Oct. 26, 1926. 1,604,677

J. BRANDSTETTER

CYLINDER GRINDER

Filed March 30, 1925

Fig. 1

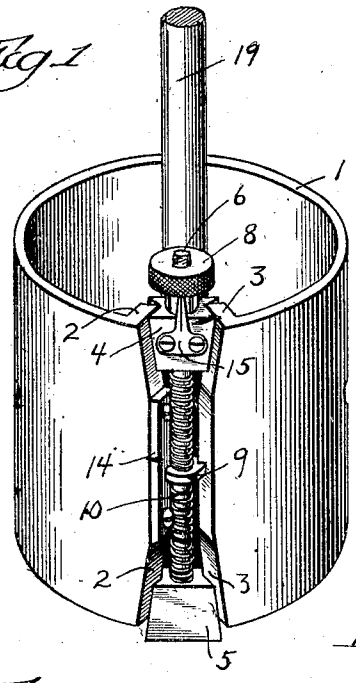


Fig. 2

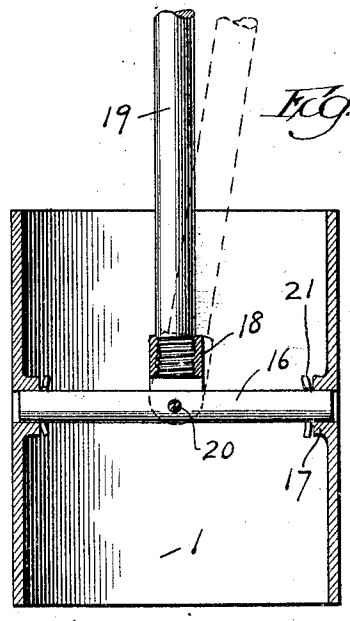


Fig. 3

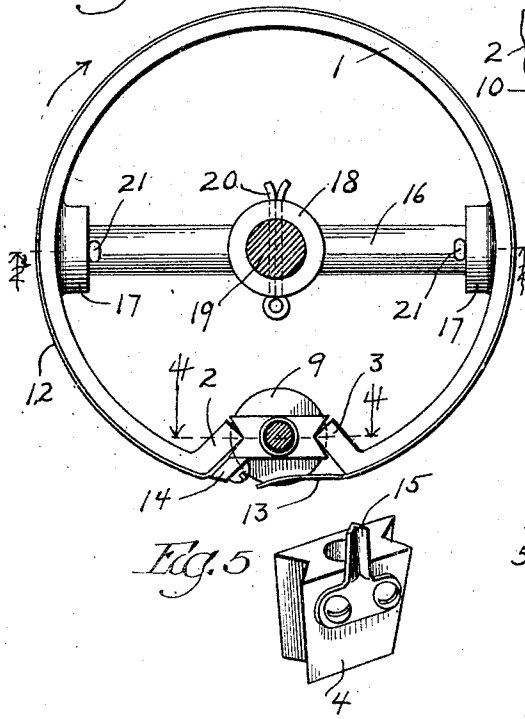


Fig. 5

Fig. 4

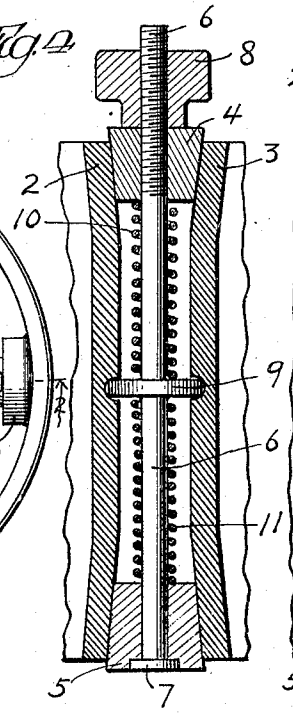
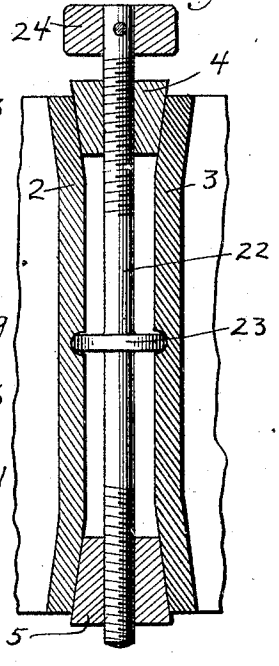


Fig. 6



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Patented Oct. 26, 1926. 1,604,677

UNITED STATES PATENT OFFICE.

JOSEF BRANDSTETTER, OF CHICAGO, ILLINOIS.

CYLINDER GRINDER.

Application filed March 30, 1925. Serial No. 19,237.

My invention relates to appliances for grinding the bores of engine cylinders or the like. Generally speaking, my invention aims to provide a grinder for this purpose which will employ easily replaceable sheets of abrasive material, which can readily be adjusted as to its effective diameter, which will cause the adjustments in diameter to be made equally throughout the length of the grinding member, which will have its adjustment latched in any adjusted position, and which will permit the grinder to be rotated by a shaft disposed at an angle to the bore which is to be ground.

