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CYLINDER GRINDING AND HONING MACHINE

Filed Feb. 19, 1931

Fig. 1.

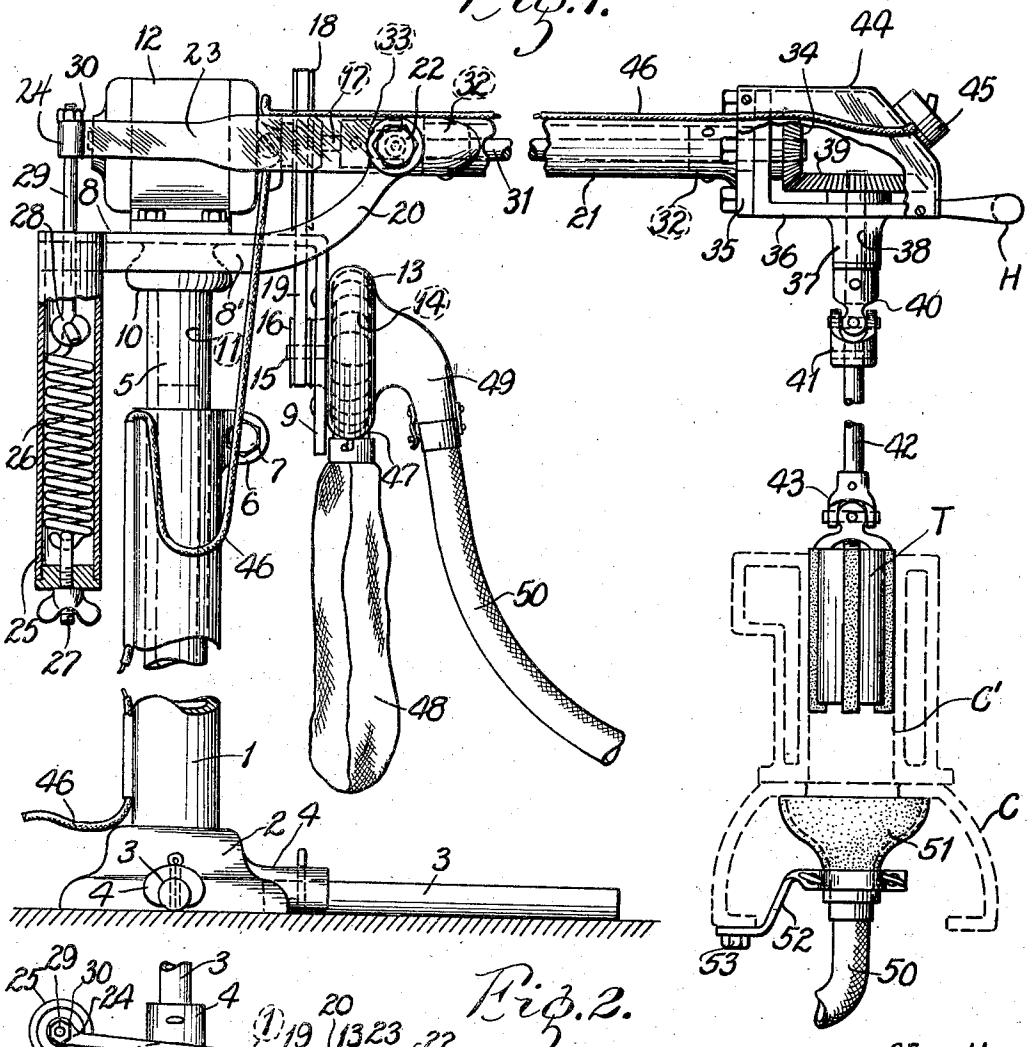
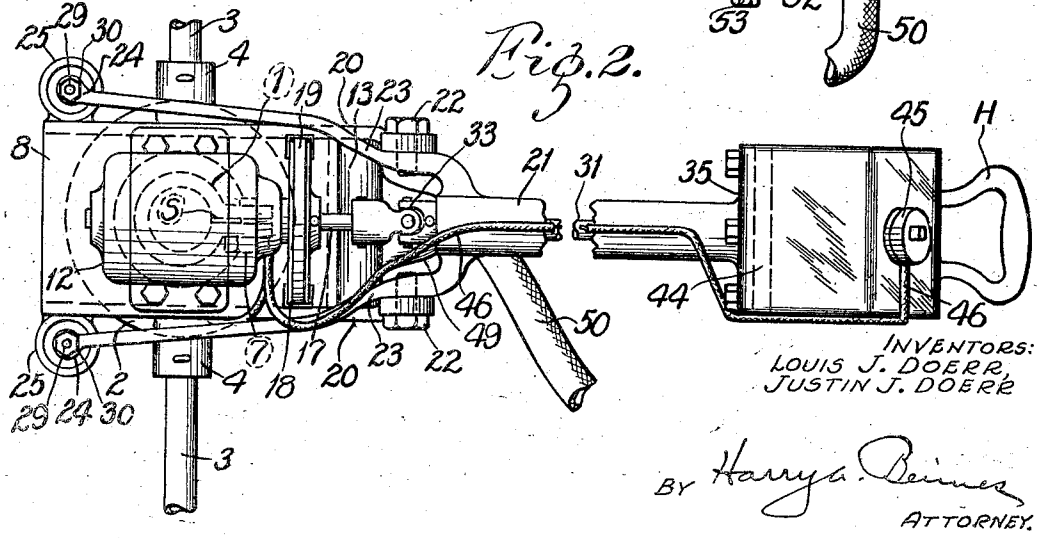


