June 13, 1944. G. STEWART 2,351,159

DRESSING MECHANISM FOR GRINDING WHEELS

Filed Oct. 17, 1941 4 Sheets-Sheet 1

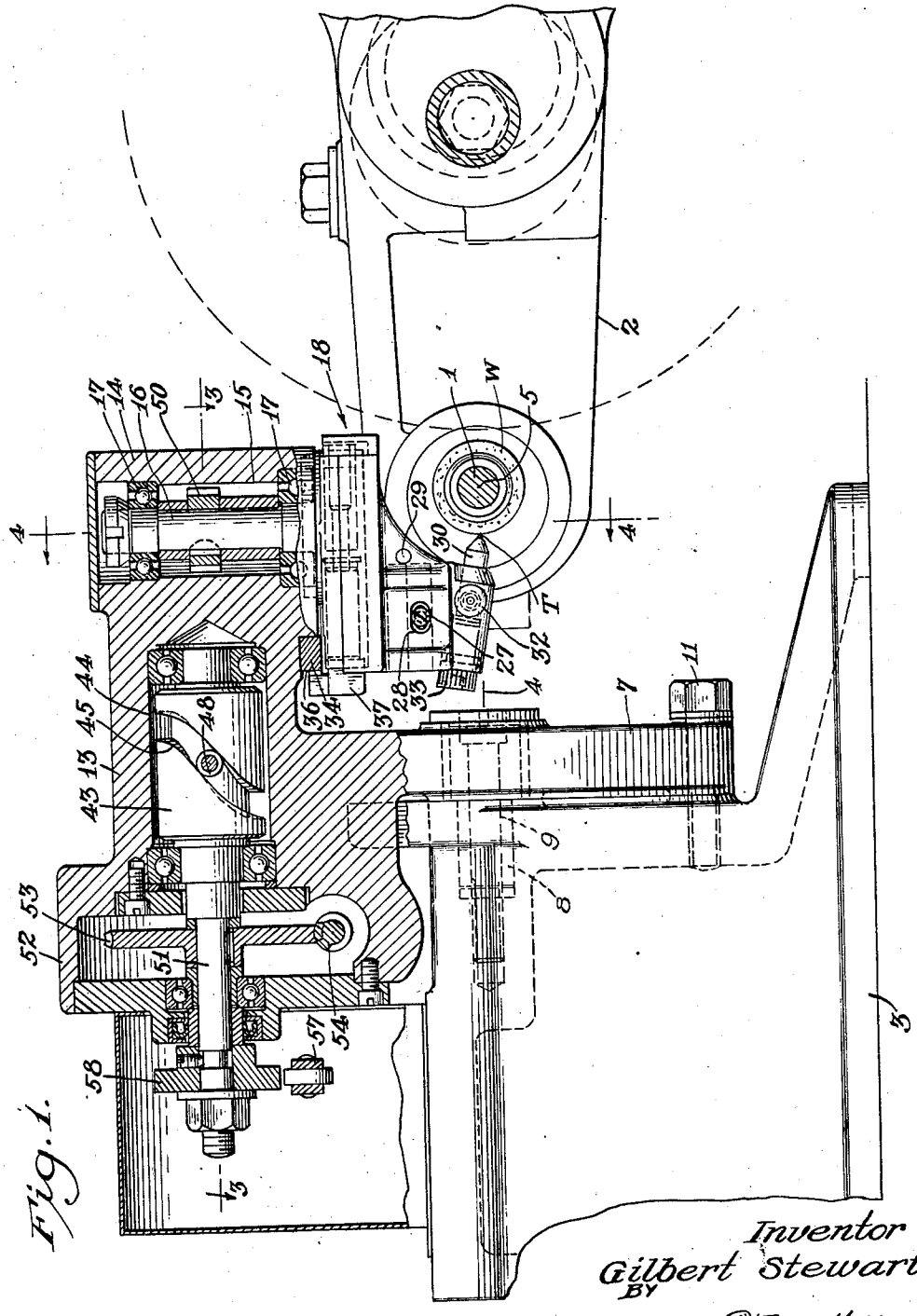


Fig. 1.

