Nov. 18, 1924. 1,516,269

A. E. DRISSNER

SHAVING AND BURNISHING TOOL

Filed July 29, 1922

Fig. 1.

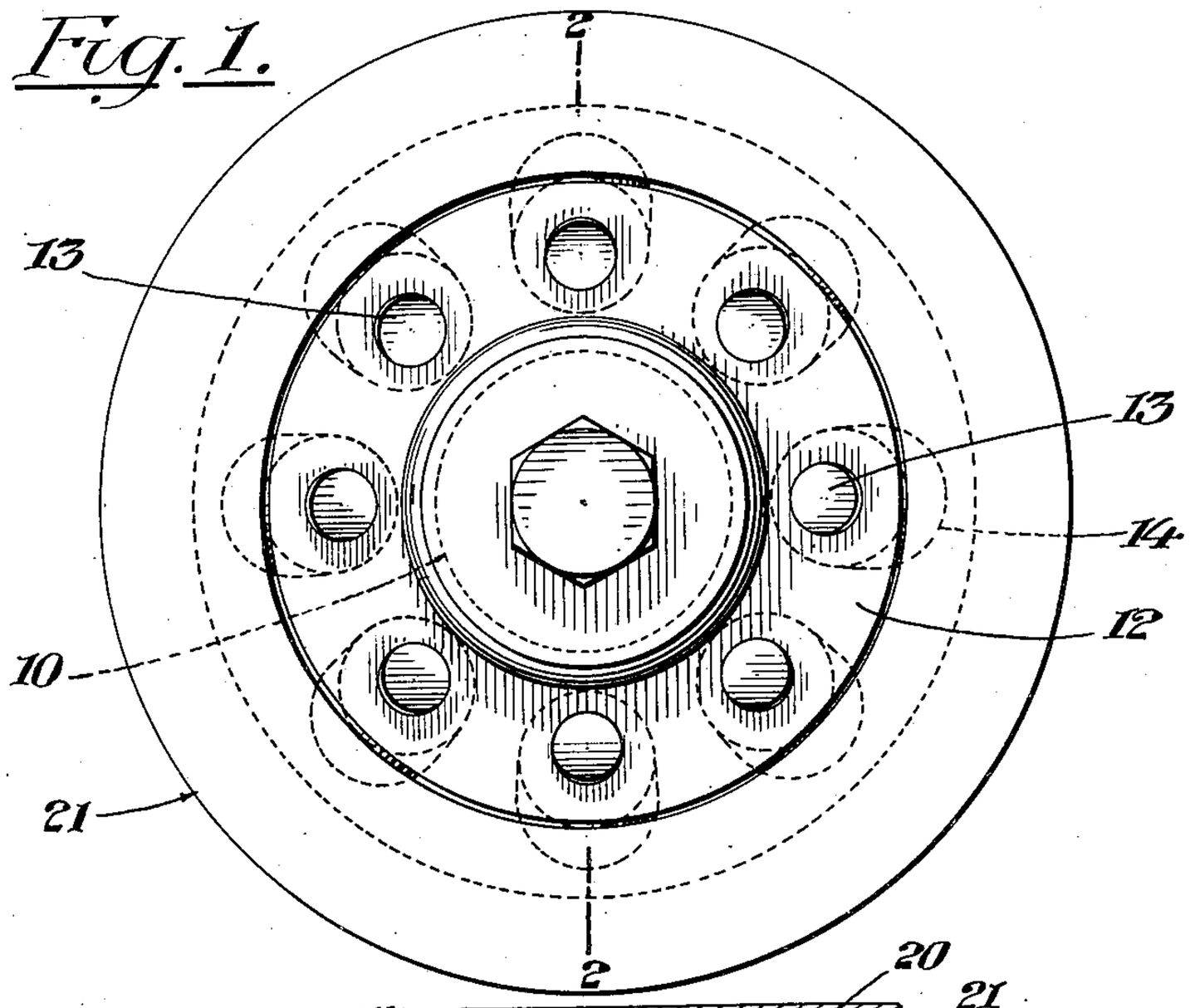


Fig. 2.

