C. H. SCHOLER.

BORING AND GRINDING TOOL.

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1,226,388.

Patented May 15, 1917.

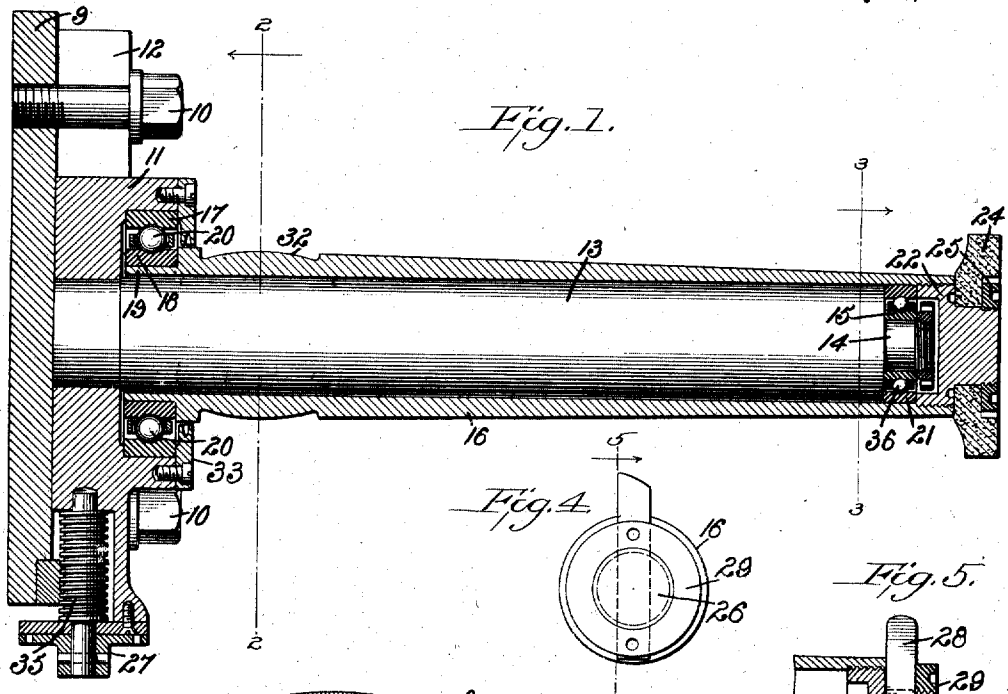


Fig. 1.

Fig. 4.

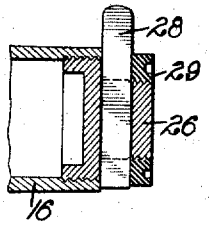


Fig. 5.

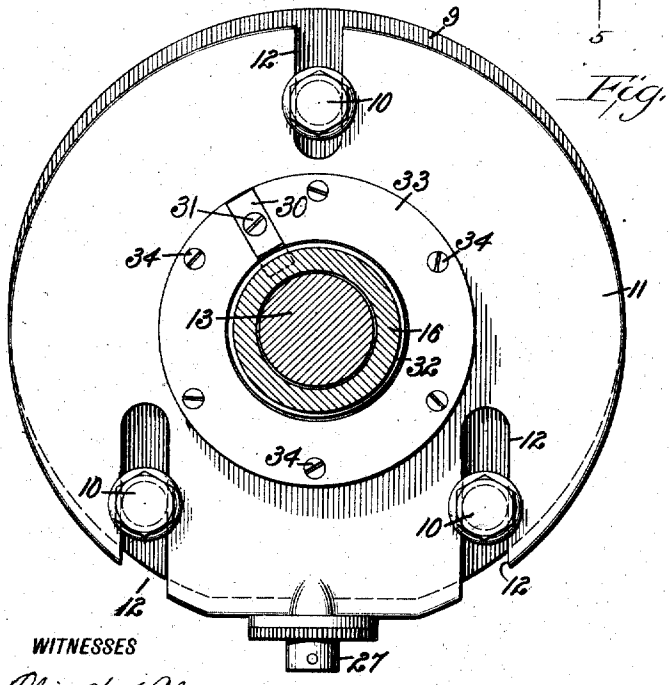


Fig. 2.

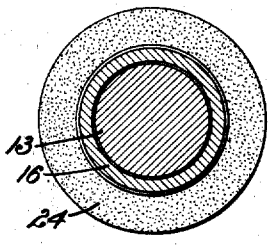


Fig. 3.

WITNESSES

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BORING AND GRINDING TOOL.