Fig. 2.



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UNITED STATES PATENT OFFICE

LOUIS J. DOERR AND JUSTIN J. DOERR, OF ST. LOUIS, MISSOURI, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, OF FOUR-FIFTHS TO LOUIS J. DOERR MOTOR WORKS COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI, AND ONE-FIFTH TO SAID JUSTIN J. DOERR

CYLINDER GRINDING AND HONING MACHINE

Application filed February 19, 1931. Serial No. 516,918.

Our invention has relation to improvements in machines for grinding and honing the cylinders of internal combustion engines particularly those used in automobiles, and it consists in the novel features of construction more fully set forth in the specification and pointed out in the claims.

The common practice now followed by mechanics in regrinding cylinders is either to remove the engine block from the automobile frame, or grind the cylinders in place by means of a grinding tool secured to an electric hand drill. The former method is expensive because of the labor entailed in removing and replacing the engine, and the latter method is tedious because of the exhaustive labor of holding and operating the hand drill above the cylinders. We have devised a machine for adjustably supporting a grinding tool over the engine block embodying means for rotating the grinding tool and also means for removing the grindings from the cylinder as rapidly as they are produced.

The principal object of the invention is therefore to provide a grinding machine having such flexibility of motion that it may be disposed in any cylinder of the engine, and one in which the weight of the operating head is counter-balanced so that it may be easily reciprocated in the cylinder being ground; it is a further object of the invention to provide suction means on the lower end of the cylinder in operative relation with the actuating means for the grinding tool to instantly remove the grindings from the cylinder. It is also the object to obtain the above advantages by a mechanism that is rugged, although of comparatively simple construction, and one possessing other and further advantages as will be more fully apparent from a detailed description of the invention in connection with the accompanying drawing in which:

Figure 1 is a side elevation of my improved grinding machine, with parts broken away, in operation on an engine cylinder indicated by dotted lines; and Fig. 2 is a top plan of the invention with parts broken away.

Referring to the drawing 1 represents a tubular standard secured in a base 2 having feet 3, 3, 3 extending laterally from hollow bosses 4, 4, 4. A tube 5 is disposed within the tubular standard 1 and is adapted for vertical adjustment therein. The standard 1 is longitudinally slotted as indicated by *s*, a short distance downwardly from its upper end, and ears 6, 6 are provided on each side of the slot so that the upper end of the standard 1 may be drawn together by means of a bolt 7 to securely clamp the tube 5 in any desired position. A motor base, or table, having a horizontal component 8 and a vertical component 9 is rotatably supported in the tube 5 by means of a boss 10 which rests on the upper end of said tube, a stem 11 projecting a short distance into the tube. A motor 12 is mounted on the horizontal component 8 of the base and an exhaust fan housing 13 is mounted on the vertical component 9 of the base, a fan within the housing being fixed to a shaft 15 having suitable bearing in the component 9 and having a pulley 16 on its inner end. Motor shaft 17 has a pulley 18 mounted on it and a drive belt 19 passes over pulleys 18 and 16 so that when the motor is in operation the fan 14 will also be driven. The component 8 is provided with side flanges 8′, 8′, the forward extremities of which curve upwardly to form supporting arms 20, 20 for a lever carriage, or shaft housing 21, the ends of arms 20, 20 being perforated to receive studs 22, 22 which are screwed into rearwardly extending arms 23 near their juncture with the housing 21. The ends of arms 23, 23 terminate in eyes 24, 24, and vertically alined beneath the eyes 24, 24 are tubular spring cases 25, 25 securely attached to flanges 8′, 8′ and extending downwardly therefrom. A spring 26 is mounted in each spring case 25 and has its lower end connected to an anchor bolt 27 and its upper end connected to an eye 28, terminating in a rod 29, the upper end of which traverses the eye 24 in arm 23, the rod 29 being held in engagement with arm 23 by a nut 30 passed over the threaded extremity of the rod 29. A drive shaft 31 is rotatable in bearings 32, 32 within housing 21 and is connected to motor shaft 17 by a universal joint 33 at its inner end and carries a beveled gear 34 on its outer