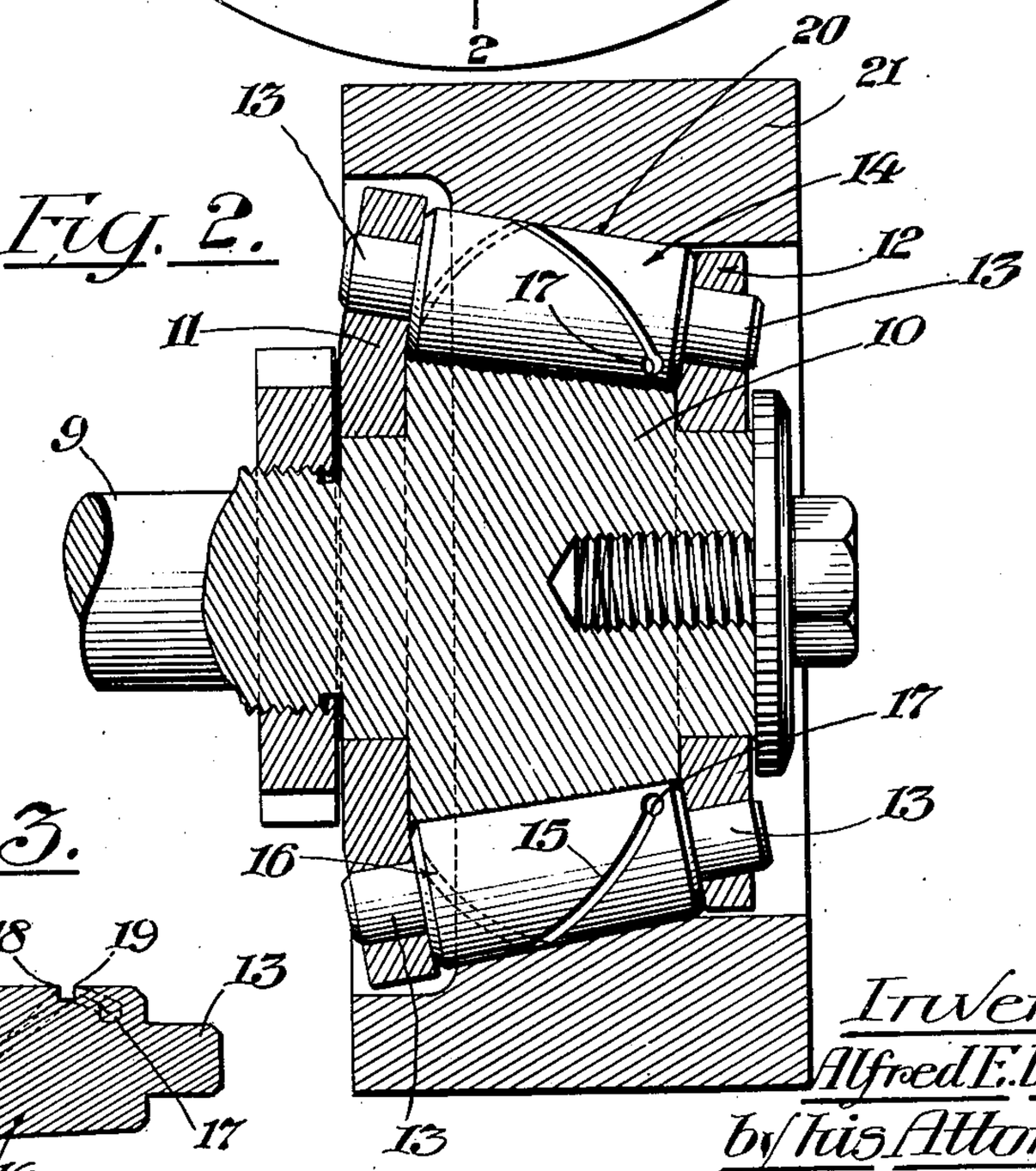
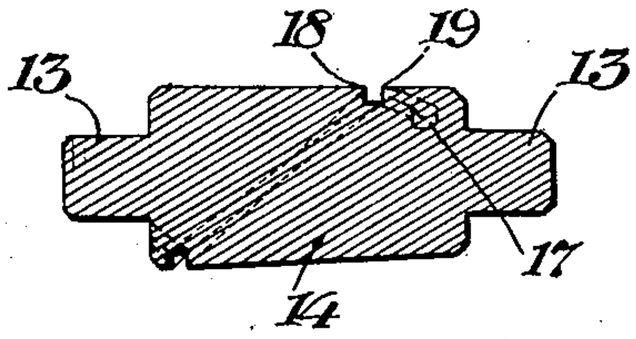


Fig. 3.



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UNITED STATES PATENT OFFICE.

