2 is the casing of the machine in which is mounted the usual gearing for driving the wheel, 3 is the handle for operating the gearing and 4 is the rail cutter or chisel which is mounted in the clamping sleeve 5 in position so that its cutting edge may be ground on the periphery of the wheel. The handle is preferably made integral with the eccentric disc 6 by means of which the frame or carriage of the attachment is oscillated during the grinding operation. The handle is mounted on the shaft 7 and held in place by the nut 8. Recessed so as to receive the eccentric disc is the eccentric collar 9, the rear side of the collar being provided with the plate 10, (Fig. 1), to hold the parts in assembled position.

The work carrier is supported from the casing 2 of the machine, by means of the bracket 11 (Figs. 1 and 2) whose shank extends into the socket 12 on the casing, being held in place by the thumb screw 13. The bracket 11 is provided at its outer end with a pair of pins 14 and 15, (Fig. 5 in connection with Figs. 1 and 2) upon which is slidably mounted for lateral adjustment the block 16, such adjustment being accomplished as the grinding progresses by means of the screw 17 threaded through the block and operating as hereinafter more fully set forth.

The block 16 is provided with an upstanding arm 18 (Fig. 3) carrying the sleeve 19 slotted diagonally as shown at 20 in Fig. 7. This sleeve is perforated to receive the pivot rod 21, integral with the bracket 22 which carries the clamping sleeve for the tool 4, as hereinafter more fully described. The block 16 is also provided at its end with the pin 23 and upon this pin is pivoted

the arm 24 having the slot 25 at its upper end (Figs. 2 and 3). The lower end of the arm 24 is moved back and forth by the eccentric collar 9, this being accomplished by means of the spring casing 26 (Fig. 6) threaded through the nut 27, which in turn is connected with the lower end of the arm 24 by means of the pivot pin 28 integral with said nut. The eccentric collar 9 is counter-bored to receive the end of the connecting rod 29, such rod being held in the collar by the thumb screw 30 (Fig. 1). The rod 29 extends through the casing 26 being provided intermediate its ends with the enlargement 31, held yieldingly against longitudinal movement by means of the springs 32 and 33.

The bracket 22 is rocked back and forth on the arm 34 integral with the bracket and carrying a pin 35 provided with a roller 36 at its outer end engaging the slot 25 in the upper end of the arm 24. This arrangement provides for the oscillation of the bracket 22 in a vertical plane around the pivot rod 21 as an axis so that in the course of the oscillation the entire area of the tool surface to be ground is presented to the periphery of the grinding wheel.

It is also desirable that during the grinding operation the tool shall be moved back and forth in a horizontal plane so as to carry the surface being ground from one side of the periphery of the grinding wheel to the other so that the wear is distributed over such periphery. This is accomplished by moving the pivot rod 21 (Fig. 3) back and forth in the direction of the axis of such pivot rod. This is provided for by the diagonal slot 20 (Fig. 7) which receives the roller head 37 of a pin which is screwed into the pivot rod 21. As the bracket 22 is oscillated and the pin 21 rotated about its axis, it is caused to reciprocate longitudinally giving the desired back and forth movement of the bracket and tool in a horizontal direction, thus carrying the edge of the tool across the peripheral surface of the grinding wheel.

The sleeve 5 which carries the tool (Fig. 3) is held between the U-shaped part 39 (integral with the bracket 22) and the bar 38 by the bolts 40, the sleeve being provided with a pair of lugs 41 (Fig. 3) which fit into corresponding recesses in the inner faces of the part 39 and bar 38 so that the sleeve can rock laterally in such part 39. This rocking movement is used to secure the convex surfaces 58 on the tool end as opposed to the usual plane surfaces ground upon a tool of this kind. A pair of coil springs 63, shown in dotted lines in Fig. 3 and in full lines in Figs. 4 and 7, are located in recesses in the inner face of the bracket 22 opposite the sleeve so that the ends of the springs bear against the sleeve and tend to rotate it about the lugs 41. When the grinding is started the wheel engages the tool along the line marked 59 in Fig. 9 and at such time the springs 63 are under full compression. As the grinding progresses and the metal at 59 is cut away, the springs cause the sleeve 5 to swing around the pivot lugs 41, so that the cutting action is transferred over the surface 58, and finally arrives at the point 60. The swinging movement is stopped at this point by means of the thumb screw 62 (Fig. 1) carried by the lug 61 on the sleeve 5 whose end is set to engage the side of the bar 38. The curvature of the surface 58 is secured in this way and corresponds to the arc around which the tool swings with the lugs 41 as a center.

