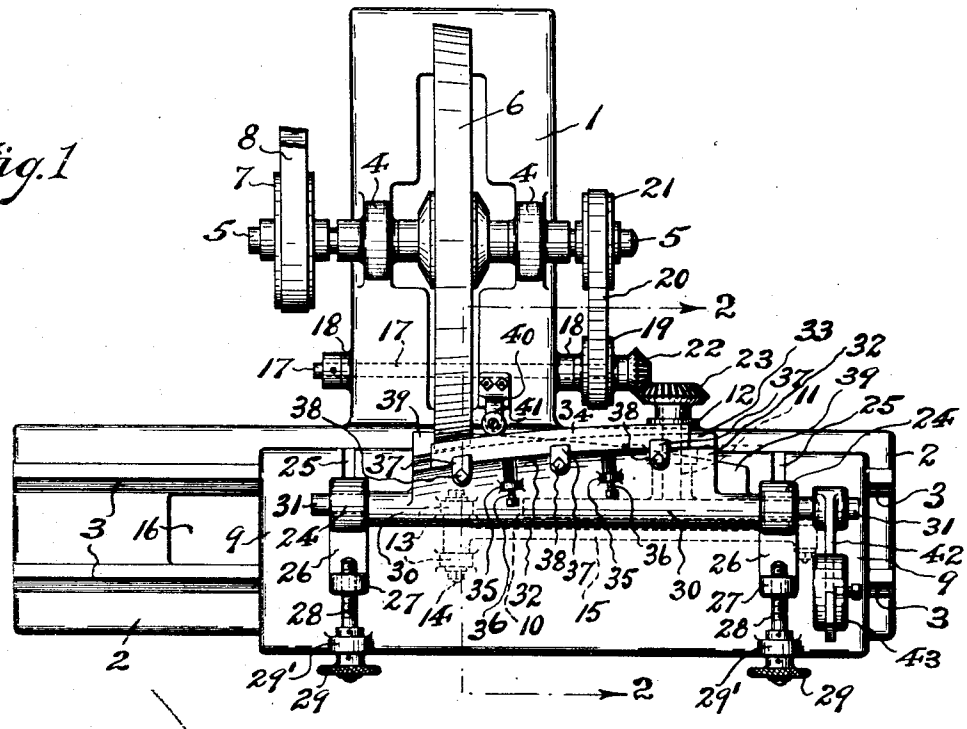
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MACHINE FOR GRINDING HELICAL BLADES.

APPLICATION FILED SEPT. 22, 1919.

1,330,981. Patented Feb. 17, 1920.

Fig. 1



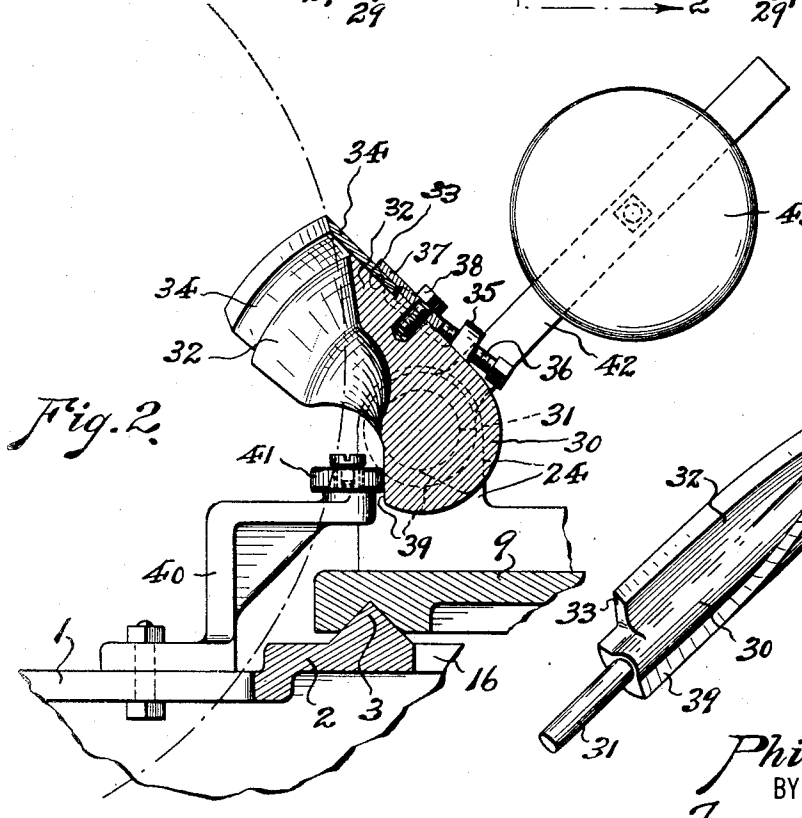


Fig. 2

Fig. 3

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MACHINE FOR GRINDING HELICAL BLADES.