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To all whom it may concern:

Be it known that I, CHARLES H. SCHOLER, a citizen of the United States, and a resident of Minneapolis, in the county of Hennepin and State of Minnesota, have invented a new and Improved Boring and Grinding Tool, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to provide equipoised bearings for grinding tools; to support an end-mounted grinding tool on bearings juxtaposed to the operating plane of said tool; and to simplify and reduce the cost of construction of tools of the character mentioned.

Drawings.

Figure 1 is a sectional elevation of a tool of the character mentioned constructed and arranged in accordance with the present invention;

Fig. 2 is a cross section taken on an enlarged scale, the section being taken as on the line 2—2 in Fig. 1;

Fig. 3 is a cross section on an enlarged scale, the section being taken on the line 3—3 in Fig. 1;

Fig. 4 shows an end view of a modified form of the invention permitting the employment of a boring tool;

Fig. 5 is a sectional view taken as on the line 5—5 in Fig. 4.

Description.

As shown in the drawings, a face plate 9 is provided with a series of wrench-headed bolts 10 for clamping the base 11 in fixed relation to said face plate. The bolts 10 fit end-opening slots 12. The slots 12, as seen best in Fig. 2 of the drawings, are parallel to permit the movement of the base 11 in one direction on the face plate 9. This arrangement insures the maintenance of the center of the stud shaft 13 in a path radiating from the center of the face plate 9. The shaft 13 is rigidly mounted in the base 11, and has at the extreme outer end thereof, a reduced portion 14, which supports the race collar 15 of a ball-bearing cage disposed at the outer end of the said shaft to support the outer end of a tubular mandrel 16.

The mandrel 16 above referred to is supported at its inner end by a ball bearing, one collar 17 of the cage of said bearing being held in a cup formed in the face of the base 11, and another collar 18 of said cage being fixedly held in a reduced end 19 of said mandrel. Between the said collars, as in the conventional construction, are held the bearing balls 20.

The mandrel 16 is bored to a larger internal diameter than the external diameter of the shaft 13 and therefore does not impinge on same. The outer end of said mandrel is supported by ball bearings, the collar 15 of which, as above described, is supported on the reduced end 14 of the shaft 13. The other collar 21 is fitted to the mandrel, to form a raceway for the balls 26, which maintain the alinement of the mandrel with the shaft.

Sufficient clearance between the inner surface of the mandrel and the outer surface of the shaft, is provided to avoid any contact between the same.

The mandrel 16 is provided at the extreme outer end thereof with an internal screw-thread to register with the threaded flange 22 of a clamp plug 23. The plug 23 extends through and fits a central perforation in a grinding wheel 24, which in service is seated on the flange 22 and the edge of the mandrel 16. The wheel 24 is permanently held on the plug 23 by a spanner nut 25. When the nut 25 is removed, the wheel 24 may be removed from the plug 23 for repair or renewal.

In service, the mandrel 16 is driven from an intermediate source, the transmission mechanism being one which preferably employs a belt which passes around the pulley crown 32. The pulley crown 32 is integrally formed on the mandrel 16, as shown in Fig. 1 of the drawings.

The bearings formed by the balls 20 and collars 17 and 18, are in service protected by a ring cover plate 33, as best shown in Fig. 2 of the drawings, the cover plate 33 is secured in position in the base 11 by screws 34.

Operation.

When the tool is placed in service, the plate 9 is first centered and then bolted to the face plate of a lathe or a boring tool, or when the condition of the operation demands, to a chuck or suitable fixture in drill press or boring mill. Initially the base 11 is disposed concentric with the plate 9.

The tool herein disclosed is especially designed for grinding and boring engine cyl-

inders. The cylinders are set preferably on a bed movable toward and away from the chuck or the plate 9. The mandrel 16 is designed to permit the grinding wheel 24 to enter the cylinder to the head thereof. The cylinder is disposed concentric with the face plate 9, and the chuck plate supporting the same. This arrangement having been established, the base 11 is moved on the plate 9 by manipulating the feed screw 35 and the wrench head 27 thereof, to offset the center of the said base 11 and the shaft 13 thereon, until the periphery of the wheel 24 engages the side or surface of the cylinder to be bored. The running gear for the lathe for rotating the chuck head is then started. The power for rotating the mandrel 16 is turned on, and the wheel 24 is rapidly revolved thereby.

The result of the dual operation is that the shaft 13, mandrel 16, and wheel 24 are moved in a gyratory path around the center of the lathe chuck or plate 9, with the grinding edge of the wheel 24 operating on the surface of the cylinder. The member on which the cylinder is mounted, is moved so that the wheel 24 is carried lengthwise of the said cylinder.