Still further and also more detailed objects will appear from the following specification and from the accompanying drawings, in which—

Fig. 1 is a perspective view of a grinder embodying my invention, showing this before the sheet of abrasive material is attached to the same.

Fig. 2 is a central and longitudinal section through the same taken along the line 2—2 of Fig. 3.

Fig. 3 is an enlarged plan view of the same grinder, showing this as it appears with a sheet of abrasive material clamped to it.

Fig. 4 is a vertical section taken along the line 4—4 of Fig. 3 to show the means for simultaneously expanding the tubular member of the grinder and for equalizing the expansion at both ends of the same.

Fig. 5 is an enlarged perspective view of the upper expanding wedge of Fig. 1 and the latching spring secured to the same.

Fig. 6 is a section similar to Fig. 4, but showing another arrangement of the expanding and expansion-equalizing means.

In the illustrated embodiment, my bore grinder includes a tube 1 of a resilient material, which may be made, for example, of the grade of iron commonly employed for piston rings. This tube has the general form of a hollow cylinder split longitudinally along one side so as to afford a gap of sufficient width to permit expanding means to be interposed between the opposed edges of the gap, and also to provide room for means which clamp one edge of an abrasive sheet to the tube. With these objects in mind, I desirably provide the tube with inwardly directed webs 2 and 3 disposed at an angle to each other and extending longitudinally of the tube at opposite sides of the gap. These webs 2 and 3 have their opposed faces beveled adjacent to each end so as to cause the gap to widen towards each end of the tube as shown in Fig. 1. Inserted between these beveled gap walls at opposite ends of the tube are a pair of wedges 4 and 5, each of which preferably corresponds in taper to the said beveling, thereby affording a relatively long bearing between each wedge and the two webs at opposite sides thereof.

With the wedges of suitable width, it will be obvious from Fig. 1 that an approaching movement of the two wedges will widen the gap, thereby expanding the resilient tube, while a separational movement of the wedges will permit the resiliency of the tube to contract its diameter. To effect such an expansion, I provide expanding means which preferably actuate both wedges simultaneously. These means are shown in Fig. 4 as consisting of a rod 6 extending slidably through longitudinal bores in the wedges 4 and 5, this rod having at its lower end a head 7 adapted to exert an upward thrust on the lower wedge 5 and having an upper portion threaded to fit a knurled nut 8 which bears against the top of the upper wedge 4. Thus arranged, a downward screwing of the nut 8 will shorten the length of the rod portion 6 between the two wedges and hence will cause the wedges to approach each other.

However, this approaching might not be symmetrical with respect to the length of the tube, so that one end of the tube would be expanded more than the other. To avoid this, I also provide means for equalizing the expanding action of the two wedges. Such means may consist of a washer 9 loosely housing a medial portion of the rod 6 and socketed in recesses in the webs 2 and 3 which prevent the washer from moving longitudinally of the gap, and a pair of compression springs 10 and 11 interposed respectively between the washer 9 and the two wedges 4 and 5. With the washer and the two springs thus interposed between the wedges, and with the springs of equal effective strength, the washer will prevent each spring from moving longitudinally and the springs will equalize the effective thrust exerted by the downward screwing of the nut 8, thereby causing the wedges to move equally towards each other during such downward screwing. Likewise, if the nut 8

is rotated in the opposite or loosening direction, the springs will force the wedges away from each other and the washer 9 (which cannot shift longitudinally of the tube owing to its engagement with the walls of the said recesses) will distribute the movement equally in both directions from the centrally located washer. Consequently, the expanding and contracting will always be the same at both ends of the tube, thereby affording a cylindrical outer tube surface on which the abrasive sheet can bear. This sheet 12 only needs to be fastened to a single one of the webs, namely the web at the same side of the gap toward which the tube is rotated when the grinder is in operation. With this in mind, I may employ a single clamping plate 14 fastened by screws to the web 2 and adapted to have one end of the abrasive sheet 12 clamped between this plate and the web 2, while the other end portion 13 of the abrasive sheet can extend loosely into the gap as shown in Fig. 3, thus permitting the sheet to be drawn tautly around the cylindrical outer surface of the tube during the grinding operation.

To prevent the nut 8 from being jarred out of its adjustment, I desirably provide suitable latching means. These are shown in Figs. 1 and 5 as comprising a latch spring 15 fastened at its base end to the wedge 4 and having a V-sectioned free end adapted to engage any one of a number of longitudinal grooves on the stem of the thumb nut 8.

To rotate the grinder, I preferably provide a shaft connected to the tube in such a manner as to permit the shaft to tilt considerably with respect to the axis of the tube. Thus, Figs. 2 and 3 show a swiveling shaft 16 extending diametric of the tube and substantially at right angles to the medial plane of the said gap into oppositely disposed inner bosses 17 on the tube, this swiveling shaft 16 being freely rotatable in the said bosses. The actuating or drive shaft 19 is threaded into a fork 18 pivoted to the middle of the swiveling shaft 16 (the connection being shown in Fig. 3 as made by means of a spring cotter 20), thereby permitting the actuating shaft to tilt after the manner shown in Fig. 2, while a loose socketing of the ends of the swiveling shaft 16 in the bosses 17 permit the actuating shaft to tilt in a plane at right angles to the aforesaid tilting. To facilitate the mounting of the swiveling shaft 16, I desirably make this in the form of a simple rod which can be slidably inserted from either side of the tube and which is locked against longitudinal movement in both directions by a pair of spring cotters 21 respectively adjacent to the two bosses 17.