1,330,981. Specification of Letters Patent. Patented Feb. 17, 1920.

Application filed September 22, 1919. Serial No. 325,322.

To all whom it may concern:

Be it known that I, PHILIP C. DONNER, a citizen of the United States, residing at Summit, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Machines for Grinding Helical Blades; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The present invention relates, generally, to automatic grinding machines; and the invention has reference, more particularly, to a very simple, efficient and accurate automatic grinding machine for grinding and re-sharpening helical cutter blades, such, for example, as are used upon fur cutting and hide dehairing machines.

The invention has for its principal object to provide a very simple and easily operated grinding machine having a novel construction of work holder upon which a helical blade may be held, and means for automatically oscillating said work holder, as the same is moved longitudinally back and forth to carry the blade edge across the grinding or abrading wheel, whereby all portions of the helical edge of the blade are properly brought into contact with the grinding wheel. A further novel feature of the invention is to provide a work or blade holder of such construction that the blade mounted thereon is presented to the grinding wheel surface, during operation of the machine, in a manner to produce a very acute concave bevel edge thereupon.

Other objects of the present invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

With the various objects of the present invention in view, the same consists, primarily, in the novel construction of grinding machine hereinafter set forth; and the invention consists, furthermore, in the novel arrangements and combinations of the various devices and parts, as well as in the details of the construction of the same, all of which will be hereinafter more fully described, and then finally embodied in the claims appended hereto.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a plan view of a grinding machine made according to and embodying the principles of my present invention; Fig. 2 is a detail cross-section of the work holding means, taken on line 2—2 in said Fig. 1, the same being drawn on an enlarged scale; and Fig. 3 is a perspective view of a part of the work holding means detached from the machine.

Similar characters of reference are employed in all of the hereinabove described views to indicate corresponding parts.

Referring now to said drawings, the reference-character 1 indicates a suitable base upon which the mechanism of the machine is mounted, said base having at its forward end a laterally extending bed-plate 2 provided with longitudinally arranged track-members or guideways 13 thereon. Connected with said base 1 are a pair of bearing members 4 in which is journaled a shaft 5. Fixed upon said shaft 5, so as to be rotated thereby, is a grinding or abrading wheel 6. Said shaft 5 is provided at one end with a driving pulley 7, over which runs a driving belt 8 operated from any suitable source of power.

Arranged to ride upon the track-members or guide-ways 3 of said bed-plate 2 is a reciprocating table 9 adapted to travel back and forth in front of said grinding wheel 6. The means for reciprocating said table 9 comprises a crank-wheel 10 mounted upon a shaft 11 journaled in a bearing 12, to position said crank-wheel beneath said bed-plate 2. Said table 9 is provided upon its under side with properly positioned lugs 13 adapted to support a wrist-pin or bolt 14 upon which is pivotally connected one end of a connecting rod 15, the opposite end of which is pivotally connected with the crank-wheel 10, so that when the latter is rotated a reciprocating movement will be transmitted to said table by said connecting rod. Said bed-plate 2 is provided with a suitable opening or hatch 16, through which said connecting-rod may pass to its connected relation with said table, and through which

the connecting-rod plays during the operation thereof. The transmission means for operating said crank-wheel 10 comprises a countershaft 17 journaled in bearings 18 connected with said base 1. Fixed on said counter-shaft 17 is a pulley 19 over which runs a transmission belt 20 driven by a pulley 21 fixed upon and rotated by said grinding-wheel shaft 5. Secured upon the end of said counter-shaft 17 is a bevel gear 22 which meshes with and drives another bevel gear 23 fixed on the end of said crank-wheel shaft 11, so that the rotary movement imparted to said counter-shaft 17 is transmitted to said crank-wheel shaft 11 and the crank-wheel 10 mounted thereon. The above described means for reciprocating the table 9, and transmission means therefor, is merely illustrative of one mechanical arrangement adapted to the purpose. Hence I do not wish to be understood as limiting myself specifically thereto, since in its broader aspects my invention embraces a novel work holding means mounted on a reciprocating table, regardless of the specific means for accomplishing the table movement, whether by hand, or by mechanical means the same or other than that above described.

