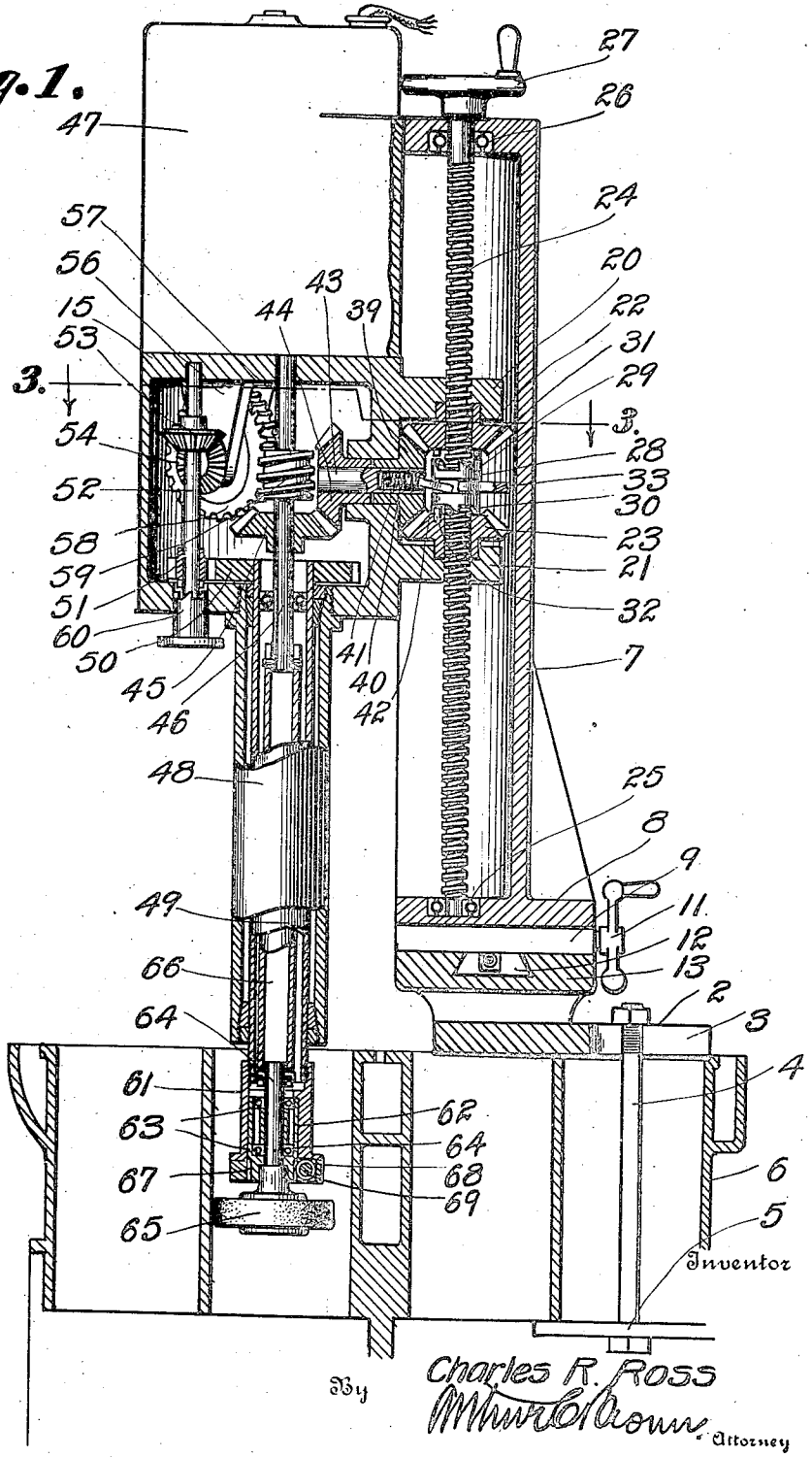
Aug. 14, 1923. 1,464,728

C. R. ROSS

PORTABLE GRINDER

Filed Sept. 6, 1921 2 Sheets-Sheet 1

Fig. 1.



Inventor

Charles R. Ross

By Mitchell Brown Attorney

Aug. 14, 1923. 1,464,728

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Fig. 2.