To maintain effective bearings between the wedges and the beveled web edges, I desirably make the lateral faces of each web of a V-shaped section and make the angle of the V-formation somewhat larger than the angle between the free end and the outer face portion of the adjacent web on the tube. This difference in the angles limits the engaging portions to a line at the extreme inner edge of each web and the bottom of the V-shaped groove in the adjacent wedge edge, and also permits this linear engagement to be maintained while the diameter of the tube is varied during the adjusting of the wedges.

It will be obvious from the above that the grinder of my invention is quite simple and inexpensive in construction, that its effective diameter can readily be varied by the adjusting nut 8, that the springs 10 automatically equalize the expanding action of the two wedges, and that the sheet of abrasive material can easily be replaced by merely loosening and again tightening the clamping plate 14. It will always be obvious that the connection of the actuating shaft 19 to the split tube of the grinder will permit the tube to be rotated by means of a shaft disposed at a considerable angle to the axis of the bore which is to be ground, thereby permitting my grinder to be employed where adjacent portions of the engine or the like would interfere with the use of a driving shaft extending coaxial with the cylinder bore.

However, while I have illustrated and described the grinder of my invention in an embodiment including highly desirable shapes and arrangements of the various parts, I do not wish to be limited to the details of the construction and arrangement thus disclosed, it being obvious that the same might be modified in many ways without departing either from the spirit of my invention or from the appended claims.

For example, the expanding means might comprise a rod 22 having end portions provided respectively with right-hand and left-hand threads and respectively threaded into the wedges 4 and 5, so that the wedges will be positively moved either towards or away from each other according to the direction in which the rod is rotated, without requiring springs for moving them in one direction. In this embodiment, as shown in Fig. 6, the centralizing collar 23 would be fast on the rod 22, this collar being likewise restricted against axial movement by the walls of the recesses of the webs 2 and 3, while the rotating of the rod may be effected through a knob 24 riveted to the rod 22.

I claim as my invention:—

1. A bore grinder comprising an expansible tube split on one side to afford a gap between two edges extending longitudinally of the tube, means for securing an abrasive sheet to the exterior of the tube, and expanding means including two simultaneously movable wedges disposed in the said

gap and respectively at opposite ends of the gap.

2. A bore grinder comprising an expansible tube split on one side to afford a gap between two edges extending longitudinally of the tube, means for securing an abrasive sheet to the exterior of the tube, and expanding means including two simultaneously movable wedges disposed in the said gap and respectively at opposite ends of the gap, means for moving the wedges towards each other, and spring means for moving the wedges away from each other.

3. A bore grinder comprising an expansible abrasive-carrying tube having as its exterior a cylindrical surface interrupted at one side by a gap extending longitudinally of the tube, the tube having at the opposite edges of the gap a pair of webs extending inward of the tube, the two webs having their opposed end portions beveled away from each other, a pair of wedges respectively disposed between the beveled end portions at opposite ends of the tube, and means for moving the wedges in unison towards or away from each other.

4. A grinder as per claim 3, in which each wedge has lateral web-engaging portions inclined to correspond to the angle between the adjacent web ends.

5. A bore grinder as per claim 3, in which each side of each wedge is V-shaped in a section transverse of the tube and has the bottom of its V-shaped formation engaging the inner longitudinal edge of the adjacent web.

6. A bore grinder as per claim 3, in which each side of each wedge is V-shaped in a section transverse of the tube and has the bottom of its V-shaped formation engaging the inner longitudinal edge of the adjacent web, the angle between the faces of the said V-shaped formation being greater than the angle between the two adjacent faces of the adjacent web of the tube.

7. A grinder as per claim 3, including a clamping member secured to the tube within the gap radially outward of the wedges and of the wedge-moving means, and adapted to clamp one end of an abrasive sheet to the tube.

8. A grinder as per claim 3, in which each wedge has lateral web-engaging portions inclined to correspond to the angle between the adjacent web ends, the said angles being equal for both wedges.

9. A bore grinder comprising a resilient and diametrically expansible abrasive-carrying tube split on one side longitudinally of the tube, means disposed at the gap formed by the said split for adjustably expanding the tube, a thrust element disposed at the gap medial of the length of the tube, a pair of wedges inserted in the gap at opposite ends thereof, a threaded rod extending through the two wedges and adapted to move the wedges toward each other, and a pair of compression springs respectively interposed between the thrust element and the two wedges for moving the wedges away from each other.

10. A bore grinder comprising an expansible and abrasive-carrying tube longitudinally split along one side to afford a gap, two means associated with the opposite ends of the gap for expanding the gap at both ends thereof, means for simultaneously operating the two expanding means, and means for latching the said operating means.

Signed at Chicago, Illinois, March 26th, 1925.

JOSEF BRANDSTETTER.