The novel work or blade holding and controlling mechanism adapted to be mounted upon said reciprocating table 9, comprises a pair of bearing brackets 24 mounted for slidable adjusting movement transversely of the table 9 in guide grooves 25 with which the table is provided, and which extend inwardly from the inner longitudinal edge of the table which moves adjacent to the grinding wheel periphery. Said bearing brackets 24 have tail-pieces 26 provided with nut-lugs 27 to receive the screw-threaded shanks 28 of adjusting screws 29 mounted in holding lugs 29′ at or adjacent to the outer edge of said table. The reference-character 30 indicates an oscillator bar, provided at each end with journal portions 31 journaled respectively in said bearing brackets 24. Said oscillator bar 30 is provided with an upper helically shaped carrying flange 32 provided on its upper surface and at its free edge with a recess or seat portion 33 in which the helically curved blade 34 (which is to be sharpened) is seated so that its rear edge abuts against the shoulder of said seat portion while its forward cutting edge projects beyond the free edge or periphery of said carrying flange. The helical shape or curve of the free edge and seat portion of said carrying flange is shaped to conform to the helical curve of the blades to be ground or sharpened by the machine.

Said carrying flange 32 projects toward the grinding wheel 10, so that as the oscillator bar oscillates the free cutting edge of the blade 34 is carried into engagement with the operative surface of said grinding wheel 10. Fixed upon said carrying flange 32 in the rear of said seat portion 33 are supporting lugs 35 provided with internally screw-threaded perforations in which are arranged adjusting screws 36, the free ends of which enter the rear of said seat portion 33 to engage the rear edge of said blade 34. By manipulating said adjusting screws 36 the blade 34 may be properly adjusted and backed in said seat-portion to properly dispose the same, and position its cutting edge in proper alinement to be engaged at all points by the grinding wheel 10 when the oscillator bar is oscillated or rocked. A plurality of clamp-bits 37 secured by bolts 38 are provided upon said carrying flange so that their forward free ends extend over and upon the blade 34 to clamp the same down into the seat-portion 33. Said oscillator bar is further provided with a lower helically reversed shaped cam flange 39. Mounted upon a supporting bracket 40, fixed upon said base 1, is a tracker roller 41 with which said cam flange 39 is engaged, and against which the latter rides to govern the oscillating movements of said oscillator bar. Fixed upon one of the outwardly projecting journal portions 31 of said oscillator bar 30 is a lever arm 42 upon which is secured a counter-balance weight 43.

The pitch of the helix described by the operative face of said cam flange 39 corresponds to the pitch of the helix described by the carrying flange 32 and the blade 34 supported thereon, but is reversed in direction relative to the direction of the helical curve of the latter, so that a swinging or oscillating movement of the lower cam flange in one direction, as it rides along the tracker-roller 41, produces an opposite swinging or oscillating movement of the upper carrying flange and the blade supported thereby.

After the blade 34 is fixed upon the carrying flange 32, and the machine is set in motion, the following operations take place. When the power is applied to the driving pulley 7 by the belt 8, the shaft 5 is rotated thereby turning the grinding wheel 6. At the same time the movement of the shaft 5 transmits, through the interconnecting transmission mechanism, motion to the crank-wheel 10, thereby reciprocating the table 9 back and forth upon the bed-plate 2 and in front of the grinding wheel 6. The table 9 being moved to the extreme right, the high part of the cam-flange 39 is positioned to ride against the tracker-roller 41, thus presenting the left end of the blade 34, supported by the low part of the carrying flange 32, against the surface of the grinding wheel 6. As the table moves to the right the cam-flange 39 rides against the tracker-roller 41, being swung toward the same and being maintained in contact therewith by the