ALFRED E. DRISSNER, OF CLEVELAND, OHIO, ASSIGNOR TO THE NATIONAL ACME COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

SHAVING AND BURNISHING TOOL.

Application filed July 29, 1922. Serial No. 578,326.

To all whom it may concern:

Be it known that I, ALFRED E. DRISSNER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Shaving and Burnishing Tools, of which the following is a specification.

This invention relates to machine tools, and more particularly to that form thereof known as burnishing tools or rolls, the object thereof being to provide an improved burnishing tool or roll which will also shave the work simultaneously with the burnishing thereof, whereby both the operations of shaving and burnishing are effected by the same tool instead of by separate or successive operations or by separate tools.

A further object of this invention is to provide a tool for simultaneously shaving and burnishing, the same being particularly adapted for operating upon the inside faces of the work irrespective of the shape thereof and which at the same time will be efficient and effective in operation, economical and easy to manufacture and readily interchangeable with many different kinds of holders.

A further object of this invention is to provide a combined shaving and burnishing tool adapted particularly for operating upon interior faces of the work irrespective of the shape thereof, the tool comprising a plurality of combined shaving and burnishing rolls circumferentially arranged and supported for operation by the work.

Other objects of this invention will appear in the following description thereof, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters indicate corresponding parts in the several views and wherein Fig. 1 is an end view illustrating an embodiment of my invention in connection with the work; Fig. 2 is a longitudinal section taken substantially on lines 2—2 of Fig. 1; and Fig. 3 is a longitudinal section through a cutting roll.

In my copending application for combined shaving and burnishing tool filed November 5, 1921, Serial No. 513,207, I have illustrated a tool adapted particularly for shaving and burnishing in one operation the outside faces of the work, the tool comprising a single roll operative upon engagement with the face of the work. In the present invention the construction of the combined shaving and burnishing tool is such as to adapt the same particularly for operation upon interior faces of various types of work. And instead of a single idler roller provided with a spiral cutting edge, the present invention contemplates especially the use of a plurality of circumferentially arranged rollers provided each with a spiral cutting edge, and as a result of the present construction the operation of shaving and burnishing is more quickly accomplished.

In its preferred form this improved tool comprises a suitable support or holder such as a shaft 9 provided at its outer end with a boss 10 suitably machined at opposite sides thereof for the reception of bearing collars 11 and 12. In the present instance these bearings are bored at spaced intervals circumferentially of the support and at an angle to provide alined holes for journaling the bearing ends 13 of the rolls or rollers 14. In the present instance the several rollers 14 are shown as mounted at an angle or an incline so as to adapt the cutting edges thereof to operate upon tapered surfaces. In the drawings eight rollers equally spaced circumferentially of the tool have been shown, but it is of course understood that any number of rollers may be used that may be best adapted for the particular character of work to be operated upon. Thus, if desired four rollers equally spaced around the axis of the tool may be provided.

It is further understood that the shape of the rollers may be varied according to the shape of the surface to be burnished and shaved. As herein shown the rollers are cylindrical in shape and have the axes thereof inclined or tapered. Yet is will be understood that the shape of the rollers may be varied to suit the shape of the work without changing the position of the axes thereof. Thus, for instance, the rollers could be curved in order to burnish a curved face of the work. On the outer surface or periphery of each roller is machined a spiral groove 15, which groove in the present instance is open at one end 16 and extends in a spiral manner about the roller to a point 17 adjacent to the lateral edge of the roller.

Thus the groove 15 in each roller is closed at one end 17 and in the present instance this closed end is shown provided with a depression or pocket for the reception of the chips, and by virtue of this construction the crowding of the chips against the supporting bearing 12 is prevented. In other words, if the ends of the groove were not closed, the chips would pass to the bearings and damage them, but the closed end of the groove keeps the chips away from the bearings and enables the chips to be thrown off, as it were, by centrifugal action during the rotation of the rollers, the pockets merely serving to more efficiently retain the chips so that they will not injure the bearings. It will be understood that by having one end 16 of the groove open the chips from the work will be forced toward the open end of the groove and cleared from the roller when the latter revolves. The surface of each roller 14 is ground after hardening and as a result sharp cutting edges 18 and 19 are formed by the several grooves, two opposed cutting edges being preferably shown in this instance in order to provide a reversible tool. Furthermore the lead or effective range of operation of the grooves 15 which are herein shown as defined between the points 16 and 17, is preferably greater or longer than the length of the work to be burnished and shaved. As a result the tool does not have to be shifted over the face of the work but upon engagement of the faces of the rollers with the surface 20 of the work the spiral cutting edges operate upon the entire face of the work upon the rotation of the rollers.