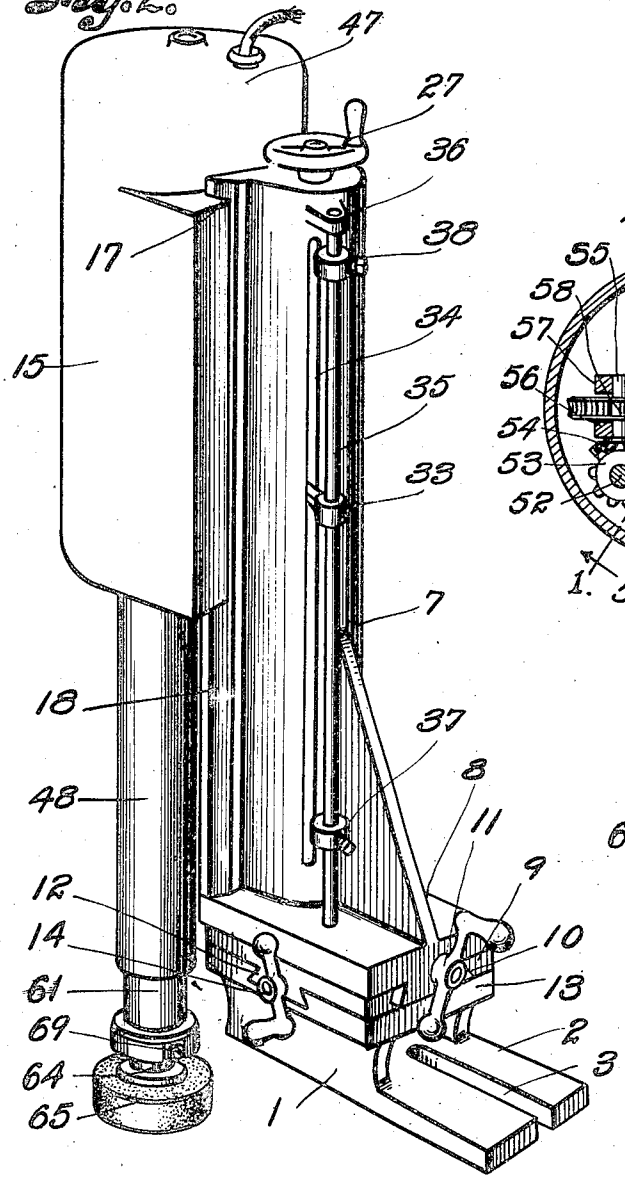


Fig. 3.

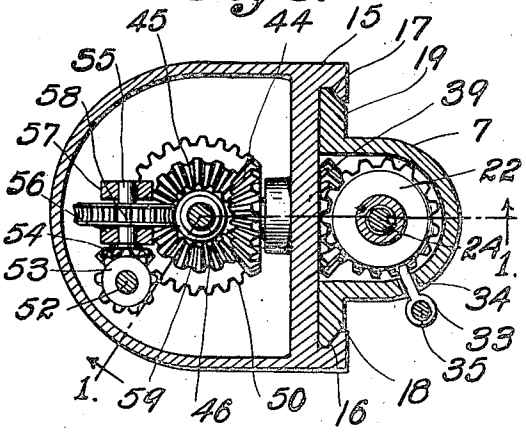


Fig. 4.

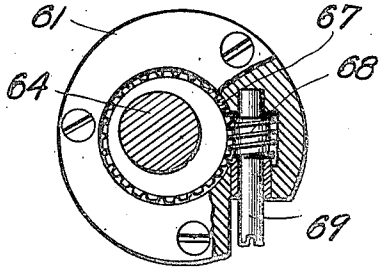
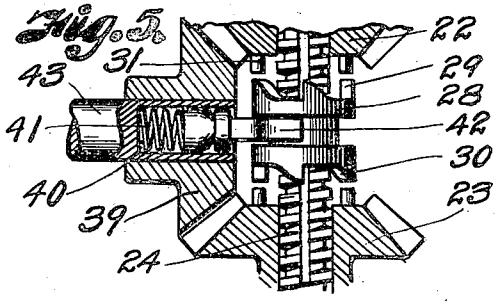


Fig. 5.



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Patented Aug. 14, 1923. 1,464,728

UNITED STATES PATENT OFFICE.

CHARLES R. ROSS, OF KANSAS CITY, MISSOURI, ASSIGNOR OF ONE-HALF TO WILLIAM D. KLINE, OF KANSAS CITY, MISSOURI.

PORTABLE GRINDER.

Application filed September 6, 1921. Serial No. 499,875.

To all whom it may concern:

Be it known that I, CHARLES R. ROSS, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Portable Grinders; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to a portable grinder particularly adapted for grinding curved surfaces and specifically illustrated as functioning to grind the interior of internal combustion engine cylinders.

The invention contemplates the provision of means whereby the grinder may be adjustably supported upon a base adapted to be secured to the engine block so that the grinder may be accurately adjusted with respect to the surface to be ground.