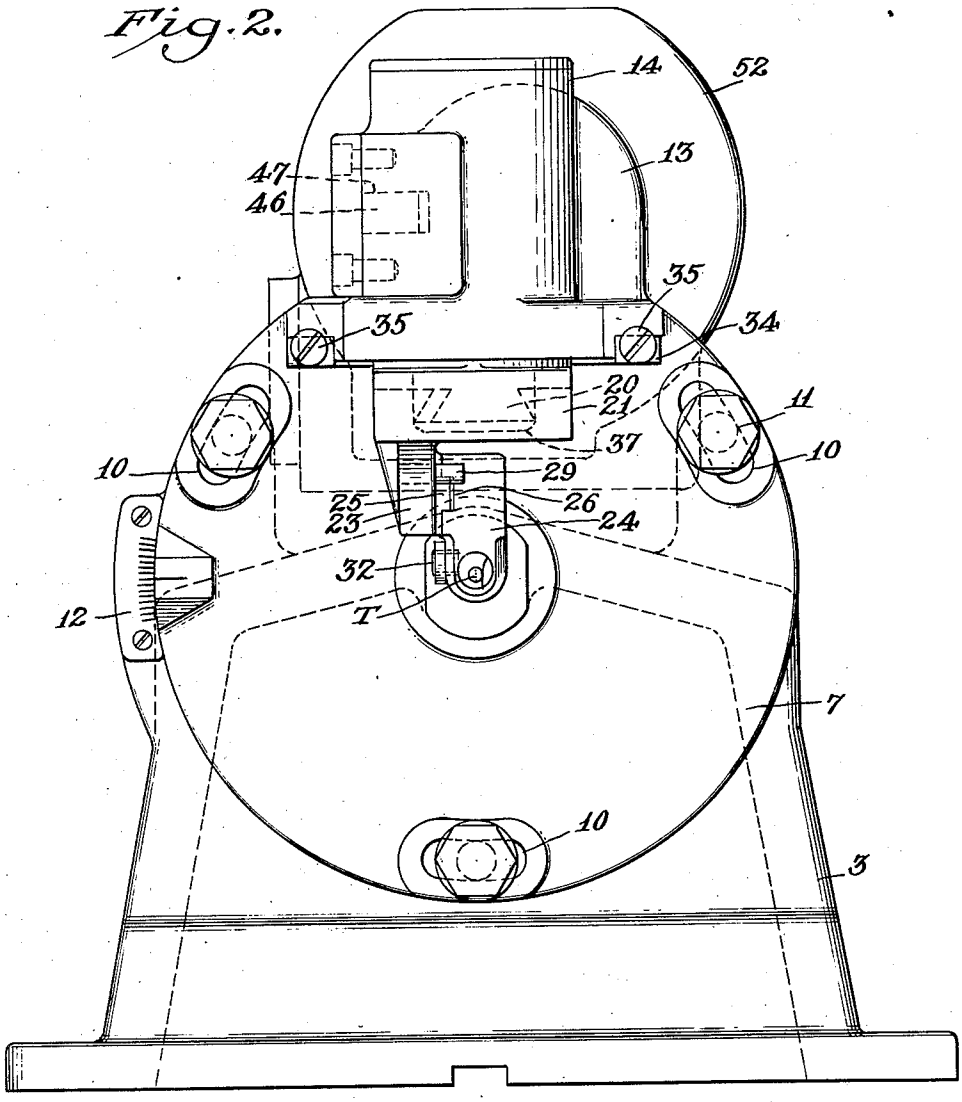
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Fig. 2.