In the operation of the tool the work 21 is rotated and upon carrying the tool or work forward so that the inclined faces of the rollers 14 will engage the inclined face 20 of the work, the rollers 14 will be caused to rotate with the work, thereby causing the spiral cutting edges of the several rollers to shave the work while the smooth surfaces of the tool or roll adjacent to such cutting edges are effective to burnish or polish the work. The idler members 14 are thus rotated by the work 21 and are effective to perform the combined operation of shaving and burnishing in a single direction of operation. It will be noted that the tool operates merely by engagement of the faces of the rollers 14 with the work, the latter rotating, and the tool is not shown driven directly nor is it necessary to shift the same endwise over the face of the work in order to shave and burnish the same. Also it will be seen that the angle formed by the side wall of the groove 15 and the face of the roller is substantially no greater than a right angle. Hence the tool will shave as well as burnish the work. The tool will cut only to the depth of the ridges or scratches or the like to be removed from the face 20 of the work due to the fact that the groove is narrower than the face of the tool at either side thereof. It will be observed that by virtue of the opposed cutting edges 18 and 19 formed by the groove, the tool is reversible, and therefore the work may be shifted in either direction and at the same time cause the tool to cut.

In the operation of the tool as shown herein in its preferred form, the work is preferably rotated as by power, and upon carrying the rolls 14 into engagement with the face of the work, these rolls are caused to rotate with the work, thereby causing the spiral cutting edges of the rolls to shave the work while the burnishing thereof is taking place, that is to say, these spiral cutting edges do the shaving while the adjoining and intermediate smooth surfaces of the rolls do the burnishing, so that the rolls are rotated by the work and are effective to perform the combined operation of shaving and burnishing at the same time by the same rolls. As shown herein, the tool operates merely by engagement with the faces of the rolls with the work, and there is no endwise shifting of the tool as a whole across the face of the work, that is to say, the rolls have no longitudinal or endwise movement on their holder or shaft 9. In practice either the work or the rolls or both might be driven by power, but the rotation of both by power is not necessary as entirely satisfactory results have been obtained by merely shifting the work and holding the shaving and burnishing rolls in engagement therewith.

As shown herein, the tool is primarily intended for use with such machines as multiple spindle screw machines, wherein the work is rotated so that various tools will perform certain operations thereon, and when these operations are completed then the work or the burnishing tool is brought into engagement one with the other, thereby to perform its operations, but the particular manner of supporting or effecting the operation of the work and the tool one relatively to the other is not believed to be material to a complete understanding of the improvement, which has to do primarily with the construction of the tool rolls.

In practice it has been demonstrated that the best results are obtained by having the relative diameters of the work and the rolls different, that is, the diameter of one should be smaller or larger than that of the other, and in the present instance the rolls are shown as having the smaller diameter.

It is a well known fact among those familiar with burnishing tools, that the cutting or forming tools leaves the work to be burnished with a series of ridges and grooves, which may be likened very much

to a toothed or serrated surface, so that when the ordinary burnishing tool is used against the points of these serrations or ridges, the effect is to mash them down, that is, to turn or bend over these slightly projecting surfaces or ridges, and in consequence, when the work was subsequently hardened, these bent-over portions would peel off; therefore in order to avoid this, the work had to be shaved by one tool to shave off these ridges or points, and then subsequently burnished by a burnishing roll. This meant of course the use of two separate and distinct tools, involving considerable loss of time and additional labor, and therefore increased expense, but in the present improvement, as the single tool, comprising combined shaving and burnishing rolls, operates to shave through the medium of the cutting edges of the spiral groove and to burnish through the medium of the adjacent surfaces of the rolls, the work of shaving and burnishing may be said to be done in one-half the time heretofore required, and with equally good, if not superior results, and certainly so where the work was burnished only.

In the present instance it will be seen that the angle formed by the side wall of the groove and the face of the tool is substantially no greater than a right angle. For the purpose of doing the proper work, for which the tool is designed, it is not intended that the cut of the spiral groove shall be any deeper than the depth of the ridges, scratches, or the like to be removed from the face of the work, although it has been found in practice that the tool will penetrate as much as three times or more deeper than previous burnishing tools, and it will be observed that in the present instance the groove is narrower than the face of the tool between the grooved portions of the roll.