Thumb screws 42 extend through the sleeve and bars and engage the faces of the tool. The tool is held or clamped and centered primarily by the device shown in section in Fig. 4 and comprising the centering plate 43, the threaded sleeve 44, and the thumb screw 45. In clamping the tool the plate is first moved inward by the sleeve 44, thus centering the tool between the inclined faces 46, after which the thumb screw 45 is screwed down, thus removing the strain of holding the tool in position from the inclined surfaces 46, which would otherwise soon become scored and worn, thus reducing their accuracy.

During the grinding operation, adjustment of the tool toward the wheel is required to compensate for the cutting away of the metal and this is accomplished by means of the screw 17. This screw is swivelled (Fig. 5) in a bar 11ª secured to the ends of the pins 14 and 15 so that its rotation moves the block 16 in and out on the pins 14 and 15. A stop screw 47 provided with a lock nut 48 adapted to engage the side of the block 16 serves to limit the movement of such block.

In order to further steady the bracket 11, the rod 49 (Figs. 1 and 2) is provided one end of which is supported on the boss around the drive shaft 7, while the other end extends through the lug 50 extending downwardly from the bracket 11, a clamping screw 51 being employed in such lug to engage the rod.

The position of the tool longitudinally of its sleeve is fixed by means of the stop 52 mounted on the rod 53, which rod is secured at its inner end to the lug 54 on the sleeve 5. The stop 52 is pressed up against the end of the tool and secured in position by the thumb screw 55. After this adjustment the collar 56 is positioned against the stop and secured by means of the thumb screw 57. After one edge of the tool is ground, the stop is removed to permit of the reversal of the tool, the collar 56 being left in position, so that when the stop 52 is pushed up against

the collar, it and the tool will occupy the same position as before the reversal of the tool.

In operation, the tool 4 is placed in the sleeve 5, and the stop 52 moved along on its rod pushing the tool forward until its edge at 59 (Fig. 9) lightly engages the periphery of the grinding wheel. The thumb screws 55 and 57 are then tightened and the plate 43 (Fig. 4) screwed down to center the tool, after which the thumb screws 45 and 42 are tightened, firmly clamping the tool in position. The handle 3 is now rotated and the back and forth movement of the connecting rod 29 as secured from the eccentric 6, causes the arm 24 to rock about its pivot 23, and this in turn rocks the bracket 22 carrying the tool 4 about the axis of the pivot rod 21, thus swinging the tool in a vertical plane so that the entire surface 58 (Fig. 1) to be ground is carried along the periphery of the grinding wheel. The oscillation of the rod 21 also causes its reciprocation longitudinally by reason of the engagement of the diagonal slot 20 (Figs. 3 and 7) with the roller head 37 of the pin carried by the rod. This carries the bracket 22 and the tool back and forth horizontally moving the surface 58 of the tool across the surface of the grinding wheel. At the same time the springs 63 give the sleeve 5 and tool 4 a yielding automatic feed around the pivot lugs 41 to grind the convex surface 58 (Fig. 9) from the point 59 to the point 60. From time to time as the grinding progresses, the tool must be adjusted toward the wheel and this is accomplished by giving the adjustment nut 17 a turn. The screw 47, (Fig. 5) is used to gauge the final position of the block 16, so that when the grinding of the first edge is finished and the tool is reversed the second edge can be ground the same amount by adjusting the screw 17 in during this second operation until the block 16 again engages the end of the screw 47.

