Dec. 4, 1956 C. O. DUTRO 2,772,529

CYLINDER BLOCK RIDGE GRINDER

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Fig. 1

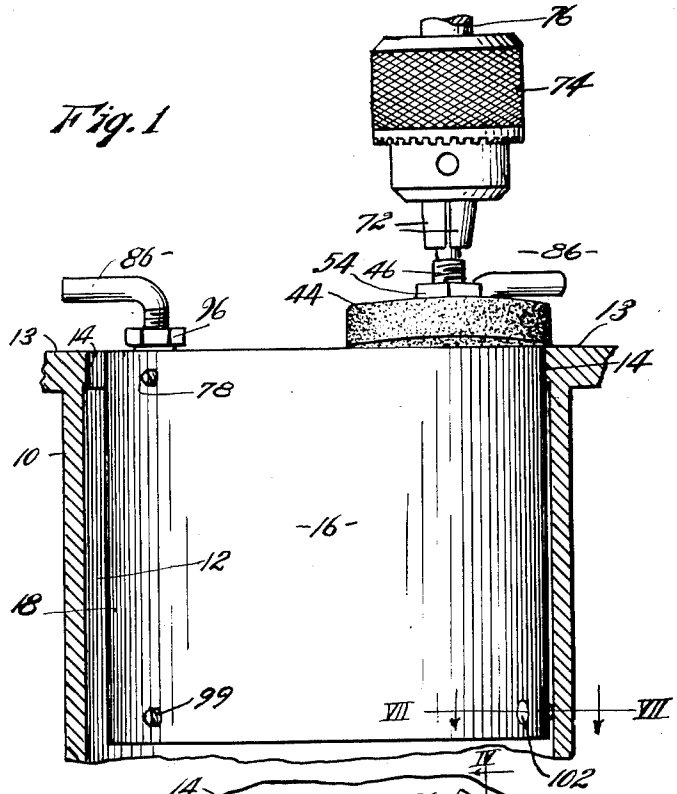


Fig. 2

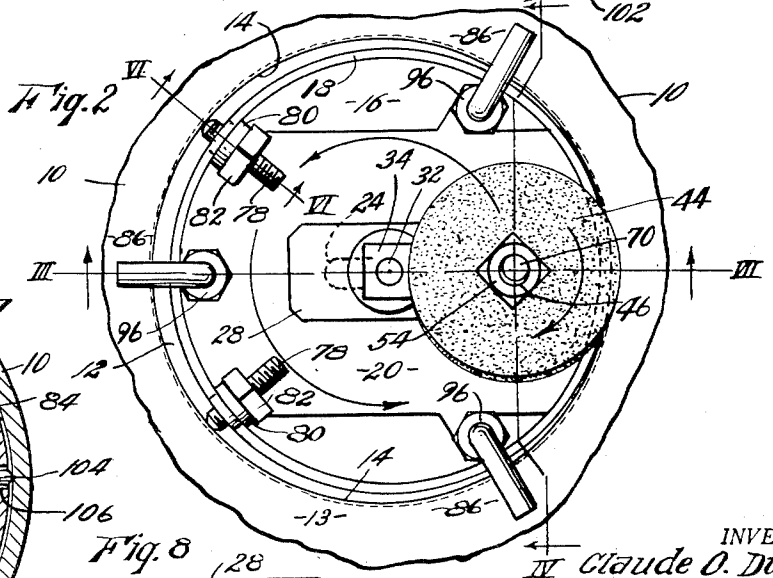


Fig. 7

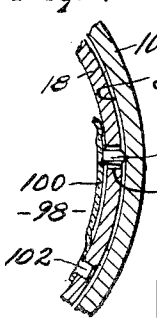
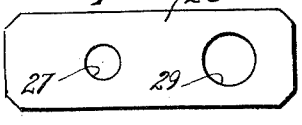