As a result of the use of this improved tool, it has been found that the work does not have to be cut as smooth and true in order to get as clear polish free from tool scratches, since such scratches or roughened surface will be effectively removed by this improved tool, whereas heretofore if a clear polish free from tool scratches was desired without any shaving of the work subsequent to the forming or cutting thereof, it was necessary that the surface be cut very smooth and true in order that the burnishing tool produce a reasonably clear polish or smooth surface, and even then the surface would frequently peel or scale.

It will be understood that by describing in detail herein any particular form, structure, or arrangement, it is not intended to limit the invention beyond the terms of the several claims or the requirements of the prior art, since I believe that I am the first to provide a plurality of burnishing rolls, each having a shaving or cutting portion and a burnishing portion, in other words, the first to provide a plurality of combined shaving and burnishing tools or rolls operative to simultaneously shave and burnish the work, and this regardless of how the cutting or burnishing surfaces are formed, and whether the surfaces are formed of a single spiral groove or a plurality thereof.

In other words, I believe that I am the first to provide a combined shaving and burnishing roll operative on the interior of a piece of work and a plurality thereof operative to burnish the work while the shaving thereof is proceeding.

I claim as my invention:

1. A combined shaving and burnishing tool operative to burnish the work while the shaving therof is proceeding and comprising a plurality of rolls each having a burnishing surface and a shaving or cutting edge.

2. A combined shaving and burnishing tool comprising a supporting member and a plurality of rolls carried thereby, each having a burnishing surface and therein a spiral cutting or shaving edge and effective to simultaneously shave and burnish the work.

3. A burnishing tool comprising a plurality of rolls, each having a burnishing surface and between the ends thereof a spiral groove having a cutting or shaving edge.

4. A combined shaving and burnishing tool comprising a plurality of rolls, each having a burnishing surface and a spiral groove provided with opposed cutting or shaving edges.

5. A combined shaving and burnishing tool comprising supporting means, a plurality of rolls carried thereby, each having a burnishing surface and a spiral cutting or shaving edge and each of said rolls having a diameter different from that of the work to be shaved and burnished.

6. A combined shaving and burnishing tool comprising supporting means, a plurality of rolls carried thereby, each having a burnishing surface and a spiral cutting or shaving edge and each of said rolls having a diameter less than the work to be shaved and burnished.

7. A combined shaving and burnishing tool comprising a plurality of rotatable rolls supported to engage the work, each having a burnishing surface and therein a spiral groove provided with one or more cutting or shaving edges.

8. A combined shaving and burnishing tool comprising supporting means, a rotatable roll carried thereby and having a burnishing surface and a spiral groove therein provided with a cutting edge, said roll having a diameter less than that of the work to be operated on.

9. A tool of the class described comprising a support and a plurality of rotatable

members carried thereby and circumferentially arranged, each having a burnishing surface and between the ends of said burnishing surface means for cutting or shaving the work while the burnishing thereof is proceeding.

10. A tool of the class described comprising a support and a plurality of rotatable members carried thereby and circumferentially arranged, each having the faces thereof tapered in the direction of the axis of the work and having a burnishing surface and between the ends of such burnishing surface a cutting or shaving edge.

11. A tool of the class described comprising a support, a plurality of rotatable members carried thereby and circumferentially arranged with their axes inclined and each having a burnishing surface and between the ends thereof a spiral cutting or shaving edge.

12. A tool of the class described comprising a support, a plurality of rollers carried thereby, each of said rollers having a burnishing surface and therein a groove provided with a cutting or shaving edge operative to cut or shave during the burnishing of the work.

13. A tool of the class described comprising a support, a plurality of idler members carried thereby, each of said members having a burnishing surface and therein a groove provided with a cutting or shaving edge for cutting or shaving the work simultaneously with the burnishing thereof.

14. A tool of the class described comprising a support and a plurality of members carried thereby, each of said members having a burnishing surface having therein a spiral groove having a cutting or shaving edge and each supported for rotation by the work.

15. A tool of the class described comprising a support and a plurality of idler members carried thereby, each having a burnishing surface provided with reverse cutting or shaving edges.

16. A tool of the class described comprising a support and a plurality of rotatable members carried thereby, each of said members provided with a burnishing surface having therein a groove forming a cutting or shaving edge adapted to cut or shave the work said groove being open at one end thereof.