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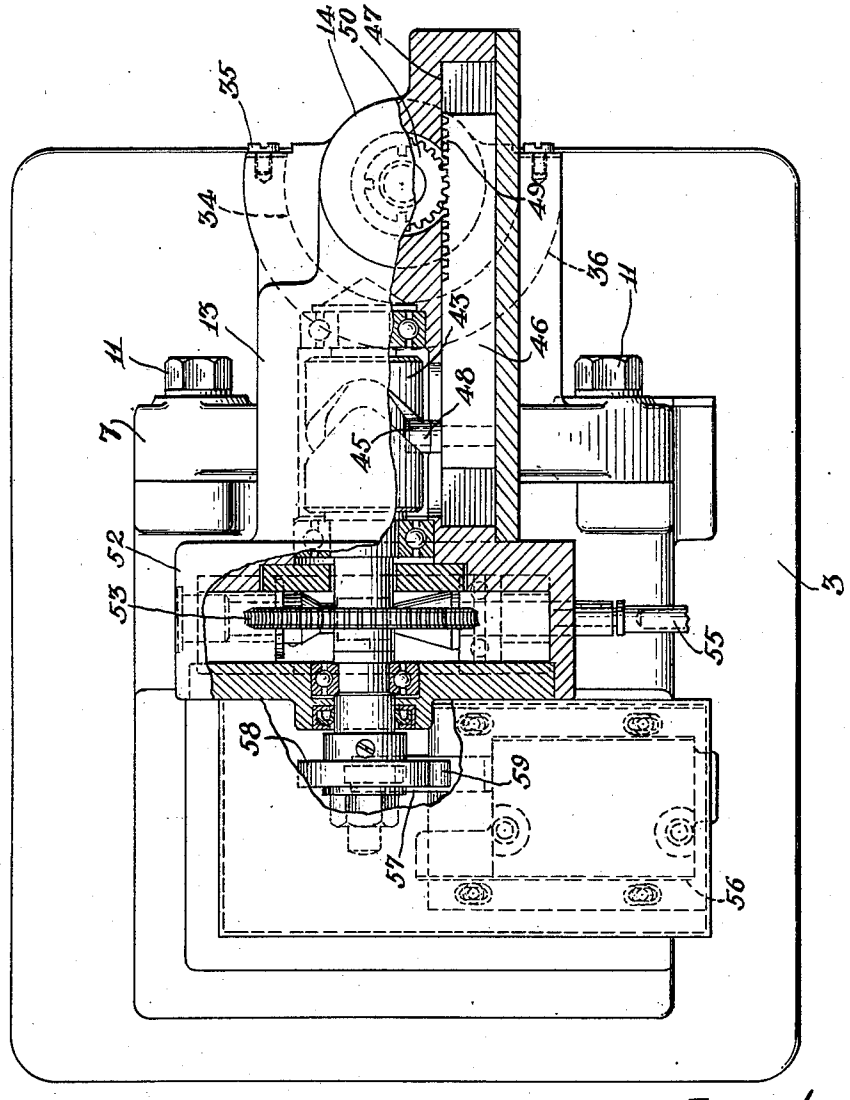


Fig. 3.

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Fig. 4.

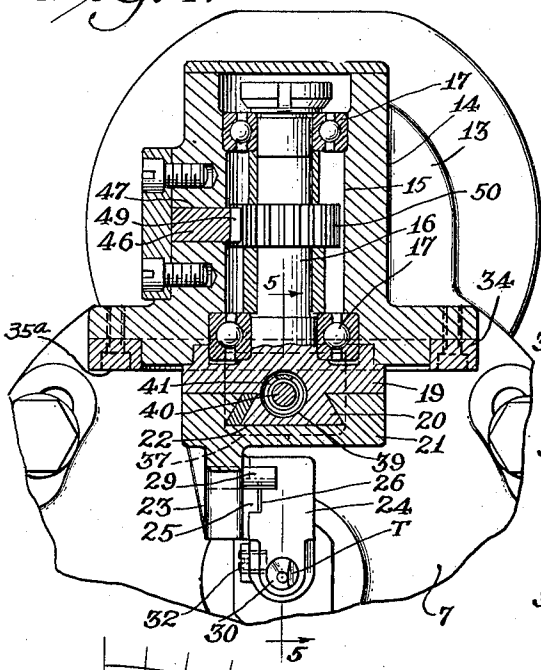


Fig. 5.