Fig. 8



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Fig. 3

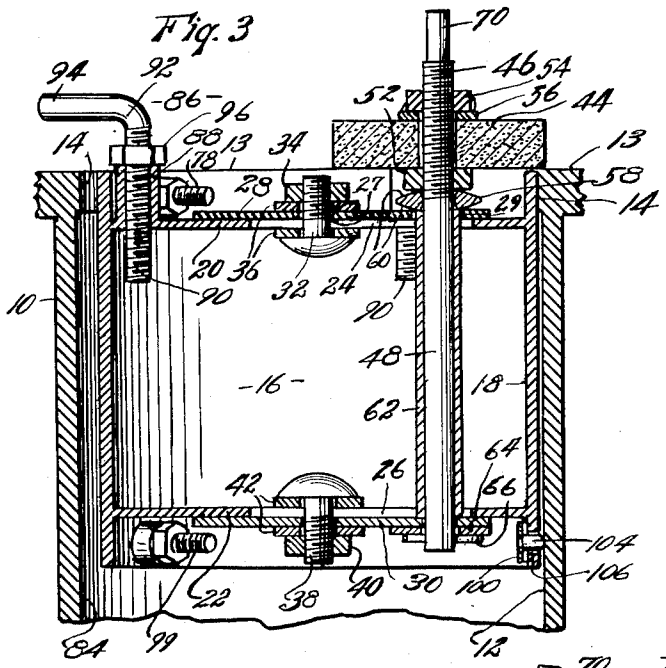


Fig. 4

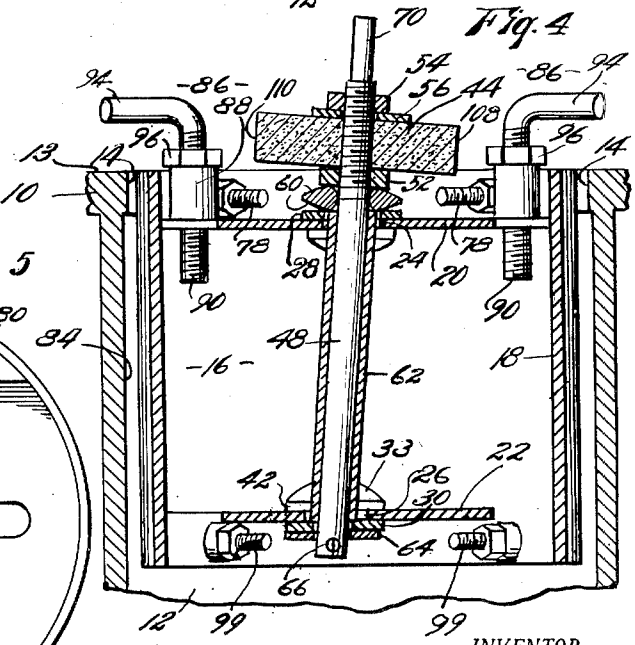


Fig. 6

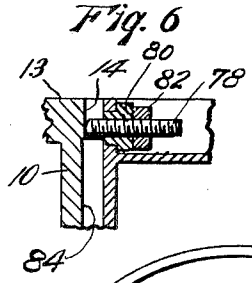
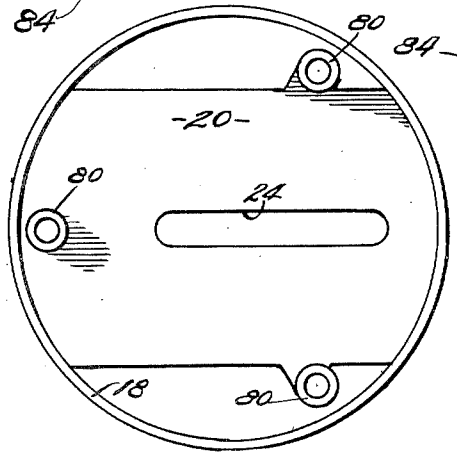


Fig. 5



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CYLINDER BLOCK RIDGE GRINDER

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Application November 12, 1952, Serial No. 319,870

2 Claims. (Cl. 51—245)

This invention relates to new and useful improvements in devices for dressing the inner surfaces of the cylinders of an internal combustion engine, and has for its primary object the provision of means for efficiently removing the ridge from the top portions of worn cylinder blocks, so that rings may be easily inserted.

Another object of this invention is the provision of a cylinder ridge grinder having novel adjustable means for holding the grinder in proper position in the cylinder to remove the ridge therefrom.

A further object of the invention is the provision of means whereby the grinding wheel and associated driving parts may be moved around in an orbit to carry out the grinding of the bore of a cylinder and to remove the ridge from the cylinder adjacent the top of the block.

Other objects are simplicity and economy of construction, ease and accuracy of operation, and adaptability for use in cylinders of various sizes.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the drawing, wherein:

Fig. 1 is a side elevational view of a grinding device embodying the present invention, shown positioned in a cylinder shown in cross section.

Fig. 2 is a plan view of the device shown in Fig. 1, with the driving clutch removed.

Fig. 3 is a cross sectional view taken on line III—III of Fig. 2.

Fig. 4 is an irregular sectional view taken on line IV—IV of Fig. 2.

Fig. 5 is a detached plan view of the body member of the grinding device.

Fig. 6 is a fragmentary sectional view of the upper portion of the device taken on line VI—VI of Fig. 2.

Fig. 7 is a fragmentary sectional view taken on line VII—VII of Fig. 1.

Fig. 8 is a plan view showing the bearing plate detached.