17. A tool of the class described comprising a support and a roller carried thereby, said roller having its axis inclined and having a burnishing surface provided therein with a groove having a cutting or shaving edge.

18. A tool of the class described comprising a support, a roller carried thereby and having the face thereof shaped to correspond to the face of the work to be operated on and having a burnishing surface provided therein with a spiral groove having a cutting or shaving edge.

19. A tool of the class described comprising a support, a rotatable roller carried thereby and having the face thereof inclined to correspond to the inclined face of the work to be operated upon, said roller having a burnishing surface having therein a spiral cutting or shaving edge.

20. A tool of the class described comprising a support, a rotatable roller carried thereby and having the face thereof inclined to correspond to the inclined face of the work to be operated upon, said roller having a burnishing surface and therein reverse spiral cutting or shaving edges.

21. A tool of the class described comprising a support and a plurality of circularly arranged rollers supported thereby for operation on the work, said rollers having substantially the same diameters and each having a burnishing surface and therein a shaving or cutting edge, whereby the rolls will shave and burnish the work in one operation.

22. A tool of the class described comprising a support and a plurality of simultaneously operative rollers carried thereby, all of said rollers being operated by the work and each having a burnishing surface provided with a spiral shaving or cutting edge.

23. A burnishing and shaving tool comprising a plurality of rolls located equidistant from the axis of the tool and supported for operation by the work and each having a burnishing surface and therein a cutting or shaving portion.

24. A burnishing and shaving tool comprising a support and a plurality of rotatable rolls carried thereby and circumferentially arranged, each having the faces thereof tapered in the direction of the axis of the work and its axis inclined and each having a burnishing surface and therein a spiral groove having one or more cutting or shaving edges.

25. A tool of the class described comprising a cutting or shaving member having a burnishing surface and therein a spiral groove closed at one end thereof.

26. A tool of the class described comprising a cutting or shaving member having a burnishing surface and therein a spiral groove open at one end and closed at the opposite end.

27. A tool of the class described comprising a cutting or shaving member supported for operation by the work and having a burnishing surface and therein a groove forming a cutting edge closed adjacent to the front end of the cutting member.

28. The combination of supporting means, a plurality of burnishing rolls carried thereby and simultaneously operative, each hav-

ing a burnishing surface and a spiral groove provided with one or more cutting edges effective to shave the work as the burnishing thereof proceeds, said groove terminating in a closed end effective to maintain the chips away from the end of the roll.

29. The method of shaving and burnishing a piece of work which consists in providing a plurality of rolls circumferentially arranged, each with a burnishing surface having therein one or more spiral cutting or shaving portions, then rotatably supporting said roll in juxtaposition to a piece of work, each of said burnishing rolls and work having different diameters and then rotating said rolls and work relatively to each other thereby to simultaneously shave and burnish the work.

30. The method of shaving and burnishing a piece of work which consists in providing a plurality of rolls, each with a burnishing surface having therein one or more spiral cutting or shaving portions, then supporting it in juxtaposition to a piece of work, said rolls each having a diameter less than that of the work and then rotating said work and the rolls one relatively to the other thereby to cut or shave and burnish the work.

31. A combined shaving and burnishing tool comprising supporting means, and a rotatable roll carried thereby and having therein a spiral groove provided with a cutting edge, said groove terminating at one end in a depression or pocket for the reception of the chips.

32. A combined shaving and burnishing tool for shaving the tapered bore of a piece of work comprising supporting means having roller bearings, a plurality of spaced rolls carried by said bearings and converging toward one end of the supporting means, each of said rolls having a spiral groove therein provided with a cutting edge, said tool having means for preventing the chips from the work injuring said bearings.

33. A combined shaving and burnishing tool comprising a rotatable roll having a spiral groove therein provided with a cutting edge, said groove having means for preventing the passage of the chips beyond the end of the roll.

34. A combined shaving and burnishing tool comprising supporting means having roller bearings, a roll journaled in said bearings and having a spiral groove provided with a cutting edge, said tool having means for preventing chips from the work injuring the bearings.

35. A combined shaving and burnishing tool comprising one or more rolls having a diameter different from that of the work to be operated upon and each having a spiral groove therein provided with a cutting edge and constructed to throw off the chips before the chips reach the end of the roll, whereby said roll will simultaneously shave, burnish and dispose of the chips.

Signed at Cleveland, Ohio, this 20th day of July, 1922.

ALFRED E. DRISSNER.