During the grinding operation the spring connection in the casing 26, (Fig. 3), insures the same in and out travel of the bracket 22 which carries the tool despite the adjustment of the screw 17, which would otherwise change the range of travel of the roller head pin 37 in the slot 20. By employing the spring connection, the parts may be given an over travel, so that the pin 37 engages both ends of the slot yieldingly at the beginning of the operation. The adjustment of the screw 17 will change the yielding force with which the pin 37 engages the ends of the slot, but the travel of the pin will be the full length of the slot 20 at all times. The spring connection is also advantageous in preventing breakage in case a hammer or other tool is accidentally placed in the attachment at some point where the clearance of the parts moved by the spring connection is slight. When it is desired to use the machine without the attachment, it is removed with the special handle 3 and an ordinary handle placed upon the shaft 7.

What I claim is:

1. In combination in a grinding machine, a grinding wheel or disc, a holder for a tool to be ground adapted to support such tool with the surface to be ground in opposition to the periphery of the wheel, a pivotal mounting for the holder so that the edge of the tool to be ground may be swung back and forth on an arc tangent to the periphery of the wheel and so that such edge may also be moved transversely of the plane of rotation of the wheel on a line parallel to the axis of the wheel to distribute the grinding wear across the periphery of the wheel, and means actuated by the rotation of the wheel for giving the holder such movements.

2. In combination in a grinding machine, a grinding wheel or disc, a holder for a tool to be ground adapted to support such tool with the surface to be ground in opposition to the periphery of the wheel, means for pivotally supporting the holder so that the edge of the tool may be (1) moved back and forth on an arc tangent to the periphery of the wheel in the plane of rotation thereof, (2) moved transversely of the plane of rotation of the wheel in a line parallel to the axis of rotation of the wheel to distribute the grinding wear across the periphery of the wheel, and (3) swung on an arc toward the axis of rotation of the wheel to give a convex ground surface, and means for giving the holder such movements during the rotation of the grinding wheel.

3. In combination in a grinding machine, a grinding wheel or disc, a holder for a tool to be ground adapted to support such tool with the surface to be ground in opposition to the periphery of the wheel, means for pivotally supporting the holder on an axis parallel to the axis of the wheel so that the edge of the tool may be swung back and forth in an arc tangent to the periphery of the wheel in the plane of rotation thereof and also swung on an arc around an axis at right angles to the first axis toward the axis of rotation of the wheel to give a convex ground surface, and means for giving the holder such movements during the rotation of the grinding wheel.

4. In combination in a grinding machine, a grinding wheel or disc, a holder for a tool to be ground adapted to support such tool with the surface to be ground in opposition to the periphery of the wheel, means for supporting the holder, so that the edge of the tool may be moved back and forth in a plane tangent to the periphery of the wheel and also swung on an arc toward the axis of rotation of the wheel to give a convex ground surface, spring means for swinging

the holder on said arc, and means operated by the rotation of the wheel for giving the holder said back and forth movement.

5. In combination in a grinding machine, a grinding wheel or disc, a holder for a chisel or cutter to be bevelled adapted to support the tool inclined toward the wheel with one of its edges to be bevelled in opposition to the periphery of the wheel, a carriage for the holder, (1) pivotally supported on an axis parallel to the axis of the wheel so that the tilting of the carriage carries the edge of the cutter along the periphery of the wheel on an arc tangent thereto and in the plane of rotation thereof, and (2) mounted for reciprocation longitudinally of said axis to carry the edge of the cutter transversely of the periphery of the wheel and distribute the wear over such periphery, and means for giving the carriage its movements during the grinding operation.

6. In combination in a grinding machine, a grinding wheel or disc, a holder for a chisel or cutter to be bevelled adapted to support the tool inclined toward the wheel with one of its edges to be bevelled in opposition to the periphery of the wheel, a carriage for the holder, (1) pivotally supported on an axis parallel to the axis of rotation of the wheel so that the tilting of the carriage carries the edge of the cutter along the periphery of the wheel on an arc tangent thereto in the plane of rotation thereof, and (2) mounted for reciprocation longitudinally of said axis to carry the edge of the cutter transversely of the periphery of the wheel and distribute the wear over such periphery, means for rocking the carriage, and means actuated by said rocking movement for reciprocating the carriage.