counter weight 43 acting under gravity upon the lever 42 to turn the oscillator bar 30 on its journals 31. As the cam-flange 39 thus rides against the tracker-roller 41 its helical curve recedes therefrom thus permitting the oscillator bar to pivot in a manner causing the carrying flange 32 to swing gradually outward as its high part approaches the grinding wheel 6, thereby always causing the helically curved edge of the blade 34 to be maintained in engagement with the grinding stone to receive the effects of the abrading or grinding action thereof. As the table 9 reverses its direction of movement, the action of the cam-flange 39 against the tracker-roller 41 is reversed, thus reversing the swinging movement of the oscillator bar and consequently of the carrying flange and blade supported thereon. The oscillation of the oscillator bar is thus synchronously timed to the reciprocating movements of the table 9, so that the blade 34 is constantly presented to the abrading operation of the grinding wheel as it is moved back and forth in front of the same. Since the helical curve of the cam-flange corresponds in pitch to that of the carrying flange and blade 34, but is reversed in direction, it follows that a rearward movement of the cam-flange at the point of contact with the tracker-roller 41 is necessarily accompanied by an equal forward movement of the carrying flange and blade 34 at the point of contact with the grinding wheel 6, and vice versa.

I am aware that some changes may be made in the general arrangements and combinations of the several devices and parts of my present invention, as well as in the details of the construction of said parts, without departing from the scope of my invention as set forth in the foregoing specification and as defined in the claims. Hence, I do not limit my invention to the exact arrangements and combinations of the various devices and parts as described in said specification, nor do I confine myself to the exact details of the construction of said parts as illustrated in the accompanying drawings.

I claim:—

1. In a machine for grinding helically curved blades, a rotary grinding wheel, a reciprocating table adapted to travel at right angles to the grinding face of said grinding wheel, an oscillator bar pivoted upon said table, said oscillator bar having an upper helically curved carrying flange projecting toward said grinding wheel, the helical curve of the periphery of said carrying flange corresponding to the helical blade to be mounted thereon, means for securing a blade to the periphery of said carrying flange, said oscillator bar having a lower reversely helically curved cam-flange the pitch of which corresponds to the pitch of said carrying flange, a fixed tracker means against which said cam-flange rides, and means for maintaining said cam-flange in engagement with said tracker means.

2. In a machine for grinding helically curved blades, a rotary grinding wheel, a reciprocating table adapted to travel at right angles to the grinding face of said grinding wheel, an oscillator-bar pivoted upon said table, said oscillator bar having an upper helically curved carrying flange projecting toward said grinding wheel, the helical curve of the periphery of said carrying flange corresponding to the helical blade to be mounted thereon, a depressed blade-seat at the periphery of said carrying flange, adjusting screws mounted on said carrying flange to engage the back of a blade in said blade-seat to regulate the projection of the blade edge relative to the periphery of said carrying flange, clamp-bits mounted on said carrying flange to clamp said blade in said blade-seat, said oscillator bar having a lower reversely helically curved cam-flange the pitch of which corresponds to the pitch of said carrying flange, a fixed tracker means against which said cam-flange rides, and means for maintaining said cam-flange in engagement with said tracker means.

3. In a machine for grinding helically curved blades, a base, a rotary grinding wheel mounted on said base, a bed-plate connected with said base in front of and at right angles to said grinding wheel, a table slidable longitudinally on said bed-plate, means for reciprocating said table, an oscillator bar pivoted upon said table, said oscillator bar having a carrying flange helically curved to correspond to a helical blade to be mounted thereon, means for mounting a blade on said carrying flange, said oscillator bar having a reversely helically curved cam-flange the pitch of which corresponds to the pitch of said carrying flange, and means engaged by said cam-flange to cause an oscillation of said oscillator bar whereby said carrying flange is oscillated to hold said blade in traveling contact with said grinding wheel.

4. In a machine for grinding helically curved blades, a base, a rotary grinding wheel mounted on said base, a bed-plate connected with said base in front of and at right angles to said grinding wheel, a table slidable longitudinally on said bed-plate, means for reciprocating said table, an oscillator bar pivoted upon said table, said oscillator bar having a carrying flange helically curved to correspond to a helical blade to be mounted thereon, means for mounting a blade on said carrying flange, said oscillator bar having a reversely helically curved cam-flange the pitch of which corresponds to the pitch of said carrying flange, a tracker-roller fixed to said base against which said

cam-flange rides, and means for maintaining said cam-flange in traveling engagement with said tracker-roller all arranged whereby said oscillator bar is rocked to oscillate said carrying flange and thus hold said blade in traveling contact with said grinding wheel.

In testimony that I claim the invention set forth above I have hereunto set my hand this 19th day of September, 1919.

PHILIP C. DONNER.

Witnesses:

FREDK C. FRAENTZEL,

BARBARA W. SUTTERLIN.