March 24, 1942. A. E. DRISSNER 2,277,084

BURNISHING TOOL FOR GEAR BLANKS

Filed May 11, 1938 2 Sheets-Sheet 1

Fig. 1.

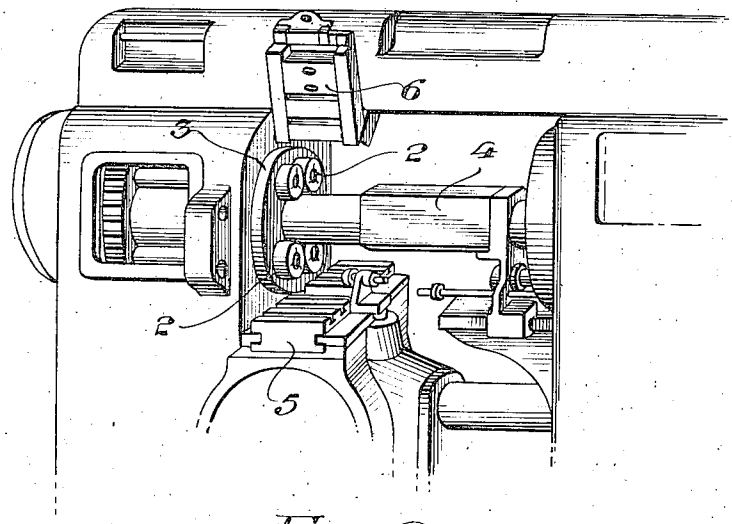
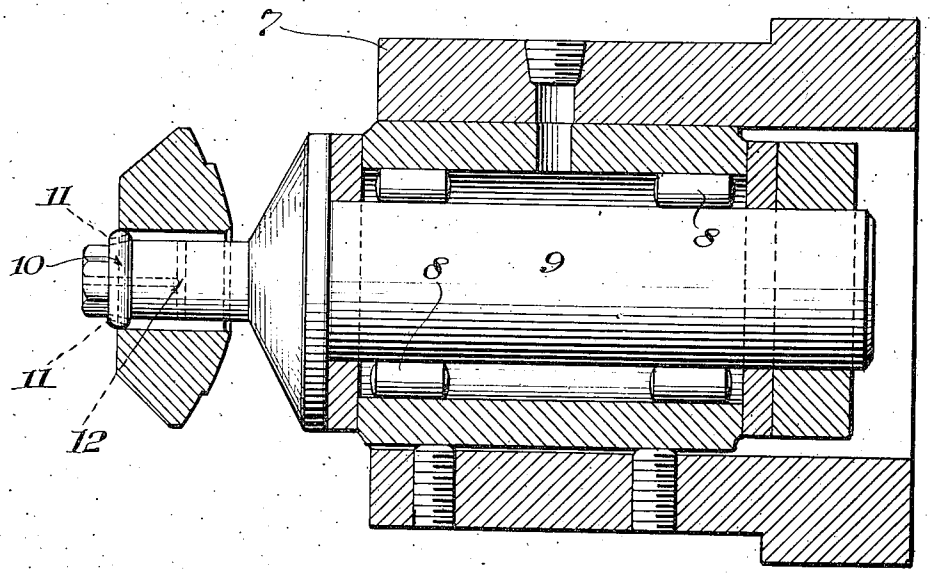


Fig. 2.



INVENTOR.
Alfred E. Drissner

BY

ATTORNEY.

March 24, 1942. A. E. DRISSNER 2,277,084

BURNISHING TOOL FOR GEAR BLANKS

Filed May 11, 1938 2 Sheets-Sheet 2

Fig. 3.

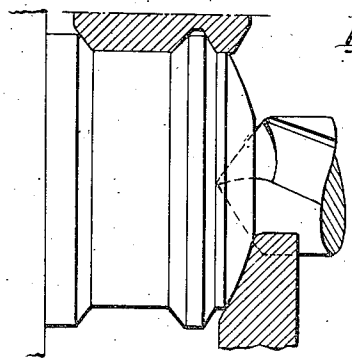


Fig. 7.

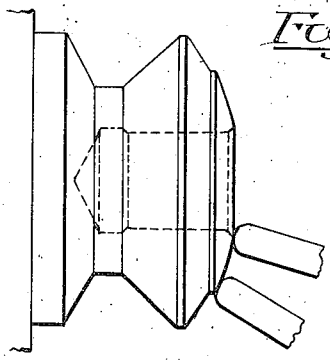


Fig. 4.

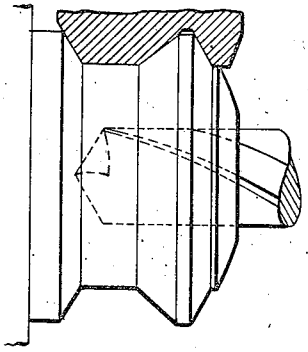


Fig. 8.

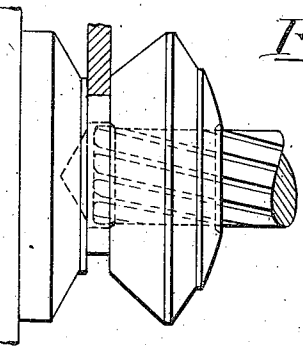


Fig. 5.