Throughout the several views of the drawing like reference characters apply to similar parts, and the numeral **10** refers to a conventional cylinder block for an internal combustion engine, having a cylindrical bore **12** and a planar top surface **13**. The bore, when the engine becomes worn, will present an objectional ridge **14** adjacent the top of the block. It is to remove this ridge that the grinding device **16** is provided. This device has a cylindrical body member **18** open at both ends and provided with like diametrically positioned partition or shelf members **20** and **22** positioned respectively in spaced relation from the upper and lower ends of member **18**. These partition members are preferably integral with or rigidly secured to the inner wall of member **18** by welding. Partition members **20** and **22** are respectively slotted at **24** and **26** and provided with bearing plates **28** and **30**, each of which has a centering hole **27** and a relatively large hole **29** formed therein. Partition member **20** and bearing plate **28** are clampingly secured together by means of bolt **32**, which is provided with a

nut **34**. Mounted on bolt **32** at opposite sides of the assembled bearing plate **28** and partition member **20** is a pair of washers **36**. Likewise partition member **22** and bearing plate **30** are secured together by means of bolt **38**, nut **40**, and washers **42**.

A grinding wheel **44** is mounted adjacent the upper threaded end **46** of shaft **48**. Grinding wheel **44** is cylindrically formed and centrally bored at **50** to fit on shaft **48** and is clampingly secured thereto by means of nut **52** which rests against the under side of wheel **44** and nut **54** which rests on top of wheel **44**, with a washer **56** therebetween.

Mounted on shaft **48** below nut **52** is a washer **58** having opposed convex faces **60**. Washer **58** rests on top of an elongated sleeve **62** through which shaft **48** extends to pass through partition member **20** and on down through partition **22** and bearing plate **30** to receive a washer **64** which is secured in position by means of cotter pin **66**. Sleeve **62** extends through larger hole **29** of upper bearing plate **28**, but the lower end of said sleeve rests for support on the upper surface of lower bearing plate **30**, only the shaft **48** passing through hole **29** of said lower bearing plate. Referring to Fig. 4 it will be noted that shaft **48** is slightly inclined from the vertical so that the bottom face of wheel **44** is slightly angled to the planar face of body member **18** and to the cylindrical bore **12**, so that when the wheel **44** is positioned as shown in Figs. 2 and 4 and the wheel is rotated clockwise as indicated by the arrow in Fig. 2, the wheel when driven at a high rate of speed will feed downwardly into cylinder block **10** and will be gradually forced in an anticlockwise direction about the inner periphery of the cylinder to grind away the ridge **14**. When the ridge has been entirely ground away there will be no tendency for the grinding wheel to move about the inner periphery of said cylinder as hereinafter set forth.

The upper end portion **70** of shaft **48** is reduced and made cylindrical to receive the jaws **72** of a conventional chuck **74** having drive shaft **76** for imparting angular velocity to said grinding wheel. This shaft **76** may be driven directly by means of an electric hand drilling tool, or by means of a flexible shaft driven by a remote power unit.

For properly guiding the grinding device into the cylinder during the ridge grinding operation a pair of upper adjustable guide bolts **78** are radially mounted in body member **18**, by means of a threaded sleeve member **80** rigidly fixed to said body member to receive said bolt for radial adjustment therein. A lock nut **82** positioned on the inner end portion of bolt **78** serves to secure said bolt in the desired set position during the grinding operation. It will be noted that guide bolts **78** are rounded at their outer ends to make good smooth contact with the cylinder wall and they are respectively positioned at opposite sides of the extended diameter of wheel **44** so that with the grinding wheel they present a three-point contact with the cylinder being ground to retain the grinding device in proper relation with the cylinder being ground.

It will be noted that these bolts rest against the surface of ridge **14** (see Fig. 6) and that as the grinder is moved into the cylinder the bolts will move outwardly to contact the face **84** of the body of the cylinder, thus causing the grinding wheel to move inwardly from its grinding position the thickness of the ridge, which is usually a few thousandths of an inch. During the setting of the grinding wheel for the proper removal of ridge **14** the wheel is adjusted and set to extend radially from the body member **18** a distance about twice the thickness of ridge **14** so that when the grinding wheel starts grinding it will cut into the block too deep. However, before the

cut has moved into the block much less than the width of the ridge the guide bolts will have moved outwardly against the cylinder wall **84** and the grinding wheel will move to a cutting position to just remove the ridge **14**.