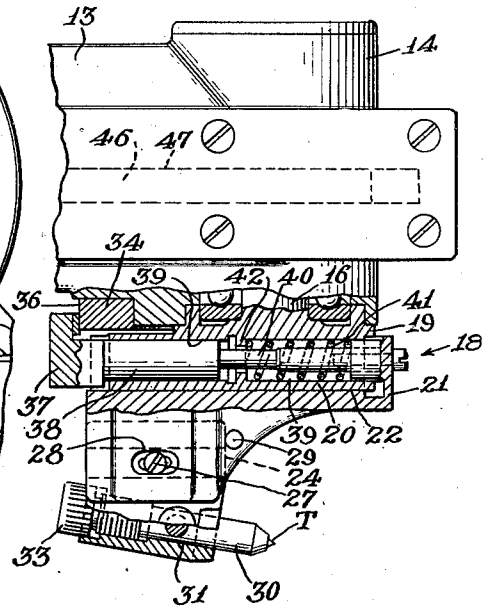
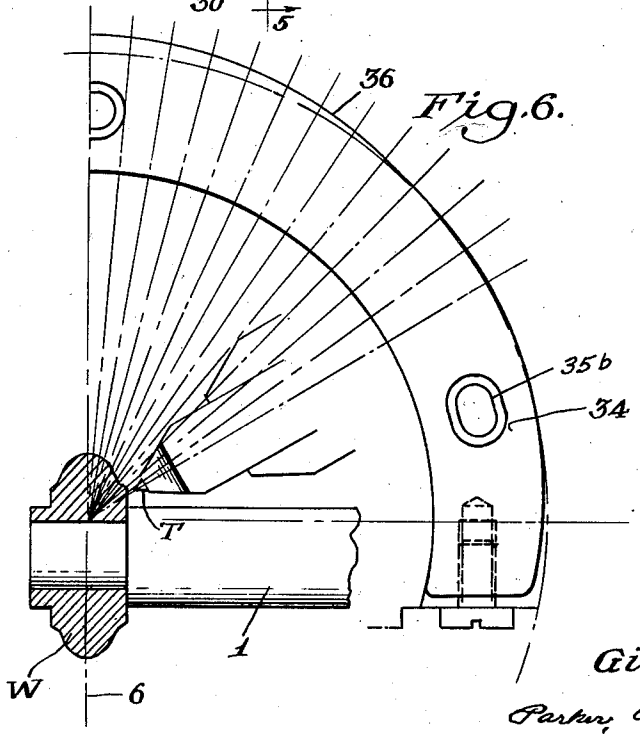


Fig. 6.



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DRESSING MECHANISM FOR GRINDING WHEELS

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Application October 17, 1941, Serial No. 415,373

5 Claims. (Cl. 125—11)

The present invention relates to a dressing mechanism for grinding wheels, and has particular reference to a new and improved mechanism in which a single dressing tool is arranged for power oscillation to generate a contour of non-arcuate form.

One of the objects of the invention is to provide a novel dressing mechanism of the foregoing character in which a unidirectional power-drive is employed for swinging the dressing tool, and in which a cam of preselected shape is operative to modify the path of movement of the tool so as to generate a contour of desired form on the grinding wheel.

Another object is to provide a dressing mechanism of the foregoing character comprising novel means for effecting dimensional adjustments of the dressing tool.

Other objects and advantages will become apparent as the description proceeds.

In the accompanying drawings:

Figure 1 is a fragmentary vertical sectional view of a dressing mechanism embodying the features of my invention.

Fig. 2 is an end elevational view of the dressing mechanism.

Fig. 3 is a plan view of the dressing mechanism partially in section along the line 3—3 of Fig. 1.

Fig. 4 is a fragmentary vertical sectional view taken along line 4—4 of Fig. 1.

Fig. 5 is a fragmentary view partially in side elevation and partially in section along line 5—5 of Fig. 4.

Fig. 6 is a diagrammatic representation illustrating the controlled path of movement of the dressing tool in relation to the grinding wheel to generate a predetermined contour.

Referring more particularly to the drawings, the dressing mechanism constituting the exemplary embodiment of the invention comprises a dressing tool T mounted for swivel movement under cam control to produce a predetermined form on a grinding wheel W, adapted particularly for grinding internal threads. The grinding machine forms no part of the present invention, and hence is not shown in detail. The grinding wheel W is mounted on a spindle 1 suitably journaled in a bracket 2 which is supported by means (not shown) for angular adjustment to incline the grinding wheel in accordance with the lead of the thread to be ground.

The dressing mechanism comprises a base 3 adapted to be mounted on a suitable support in predetermined relation to the grinding wheel W. Mounted on the base 3, for angular adjustment about a horizontal axis 4 perpendicular to and intersecting the axis 5 of the spindle 1 in the medial transverse plane 6 of the grinding wheel W, is a swivel plate 7 for supporting the dressing tool assembly. More particularly, the swivel plate 7 is supported on a fixed bearing stud 8 fitted into the body 3 and secured in position by a bolt 9. The plate 7 is formed about the periphery with spaced arcuate slots 10 through which clamping bolts 11 extend into threaded engagement with the base 3. An indicator 12 is provided for showing the degree of angular adjustment, which normally is set to conform to the angular disposition of the grinding wheel W in accordance with the lead angle of the work.