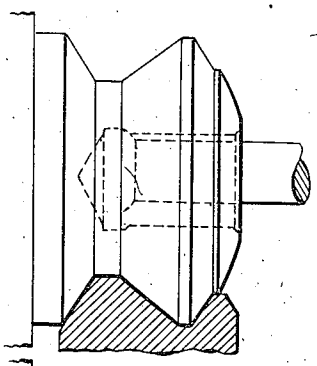


Fig. 9.

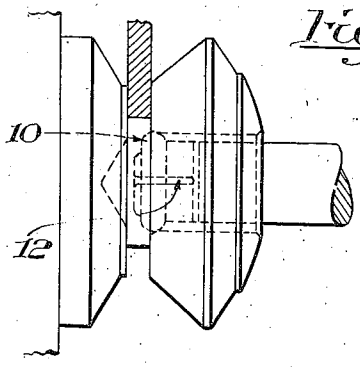


Fig. 6.

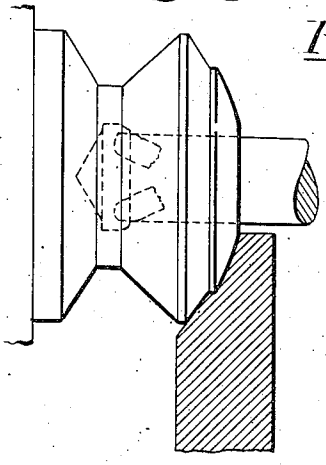
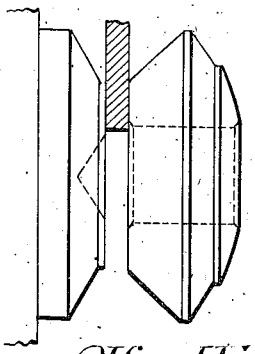


Fig. 10.



INVENTOR.
Alfred E. Drissner.
BY
ATTORNEY.

Patented Mar. 24, 1942

2,277,084

UNITED STATES PATENT OFFICE

2,277,084

BURNISHING TOOL FOR GEAR BLANKS

Alfred E. Drissner, Cleveland, Ohio, assignor to The National Acme Company, Cleveland, Ohio, a corporation of Ohio

Application May 11, 1938, Serial No. 207,237

4 Claims. (Cl. 29—57)

This invention has to do with the burnishing of holes or bores in blanks such, for instance, as gear blanks, the object of the invention being to provide an improved tool for use with an improved means and method for the burnishing of such holes or bores during the formation of the blanks on the stock bar and, therefore, before the blanks have been cut from the bar or stock rod from which they are made.

A further object of the invention is the provision of such an improved tool for use with an improved means and method of burnishing the holes or bores of blanks such as beveled gear blanks during the operation of forming such blanks from the stock and to do this in a very simple, efficient, inexpensive and expeditious manner.

Heretofore, in the manufacture of gear blanks, for instance, on a multiple spindle screw machine, it has been the practice to form the blanks from the bar or stock where the stock is of rod formation, by successively boring, drilling and reaming the hole in the blank during the formation of the blank from the stock rod and then, as no practical way has been known to burnish the hole or bore while the blank is still on the rod, to perform this as a subsequent operation after the blank has been cut from the stock rod. This not only increased the expense of forming the blank because of the second operation and handling of the blank as a separate piece but had other objectionable disadvantages.

One prominent automobile manufacturer experimented and also had the assignee of the present case experiment for years in an endeavor to accomplish the object of the present improvement but without success. Various burnishing tools supplied by different manufacturers were used but with entirely unsatisfactory results until the present discovery and the conclusion had practically been reached that it was impossible of accomplishment for it must be remembered that, in burnishing a bore in a piece of work such as a gear blank made from a solid rod before it is cut from the stock rod, the bore has a dead or blind end.

After many experiments with burnishing rollers of different diameters, it was found that the burnishing roller or disk must be of the same diameter as the bore or even slightly larger but never appreciably smaller and that it must be provided with some means such as openings to permit air or oil to escape. Otherwise, it was impossible to withdraw the burnishing tool from the hole.

In the present instance, the burnishing tool is adapted for use with a multiple spindle screw machine although it may be used on the tool slide of a turret lathe or drill press or single spindle machine and, of course, can be used in connection with tubular stock where it is desired to burnish the hole before the blank is cut from the stock but it is particularly adapted for use with rod stock.

In the drawings accompanying and forming a part of this specification, Fig. 1 illustrates so much of a multiple spindle machine as is deemed necessary to show the present improvement.

Fig. 2 is a sectional view of a burnishing tool and holder adapted to be applied to the tool slide of the machine shown in Fig. 1.

Fig. 3 illustrates the rough formation of a blank by the end and side tools.

Fig. 4 illustrates the drilling of the blind hole or bore of a blank.

Fig. 5 illustrates further formation of the blank.

