Sept. 19, 1939. H. HIPPLE 2,173,555

GRINDING DISK

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Fig. 1

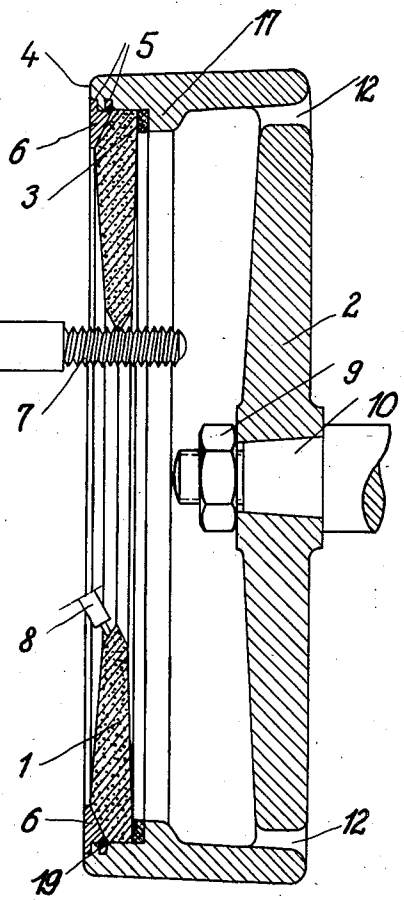
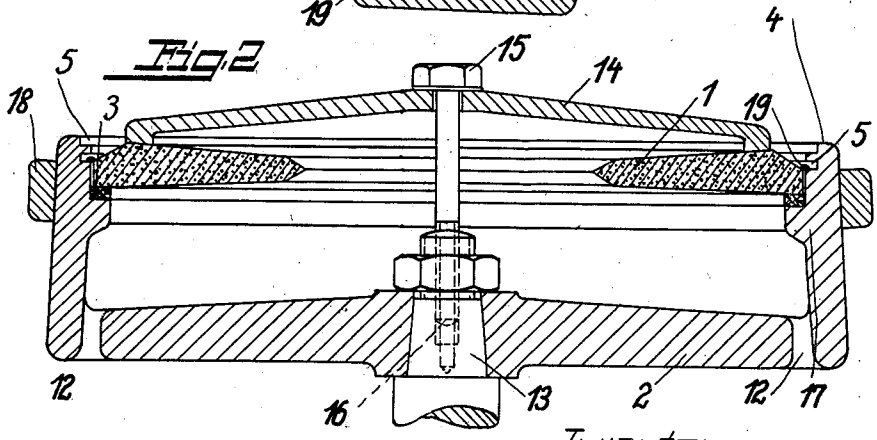


Fig. 2



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GRINDING DISK

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9 Claims. (Cl. 51—206)

My invention relates to grinding disks and has for its general object to devise an improved grinding disk for grinding surfaces, grooves, threads or the like on cylindrical work-pieces. Further objects of my invention consist therein to provide a grinding disk of specific conformation and arrangement with a view of improving the process of grinding and of avoiding the centrifugal forces arising during rotation of the grinding disk against injuriously acting into the latter.

Heretofore grinding disks have been constructed and operated in such a manner that the grinding is performed along the exterior periphery of the disk. The known constructions of grinding disks are connected with certain disadvantages firstly in that the process of grinding could not be carried out in a fully satisfactory manner and secondly in that no provisions could be made to avoid bursting of the disk due to centrifugal forces arising during rotation thereof. In known constructions of grinding disks the relatively unfavorable conditions of grinding could only be improved to some extent by using grinding disks of large diameter in order to ensure as much as possible a grinding along an approximately straight line. Grinding disks of large diameter, however, are particularly exposed to the danger of bursting, as no provisions can be made on such disks to protect them against the action of centrifugal forces.

By my invention the aforementioned disadvantages inherent to grinding disks of the ordinary construction will be fully avoided and, in addition, the general conditions of grinding may be essentially improved.