7. In combination in a grinding machine, a grinding wheel or disc, a holder for a chisel or cutter to be bevelled adapted to support the tool inclined toward the wheel with one of its edges to be bevelled in opposition to the periphery of the wheel, a carriage for the holder, (1) pivotally supported on an axis parallel to the axis of rotation of the wheel, so that the tilting of the carriage moves the edge of the cutter along the periphery of the wheel on an arc tangent thereto in the plane of rotation thereof, and (2) mounted for reciprocation on said axis to carry the edge of the cutter transversely of the periphery of the wheel, means for rocking the carriage, and cam means cooperating with the axle for moving it and the carriage longitudinally when such carriage is rocked.

8. In combination in a grinding machine, a grinding wheel or disc, a holder for a chisel or cutter to be bevelled adapted to support the tool inclined toward the wheel with one of its edges to be bevelled in opposition to the periphery of the wheel, a carriage for the holder, (1) pivotally supported on an axis parallel to the axis of rotation of the wheel, so that the tilting of the carriage moves the edge of the cutter along the periphery of the wheel on an arc tangent thereto in the plane of rotation thereof, and (2) mounted for reciprocation on said axis to carry the edge of the cutter transversely of the periphery of the wheel, a yielding connecting rod for rocking the carriage when the wheel is operated, and cam means co-operating with the axis for moving it and the carriage longitudinally when the carriage is rocked.

9. In combination in a grinding machine, a grinding wheel or disc, a holder for a chisel or cutter to be bevelled adapted to support the tool inclined toward the wheel with one of its edges to be bevelled in opposition to the periphery of the wheel, a supporting bracket, a carriage for the holder pivotally supported on the bracket on an axis parallel to the axis of rotation of the wheel so that the tilting of the carriage moves the edge of the cutter along the periphery of the wheel on an arc tangent thereto, and mounted for reciprocation longitudinally of said axis, means for rocking the carriage from the actuation of the grinding wheel including a yielding connecting element, means whereby the carriage may be adjusted on said bracket transversely of said axis, and means actuated by said rocking movement for reciprocating the carriage.

10. In combination in a grinding machine, grinding wheel or disc, a holder for a chisel or cutter to be bevelled adapted to support the tool inclined toward the wheel with one of its edges to be bevelled in opposition to the periphery of the wheel, a supporting bracket, a carriage for the holder pivotally supported on the bracket on an axis parallel to the axis of rotation of the wheel, and mounted for reciprocation longitudinally of said axis, means for rocking the carriage automatically including a yielding connecting element, means for adjusting the carriage on the bracket transversely of said axis, and cam means for co-operating with the axle for moving the carriage longitudinally of the axle when such carriage is rocked.

11. In combination in a grinding machine, a grinding wheel or disc, a holder for a chisel or cutter to be bevelled adapted to support the tool inclined toward the wheel with one of its edges to be bevelled in opposition to the periphery of the wheel, a carriage for the holder, (1) pivotally supported on an axis parallel to the axis of rotation of the wheel so that the tilting of the carriage carries the edge of the cutter along the periphery of the wheel on an arc tangent thereto in the plane of rotation thereof, and

(2) mounted for reciprocation longitudinally of said axis to carry the edge of the cutter transversely of the periphery of the wheel and distribute the wear over such periphery, and means for giving the carriage its movement during the grinding operation, the holder being pivotally supported on the carriage on an axis at right angles to the first axis whereby the holder and cutter may be swung on an arc toward the axis of the wheel as the grinding operation progresses to secure a convex bevelled surface.

In testimony whereof, I have hereunto subscribed my name this 29th day of Aug., 1921.

L. J. COONEY.