Fig. 6 illustrates the completion of the formation of the blank and of the bore.

Fig. 7 illustrates the burnishing of the front face of the blank.

Fig. 8 illustrates the partial cutting off of the blank from its stock bar and the reaming of the hole.

Fig. 9 illustrates the burnishing of the hole during a further cutting off operation of the blank from the stock, and

Fig. 10 illustrates the blank as it is completely cut off from the stock bar with the bore or hole burnished.

Thus, it will be seen that Figs. 3, 4, 5, 6, 7, 8, 9 and 10 illustrate the successive steps in the formation of the blank and its blind hole or bore and the cutting off of the gear blank from the stock rod in readiness to have teeth formed thereon.

Similar characters of reference indicate corresponding parts in the several views.

Before explaining in detail the present improvement and mode of operation thereof, I desire to have it understood that the invention is not limited to the details of construction and arrangement of parts illustrated in the accompanying drawings since the invention is capable of other embodiments, and that the phraseology employed is for the purpose of description and not of limitation.

When this improvement is used, for instance, with a multiple spindle machine, that machine usually consists of a series of rotatable work

spindles 2 carried by an indexible spindle carrier 3 and through these spindles, stock rods are fed in the usual manner and from these stock rods the gear blanks are successively formed.

This machine is also provided with a main sliding tool carrier 4 to which the various end working tools are applied such as drills, broaching tools etc., and to which this improved burnishing tool is also applied. Side and top cross slides 5 and 6 carrying side and top tools for forming the blank in the usual way are also provided.

In the present improvement, the burnishing tool is carried by a suitable holder 7 having antifriction bearings 8 for supporting a freely rotatable shaft or arbor 9 carrying the burnishing tool 10 shown as a roll mounted on the end of this shaft whereby, as the main tool slide moves toward and from the spindle carrier, this burnishing tool is forced into the hole of the blank whereby it will freely rotate with the rotatable stock spindle and be withdrawn from the bore of the blank as the tool slide moves away from the spindle carrier. The rotation of the stock spindle rotates the burnishing roll at the same speed as the work so that when the burnishing tool is used with a multiple spindle machine, the burnishing of one piece of work proceeds as the other pieces are successively formed, drilled and bored.

As before stated, many experiments have been made in an attempt to accomplish the foregoing by using different diameters of rolls and by using a series of small rollers mounted on an arbor but the results have been unsatisfactory as the holes were not smooth and the material was flaky and chippy, in consequence of which, it has been necessary to burnish each blank as a second operation after the blank has been completely cut from the stock bar. However, by having the burnishing roll of the same diameter or even slightly larger than the hole or bore in the blank and by mounting it on a slide or other means effective to force the roll into the hole and thereby, as I apprehend, squeezing it into the bore or hole of the blanks, the results have been entirely satisfactory in the burnishing of that hole or bore.

To accomplish this, it is essential that some provision be made for the escape of air and oil from the blind hole as the burnishing roll is forced thereinto and this is done by providing small orifices through the roll as at 11, the roll being shown in the form of a relatively narrow disk having a thickness considerably less than the diameter thereof and, in fact, is usually less than half the diameter thereof with the passage between the opening in the disk for the reception of the shank and the periphery of the disk so that it is in the rim of the rotatable disk between the shank and said disk periphery and may be substantially midway of its rim or the opening may be formed by drilling a hole in the axis of the shaft and a meeting cross hole as at 12, thus permitting the escape of air or oil.

The burnishing roll can be made with a radius similar to a ball of the same diameter or two radii similar to two disks fastened together but, for convenience of operation, it is preferably made of one piece.

It will be understood that, as before stated, this burnishing roll may be used with a single spindle machine having a tool slide or with any other machine in which the burnishing tool can be forced into the blind hole and it can also be used to burnish the bores of tubular stock rods before the blanks formed therefrom are cut from the stock rod and may also operate on various forms of blanks useable for different purposes. When the hole in the blank has been burnished and the blank cut off from the stock bar it is then ready to have its teeth cut therein.

It is to 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.

Having thus explained the nature of my said invention and described a way of constructing and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, I claim:

1. A device of the class described comprising a burnishing tool in the form of a disk having a periphery rounded longitudinally of its axis and a shank to one end of which said tool is secured, the construction and location of the disk at the end of the shank being such that the tool is effective to burnish blind holes of the work, said disk having a passage therethrough between said shank and its periphery.

2. A device of the class described comprising a burnishing tool in the form of a disk having a thickness considerably less than its diameter and having a periphery rounded longitudinally of its axis, and a shank to one end of which said tool is secured, the construction and location of the disk at the end of the shank being such that the tool is effective to burnish blind holes of the work, said disk having a passage therethrough between said shank and its periphery.

3. The device of claim 2 in which the disk has an axial opening and the thickness of the disk is less than half its diameter with the passage located to one side of said axial opening.

4. The device of claim 2 in which the disk has an axial opening for the reception of the end of the shank and is rotatable with or relative thereto and has its passage to one side of said axial opening and substantially midway of its rim.

ALFRED E. DRISSNER.