According to my invention the grinding disk is constructed in the form of an annular body presenting a grinding surface along its interior periphery which for this purpose is of a cross-sectional conformation in agreement with the shape to be given to the work-piece by the operation of grinding. As a result of this construction, in the first place, the center-points of the curvatures of the grinding surface and of the periphery of the work-piece to be subjected to grinding are positioned both on one and the same side of the grinding surface, and in the second place the grinding disk may be effectively protected against the action of centrifugal forces.

In the accompanying drawing which forms part of this specification I have represented an example of a construction of my new grinding disk, Fig. 1 being a section partly in view, showing the general conformation of my novel grinding disk and the mode of mounting the same within a carrier preventing against bursting of the disk during rotation, and Fig. 2 a similar section showing in particular the mode of mounting and assembling the grinding disk within said carrier.

Referring more particularly to the drawing, the grinding disk consists of an annular body 1, the interior circular edge thereof being adapted to act as grinding surface, while the exterior circular edge or periphery of said annular body is fully surrounded by the margin 4 of a pot-shaped carrier 2 at a distance from the bottom or plate-shaped portion of the latter. The annular grinding body or disk 1, more particularly, is supported in said pot-shaped carrier 2 within a circular depression provided alongside the interior of the circular rim of said carrier, a ring of yielding material 3 being interposed between the rear marginal surface of said annular grinding body or disk 1 and an annular projection 17 limiting said circular depression in inward direction of said carrier 2. Said grinding disk 1 is further firmly seated within said circular depression by means of an annular metal body or fillet 6 cast into the annular space between the tapering portion of the outer surface of said disk 1 and the annular grooves 5 formed along the front portion of the interior surface of said circular depression provided along the interior of the margin 4 of said pot-shaped carrier 2. In case of grinding machines for making the threads of screw-bolts, the work-piece 7 is moved in known manner with respect to the interior wedge-shaped grinding surface of the disk 1, while at some other place of said grinding surface there is provided a diamond 8 guided by a proper device forming part of the machine in a manner to slide along the profile of the grinding surface to sharpen the latter. The pot-shaped carrier 2 surrounding at its margin 4 the grinding disk 1 is pressed onto the conical portion 10 of the machine shaft 11 by means of a nut 9 threaded onto the end of said shaft 11. The pot-shaped carrier 2 now will serve to effectively suppress the action of centrifugal forces arising within the grinding disk 1 thus protecting the latter against bursting even at high peripheral speeds. Said carrier 2, moreover, consists of a material of great mechanical strength able to withstand the centrifugal forces arising at the highest peripheral speeds. In the bottom or plate-shaped part of the carrier 2 there are provided uniformly distributed apertures 12 serving for discharging the cooling or lubricating medium.

My new grinding disk is inserted into the carrier 2 according to my invention in the following manner. The carrier 2 is placed according to Fig. 2 with its axis in vertical direction onto the conical portion 13 of the machine shaft and thereupon the annular grinding disk 1 is pressed onto the yielding ring 3 resting on the annular projection 17 (Fig. 1) which limits the circular depression within the interior of the margin 4 of the carrier 2. The disk 1, moreover, is pressed into the carrier 2 in cold condition of the latter in a manner to secure a firm seat of the disk in the carrier and to avoid any eccentricity of the center of gravity of the disk. After inserting the disk 1 into the carrier 2 the tapered portion of the former will be positioned radially opposite the grooves 5. Upon heating the carrier 2, for instance by means of a heating bandage 18, owing to the expansion of the carrier there will be formed a narrow annular gap between the margin 4 of the carried and the disk 1, said gap being covered up by means of a cord 19 serving to prevent cast metal 6 against flowing into said gap. Subsequent to removing the heating bandage 18 the whole of the disk and carrier will become cool and the cast metal 6 solid, whereupon the pressure plate 14 is taken off by unscrewing the threaded nut 15. Now the yielding ring 3 which had previously been kept in compressed condition will come into action and exert a pressure onto the grinding disk 1, thereby pressing the latter at its tapered portion with a uniform force outwardly against the cast-in metal 6, which will thus be kept safely within the depression by means of the grooves 5. In this manner any displacement of the disk 1 within its carrier 2 will be safely prevented.