The means for regulating the depth of insertion of the grinding device into the cylinder comprises three equally spaced rider members **86** carried by body member **18**. Each rider member includes a threaded sleeve **88** integral with said body member and disposed in parallel relation to the axis of said body member to receive the threaded leg **90** of a right-angled rod member **92** having a leg **94** extending radially above the planar surface **13** of the cylinder block **10**. A lock nut **96** operatively mounted on the threaded leg **90** serves to lock the member **92** in the adjusted position, to limit the downward movement of the grinder into the cylinder. It is the purpose of this invention that said rider members be so set that when the grinding device has been lowered so that the entire ridge has been cut away the radial arms will rest on the top surface **13** of cylinder block **10**.

Means for centering the lower end portion of body member **18** include a pair of spaced apart guide bolts **99** similar to bolts **78** and set in like manner to cooperate with resilient member **98** to present a three-point contact with the cylinder wall to center the lower end of the body member during the grinding operation. Resilient member **98** comprises an arcute spring member **100** secured to body member **18** at its one end by a rivet **102**, the other end portion thereof is provided with a pin **104** which extends through an opening **106** formed through the wall of the body member to contact the wall **84** of the cylinder. This resilient member tends to urge bolts **99** tightly against wall **84**, and at the same time is adapted to be compressed into member **18** to permit the easy insertion of the device into the cylinder past the ridge **14**.

In positioning the grinding device into the operating position in cylinder bore **12** the operator inserts the lower portion of the device after properly adjusting screws **99** to the size of the body of the cylinder, by compressing the pin **104** into the body of member **18**. Bolts **78** are next set to form a three-point contact of the two bolts **78** and the opposite periphery of body member **18** at the ridge **14**. The bearing plates **28** and **30** are now adjusted so as to position the edge portion of grinding wheel **44** beyond the periphery of ridge **14** twice the thickness of said ridge. It will be noted that grinding wheel **44** is slightly tilted relative to the surface **13** of the cylinder block **10** with its forward edge **108** slightly lower than its rear edge **110**. With the grinding wheel so tilted and when driven at a high rate of speed in the direction indicated by the arrow **71** in Fig. 2, the cutting action will draw the wheel into the body of the block until the rider members rest on the surface **13** of the block **10**. During the grinding operation, the entire device will be rotated entirely around the periphery of said cylinder in the direction indicated by the arrows **73** until the ridge is entirely ground away. When the ridge is entirely cut away the grinding device will have no further urge to rotate in the cylinder and will stand still and can be removed from the cylinder block for positioning it in the next cylinder in the block.

Due to the slight thickness of the ridge **14** it has been advisable to exaggerate said dimension to properly indicate the relationship of the parts, which otherwise would not be readily apparent.

What I claim as new and desire to protect by Letters Patent is:

1. A ridge grinding device for the cylinders of engine blocks comprising a body member, centering members carried by said body member and operable to engage slidably the walls of a cylinder into which said body member is inserted, whereby to support said body member for free rotational and axial movement in said cylinder, and a grinding wheel carried rotatably by said body member and positioned to grind the wall of a cylinder in which said body member is positioned, the axis of said grinding wheel being disposed eccentrically to the axis of said body member and inclined slightly relatively thereto in a plane at right angles to the direction of eccentricity thereof, at least certain of said centering members being provided with resilient means urging them radially outwardly relative to the body member, whereby they may be pressed inwardly to permit the insertion of the body member into a cylinder when the wall of said cylinder is ridged.

2. A ridge grinding device for the cylinders of engine blocks comprising a body member, centering members carried by said body member and operable to engage slidably the walls of a cylinder into which said body member is inserted, whereby to support said body member for free rotational and axial movement in said cylinder, and a grinding wheel carried rotatably by said body member and positioned to grind the wall of a cylinder in which said body member is positioned, the axis of said grinding wheel being disposed eccentrically to the axis of said body member and inclined slightly relatively thereto in a plane at right angles to the direction of eccentricity thereof, stop members affixed to said body member in axially offset relation from said grinding wheel, and projecting radially whereby to engage said engine block adjacent said cylinder, whereby to limit the travel of said grinding wheel into said cylinder.

References Cited in the file of this patent

UNITED STATES PATENTS

386,848	Rast	July 31, 1888
1,032,193	Elliott	July 9, 1912
1,219,827	Leschler	Mar. 20, 1917
1,365,149	Breed	Jan. 11, 1921
1,374,599	Moore	Apr. 12, 1921
1,408,578	Garner	Mar. 7, 1922
1,513,604	Kosmos	Oct. 28, 1924
1,933,677	Moore	Nov. 7, 1933
2,521,210	Fulmer	Sept. 5, 1950
2,541,412	Frost	Feb. 13, 1951
2,546,490	Baldwin	Mar. 27, 1951

FOREIGN PATENTS

22,380	Great Britain	Oct. 22, 1908
135,918	Germany	Nov. 21, 1902