The upper portion of the swivel plate 7 is formed with a bracket 13 extending parallel to the swivel axis 4, and the forward end thereof is formed with a tubular sleeve 14 having a generally vertical bore 15 extending transversely of the swivel axis. A shaft 16 is suitably journaled in spaced ball bearings 17 within the bore 15, and at its lower end supports a dressing tool assembly 18 for swinging or oscillatory movement. In the present instance, the shaft 16 is provided with a diametrical cross head 19 formed with the dovetailed guide 20. A slide 21, with a complementary guideway 22, is adjustably mounted on the guide 20 and is formed with a depending bracket arm 23.

Adjustably secured to the arm 23 is a block 24 for supporting the dressing tool T. The block 24 is positioned on the arm 23 by a tongue 25 and groove 26, and is adapted to be secured in position by means of a clamp bolt 27 extending through an elongated slot 28 in the arm. A pin 29 projects from the arm 23 across the forward end of the block 24, and definitely locates the latter in relation to the axis of oscillation.

The dressing tool T is mounted in the end of a shank 30 extending adjustably into an inclined bore or socket 31 in the lower end of the block 24, and adapted to be secured in position by a set screw 32. An adjusting screw 33 is threaded into the rear end of the bore 31 in end abutment with the tool shank 30 to locate and back up the latter.

It is to be understood that, to a certain degree, the attrition of the dressing tool T which results from contact with the grinding wheel W may be estimated and compensated by adjustment of screw 33 thus maintaining the effective point of the tool at a predetermined radial

distance from that portion of block 24 which abuts pin 29 to the end that the form dressed upon the grinding wheel be not substantially effected by wear of the dressing tool T.

Periodically, and particularly when occasion requires replacement of the dressing tool T and its associated shank 30, the block 24 is removed from association with its locating tongue 25 and pin 29 and located upon a checking fixture (not shown) which is external to the machine. By means of the fixture last named the correct location of the diamond tool T in relation to the block 24 may be determined and the desired adjusted position may be accomplished by screw 33.

In practice it is customary to have a multiplicity of blocks 24 with their associated dressing tools available in correctly adjusted relationship ready for interchangeable use on the bracket 21 without altering the form which is dressed upon wheel W. In the alternative use of such blocks 24 the pin 29 together with tongue 25 and groove 26 determines the correct location of block 24 with respect to bracket 21.

Oscillation of the shaft 16 serves to swing the dressing tool T in a normally arcuate path. Cam means is provided for modifying the path of swinging movement in order to provide the grinding wheel with a non-arcuate contour of any particular form. To this end, a curved template or cam 34 is removably secured about the lower end of the sleeve 14. The cam 34 has an inner arcuate face concentric with the axis of the shaft 16 and permitting rotary adjustment and an outer configurated cam face 36 which may be non-arcuate. Adjustment of the cam 34 may be effected by means of screws 35, and suitable bolts 35a extending through slots 35b are provided for securing the cam in position of adjustment. A cam follower 37 engages the cam face 36, and is fixed on the rear end of a plunger 38 slidable in a bore 39 opening longitudinally through the cross head 19. The forward end of the plunger 38 is attached to the tool slide 21 and has a reduced portion 40. A coiled compression spring 41 encircles the reduced portion 40 within the bore 39 and through end abutment with an internal flange 42 serves to urge the slide 21 forwardly and hence to hold the follower 37 in engagement with the cam face 36. Consequently, as the shaft 16 is rocked through approximately 180° to oscillate the dressing tool T, the cam 34 will cause the dressing tool slide to shift in timed relation so as to generate a non-circular path of cut as indicated in Fig. 6.

To provide means for oscillating the shaft 16, a rotary cam drum 43 is journaled in a bore 44 in the bracket 13 for rotation on an axis parallel to the swivel axis 4 of the plate 7. The cam drum has a continuous spiral groove 45 formed in its periphery. A bar 46 is slidable in a longitudinal groove 47 in one side of the bracket 13, and carries a roller 48 in engagement with the groove 45. The forward end of the bar 46 is formed with a gear rack 49 meshing with a pinion 50 on the rock shaft 16.