Fastening of the grinding disk 1 in the carrier 2 may also be accomplished in that the annular gap formed between the margin 4 of the carrier 2 and the disk 1 is not covered up against cast metal flowing thereinto, so that the latter may protrude as far as to the yielding ring 3.

I claim:

1. A grinding disk of annular conformation, the interior periphery of said disk being adapted to act as a grinding surface, said disk being seated under pressure along its exterior periphery within a carrier in a circular depression provided along the interior periphery of the latter, and a fillet of cast metal in said circular depression and engaging the exterior periphery of said disk to keep the latter permanently seated in said carrier.

2. A grinding disk of annular conformation, the interior periphery of said disk being adapted to act as a grinding surface, said disk being seated under pressure along its exterior periphery within a carrier in a circular depression provided along the interior periphery of the latter, and a fillet of cast metal in said circular depression and engaging the exterior periphery of said disk to keep the latter permanently seated in said carrier, a ring of yielding material interposed between said disk and an annular projection forming the bottom of said depression.

3. A grinding disk of annular conformation, the interior periphery of said disk being adapted to act as a grinding surface, said disk being seated under pressure along its exterior periphery within a carrier in a circular depression provided along the interior periphery of the latter, a circular groove within said depression, and a fillet of cast metal in said groove and engaging said disk near the exterior periphery of the latter.

4. A grinding disk of annular conformation, the interior periphery of said disk being adapted to act as a grinding surface, said disk being seated under pressure along its exterior periphery within a carrier in a circular depression provided along the interior periphery of the latter, and a fillet of cast metal in said circular depression and engaging a tapered surface provided on said disk near its exterior periphery.

5. In a device for producing threads by grinding, a rotatable annular grinding disk, the inner circumference of which is formed of two angularly disposed annular surfaces forming together a pointed annular grinding edge arranged in a plane between the two end faces of said grinding disk, said grinding edge being adapted to grind a thread into an axially advancing and rotating work-piece having a circular cross section, said inner circular grinding edge producing simultaneously both flanks of the thread to be produced.

6. A method of securing an annular grinding disk with its outer circumference in an annular groove provided in the inner wall of a hollow carrier, including the steps of fitting said grinding disk accurately in said annular groove and inserting a yieldable packing between one wall of said groove and the adjacent inner face portion of said annular disk, applying a pressure upon the outer face of said grinding disk so as to compress said yieldable packing, heating said hollow carrier to expand the same and thereby produce an annular clearance between the bottom of said annular groove and the outer circumference of said grinding disk, and then pouring molten metal into said annular clearance.

7. A method of securing an annular grinding disk with its outer circumference in an annular groove provided in the inner wall of a hollow carrier, including the steps of fitting said grinding disk accurately in said annular groove and inserting a yieldable packing between one wall of said groove and the adjacent inner face portion of said annular disk, applying a pressure upon the outer face of said grinding disk so as to compress said yieldable packing, heating said hollow carrier to expand the same and thereby produce an annular clearance between the bottom of said annular groove and the outer circumference of said grinding disk, and then pouring molten metal into said annular clearance and also into the corner formed between the outer face of said grinding disk and the inner wall of said hollow carrier to form a cast annular fillet which permanently holds the grinding disk in place in said holder.

8. In a device for producing threads by grinding, a rotatable annular grinding disk, the inner circumference of which being employed for producing the thread and being formed by two conical surfaces intersecting each other in a plane between the two end faces of said grinding disk, said conical surfaces forming an angle between each other which is equal to the angle between two adjacent flanks of the thread to be produced.

9. In a device for producing a thread by grinding, a rotatable annular grinding disk, the inner circumference of which being employed for grinding a thread into the circumference of a work piece having a circular cross section, the work engaging portion at the inner circumference of said annular grinding disk having a profile corresponding to the profile of the thread to be produced.

HERMANN HIPPLE.