end. The outer extremity of the housing 21 terminates in a flange 35 to which is bolted an angle bracket 36 which carries the grinding, or honing tool T and driving mechanism thereof, now to be described. A boss 37 depends from the horizontal component of angle bracket 36 and is traversed by a stud shaft 38 having a beveled gear 39 securely fixed on its inner end and one component 40 of a universal joint fixed on its outer end, the gear 39 being supported by the bracket 36 in engaging relation with the gear 34 so that when the motor is actuated to rotate gear 34, gear 39 will be driven and rotate stub shaft 38. Universal joint component 41 is connected to component 40 and carries a shaft 42 connected to the tool T by means of a second universal joint 43. Thus, a rotation of stub shaft 38 will drive the tool T through shaft 42 and connecting universals. A suitable cover plate 44 is secured over the angle bracket 36 and has an electric switch 45 mounted on it to which the cable 46 containing the electric wires for the motor are connected.

The fan housing 13 has an outlet 47 to which is connected a receiving bag 48 (of any well known type), and inlet spout 49 of the housing 13 carries a flexible conduit 50 at the outer end of which is a flexible cup 51 adapted to be held in intimate contact with the top wall of the engine crankcase C immediately below the cylinder C′ that is being ground. A clamp 52 of any suitable design supports the cup 51 and holds it in firm engagement beneath the cylinder C′. This clamp 52 may be fastened as shown by means of a bolt 53 to the crankcase flange or in any other satisfactory manner. We have seen that when the motor is in operation the fan 14 will also be put in operation through the belt and pulley connections illustrated, therefore, as fast as the grindings are produced by the operations of the tool T within the cylinder C′, they will be sucked down into the cup 51 through the conduit 50 and ultimately discharged through the sack 48 where they accumulate. If the cup 51 is properly positioned, there is no chance for grindings to find their way into any part of the engine to do subsequent damage, because they are removed as rapidly as they are produced.

In grinding engine cylinders, the machine is so placed with respect to the engine block that the tool T may be rotated over the block so as to reach each one of the cylinders through the added flexibility of the universal joints 41, and 43. While the grinding operation is going on, the operator need only to move the tool up and down by pressure on the handle H as the entire weight of the operating head, including the tool T is counterbalanced by the springs 26, 26. Thus, the grinding of engine cylinders becomes a comparatively easy job compared to the old method which required the operator to actually support the entire weight of the grinding tool and its driving mechanism while he worked the tool up and down in the cylinder.

Having described our invention, we claim:

1. In a machine for grinding engine cylinders, a supporting standard, a table rotatably mounted thereon, a motor mounted on said table, a pair of supporting arms projecting outwardly from said table, a lever carriage pivotally mounted between said arms, a drive shaft mounted in said carriage, a flexible connection between said drive shaft and motor shaft, the axis of said connection and the pivotal axis of the lever carriage being in alignment, a tool head carried by the otuer end of said carriage, the inner end of said carriage having a bifurcated extremity spanning the motor, and means connected to the bifurcated ends of the lever carriage for counterbalancing said carriage.

2. In a machine for grinding engine cylinders, a supporting standard, a table rotatably mounted thereon, a motor mounted on said table, a pair of supporting arms projecting outwardly from said table, a lever carriage pivotally mounted between said arms, a drive shaft mounted in said carriage, a flexible connection between said drive shaft and motor shaft, the axis of said connection and the pivotal axis of the lever carriage being in alignment, and a tool head carried on the free end of the lever carriage.

In testimony whereof we hereunto affix our signatures.

LOUIS J. DOERR.
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