The cam drum 43 is rigid with an axial shaft 51 which extends through a gear housing 52 on the rear end of the bracket 13. A worm wheel 53 is keyed to the shaft 51 within the gear housing 52 and meshes with a worm 54 on a drive shaft 55 projecting from the housing for connection to a suitable source of power, such as an electric motor (not shown).

The motor is controlled by a switch 56 mounted on the base 3 and having a control lever 57 normally biased toward the periphery of a cam 58 fixed on the outer end of the shaft 51. The cam 58 has a peripheral lug 59 adapted at the end of each revolution to depress the lever 57, and thereby stop the electric drive motor at the end of each dressing cycle.

It will be seen that the cam 43 by reason of the groove 45 will in one revolution oscillate the shaft 16 back and forth through its full range of movement, and hence a simple unidirectional drive for the shaft 55 can be employed.

I claim:

1. A dressing mechanism comprising, in combination, a base, a swivel plate mounted for angular adjustment on said base, a bracket on said swivel plate, a rock shaft on said bracket and extending perpendicularly to the swivel axis, a dressing tool holder mounted on one end of said rock shaft and adapted to be oscillated thereby, said holder supporting a dressing tool for adjustment radially of the shaft axis, a rotary cam journaled in said bracket and having a continuous spiral cam groove, means coacting with said groove and operatively connected to said shaft to oscillate the latter back and forth for each complete revolution of said cam, and a worm and worm wheel drive for said cam.

2. A dressing mechanism comprising, in combination, a base, a swivel plate mounted for angular adjustment on said base, a bracket on said swivel plate, a rock shaft on said bracket and extending perpendicularly to the swivel axis, a dressing tool holder mounted on one end of said rock shaft and adapted to be oscillated thereby, a rotary cam journaled in said bracket and having a continuous spiral cam groove, means coacting with said groove and operatively connected to said shaft to oscillate the latter back and forth for each complete revolution of said cam, and means for rotating said cam in one direction.

3. A dressing mechanism comprising, in combination, a base, a swivel plate mounted on said base for angular adjustment to different selected positions and having an eccentrically disposed bracket, a bearing sleeve on one end of said bracket, a shaft journaled in said bearing sleeve for rotation on an axis perpendicular to the axis of said swivel plate and supporting a transverse guide, a curved cam partially circumscribing said bearing sleeve, a dresser slide reciprocable on said guide, a follower connected to said slide for movement therewith and coacting with said cam, spring means acting on said slide to maintain said follower in contact with said cam, a block removably mounted on said slide, a dressing tool adjustably mounted on said block, stop means for locating said block in predetermined position on said slide, and means on said bracket for oscillating said shaft, said cam acting to modify the swinging movement of said dressing tool so as to cause the latter to describe a predetermined non-arcuate path of movement.

4. A dressing mechanism comprising, in combination, a base, a swivel plate mounted for angular adjustment on said base, a bracket on said swivel plate, a rock shaft on said bracket and extending perpendicularly to the swivel axis, a dressing tool holder mounted on one end of said rock shaft and adapted to be oscillated thereby, a dressing tool mounted on said holder for adjustment radially of the shaft axis, means acting automatically to control the radial posi-

tion of said tool on said holder in different positions of oscillation of said holder, a rotary cam journaled in said bracket and having a continuous spiral cam groove, means coacting with said groove and operatively connected to said shaft to oscillate the latter back and forth for each complete revolution of said cam, and means for rotating said cam in one direction.

5. A dressing mechanism comprising, in combination, a base, a swivel plate mounted for angular adjustment on said base, a bracket on said swivel plate, a rock shaft on said bracket and extending perpendicularly to the swivel axis, a dressing tool holder mounted on one end of said rock shaft and adapted to be oscillated thereby, a dressing tool mounted on said holder for adjustment radially of the shaft axis, a curved cam member partially circumscribing said axis and formed with a configurated cam face along its length, a cam follower coacting with said tool, spring means for maintaing said follower in engagement with said cam face, said follower coacting with said cam face to control the radial position of said tool on said holder in different positions of oscillation of said holder, a rotary cam journaled in said bracket and having a continuous spiral cam groove, means coacting with said groove and operatively connected to said shaft to oscillate the latter back and forth for each complete revolution of said cam, and means for rotating said cam in one direction.

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