The screw 35 is again manipulated to increase the eccentricity of the shaft 13 and wheel 24, to increase what may be termed the feed of the grinding wheel. While the cylinder is moved toward and away from the base 11, the grinding wheel 24 continues to operate. The said wheel revolves at a speed relatively greater than the lathe head. The cylinder is finally ground to a bore perfectly concentric with the plate 9 and lathe head on which the same is mounted.

It will be noted that the mandrel 16 is supported at the inner end by a ball bearing rigidly held in the base 11 and removed from the shaft 13. This arrangement gives a more solid and less vibratory support for the mandrel 16 and dissipates or absorbs all vibration to which the same may be subject. Avoidance of vibration in a tool of the character herein disclosed is of major importance, and to this end the pulley crown 32 is disposed in close proximity to the said bearing, thereby minimizing the vibratory tendency inherent to this class.

When the tool is to be used for boring, the base 11 is moved by the screw 35 to the position concentric with the plate 9 and the lathe head on which the tool is mounted. The belt is removed from the crown 32, the grinding wheel 24 and the plug 22 on which the same is mounted, being removed from engagement with the mandrel 16, and the plug 26 substituted for the plug 22. This plug 26 has a square hole broached through the body to receive a boring tool 28.

When the tool 28 is in position, the plug 26 is turned until the tool 28 is clamped firmly on the outer edge of the mandrel 16. A spanner nut 29 is employed to hold the tool 28 more firmly, this nut being adapted to provide threads to engage the threads on the reduced portion of the plug 26, as best shown in Fig. 5 of the drawings.

The mandrel 16 is then locked fixedly on the base 11 by means of a latch plate 30. The latch plate 30 normally rests in a recess formed in the plate 33.

As shown in Fig. 2 of the drawings, the plate 30 may be introduced into a recess formed in the mandrel 16. A set screw 31 is employed for locking the plate 30 in both the inactive and active positions mentioned. It will be understood that when the mandrel 16 is locked by the plate 30 and the tool 28 is held in the manner above described, the rotation of said mandrel is regulated by the rate of rotation of the lathe head and of the plate 9 connected therewith.

It is after the boring is completed, that the tool 28 and the plug 26 holding the same are removed from the mandrel 16, and the grinding wheel 24 and plug 22 holding it are readjusted on the mandrel 16. The operating belt for the said mandrel is reëngaged with the crown 32, and the latch plate 30 is withdrawn to its inactive position shown in Fig. 2 of the drawings. When the tool is now offset from the center of the lathe, the same may be turned in the grinding operation for which it is principally designed.

Claims.

1. A tool as characterized comprising a base plate; a mandrel rotatably mounted thereon; a bearing for said mandrel, part of said bearing being permanent in said base plate and part of said bearing being permanent in said mandrel; means for applying power for rotating said mandrel, said means embodying an integral belt-engaging member, said member being disposed in juxtaposed relation to said bearing; and a second bearing for said mandrel, part of said bearing being permanently connected with said base plate by means of a structural member extending therefrom through said mandrel.

2. A tool as characterized comprising a face plate; a base movably mounted on said face plate; a bracket shaft rigidly mounted in said base for extension perpendicular to said face plate; a rotary mandrel circumfolding said shaft; bearings for said mandrel for supporting the opposite ends thereof, one of said bearings being mounted in said base and the other of said bearings being mounted in the outer end of said shaft; and means rigidly provided on said mandrel for revolving the same on said bearings, said means embodying a power-driven element rigidly mounted on said mandrel adjacent said base.

3. A tool as characterized comprising a face plate adapted for centering on a lathe head; a base mounted on said plate and laterally movable thereon to positions eccentric thereto; means for moving said base; a bracket shaft extending from said base in perpendicular relation to said face plate; a rotary mandrel circumfolding said shaft in spaced relation thereto, said mandrel having formed thereon adjacent said base a pulley member and a plurality of bearings supporting the opposite ends of said mandrel, said bearings having each a rotary member and a stationary member, the stationary member of one of said bearings being permanently mounted in said base and the stationary member of the other of said bearings being permanently mounted on said shaft.

4. A tool as characterized comprising a face plate adapted for centering on a lathe head; a base mounted on said plate and laterally movable thereon to positions eccentric thereto; means for moving said base; a bracket shaft extending from said base in perpendicular relation to said face plate; a rotary mandrel circumfolding said shaft in spaced relation thereto, said mandrel having formed thereon adjacent said base a pulley member; a plurality of bearings supporting the opposite ends of said mandrel, said bearings having each a rotary member and a stationary member, the stationary member of one of said bearings being permanently mounted in said base and the stationary member of the other of said bearings being permanently mounted on said shaft; and means for locking said base and face plate in service relation.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."