Means is also provided whereby the grinding tool may be rotated on a fixed axis and revolved at the same time. The rotating action affords the grinding function and the revolving action is effective in moving the grinding tool over the surface to be ground. Therefore, the grinding tool may turn about a fixed axis and also turn in a variable orbit whenever the machine is operated.

Hereinafter the word "rotate" is intended to mean to turn about a fixed axis and the word "revolve" is intended to mean to turn in a variable orbit, these distinctions being used in order to differentiate two different movements of the grinding tool.

Means is provided whereby a reciprocatory motion will be imparted to the grinding tool to cause the tool to move along the work so that the grinder may proceed from one end of the work to the other and back.

Means is provided for effecting a manually controlled feed of the grinding tool in addition to the mechanically operated feed, and there are other novel details of construction of more or less importance which will be referred to hereinafter, reference being had to the accompanying drawings, in which,

Fig. 1 is a view partly in elevation and partly in longitudinal section through a portable grinder constructed in accordance with my invention, the grinder being shown as applied to an engine block.

Fig. 2 is a perspective view of the grinder.

Fig. 3 is a section view of the grinder on the line 3—3 of Fig. 1.

Fig. 4 is an end view of the tool actuating head, parts being broken away to show means for adjusting it, and

Fig. 5 is an enlarged view of a clutch mechanism for controlling the direction of feed of the grinding tool.

The grinder is shown as consisting of a base bracket 1, having a projecting portion 2, provided with an elongated slot 3 to receive a bolt 4, having upon one end a plate 5, whereby the base bracket 1 may be clamped to a suitable support; for example, an engine block 6, as will be clearly apparent by reference to Figs. 1 and 2. There is a standard 7 having a base plate 8 longitudinally adjustable on the surface plate 9 through the medium of the dove-tail connection 10, in response to a screw on the handle 11, as will be well understood. The surface adjustment may be effected by dove-tailing the plate 9 as at 12 and supporting it upon the plate 13 integral with the base 1, the adjustment being effected by the handle 14 as will be well understood. The standard 7 supports a vertically reciprocatory slide 15 which is provided with under-cut portions 16 and 17 to engage the side flanges or guides 18 and 19 integral with the standard 7, as will be clearly apparent by reference to Figs. 2 and 3. The slide may reciprocate to feed the tool in either direction in response to a feed mechanism which is constructed as follows. The slide is shown as having two internally threaded tongues 20 and 21 constituting bearings for the bevel gears 22 and 23 and extending into the hollow portion of the standard 7. The bevel gears 22 and 23 are mounted idly in the tongues of the slide, and extending through them is a feed screw 24 having a relatively steep pitch the threads of which engage the threads of the tongues 21 and 22. The screw 24 is not, however, in threaded engagement with the bevel gears 22 and 23. The screw is mounted at its bottom in an antifriction bearing 25 and at its top in a similar bearing 26, the upper end of the screw extending through the standard and being provided

with a hand wheel 27 so that the screw may be operated to initially set the grinding tool to be referred to hereinafter.

Slidably keyed upon the screw 24 is a collar 28 (see Figs. 3 and 5). The collar is located between the gears 22 and 23 and it is provided with clutch teeth 29 and 30, which may alternately engage the pins 31 and 32 on the respective gears 22 and 23, the collar being actuated by a clutch actuator 33 which extends through a slot 34 in the standard 7 and which has slidable engagement with the rod 35 mounted on the base plate 8 and fixed at its upper end in the ear 36. The rod 35 has adjustable collars 37 against which the clutch actuator may contact at the limit of its movement to disengage the clutch from either of the gears 22 and 23, as will be clearly apparent hereinafter. Therefore, while the screw will rotate in one direction, it may cause a reversal of movement of the slide, dependent upon which gear, 22 or 23, is rotating. The gears receive their rotation from a bevel gear 39. One of the gears, 22 or 23, will always be idle, dependent upon which gear is clutched to the collar. In some instances, both may be idle; for example, when the clutch collar is in neutral position. In the shaft of the gear 39 is a recess 40, having a coil spring 41 normally pressing against a detent 42, which will move outwardly under the action of the spring to tension the collar in clutch engagement with either gear against which it has been moved. Tension of the strength of the spring, however, is very slight so that it can be effectively opposed by the clutch actuator. On the shaft 43 which carries the gear 39 is a bevel gear 44 which meshes with a bevel gear 45 on the motor shaft 46, the shaft 46 being driven by the motor 47 carried by the top of the slide 15. Therefore, the feed of the slide will be effected from the motor and the feed mechanism just described. The motor also drives a tool in both a planetary and a rotative movement. The rotative movement of the tool will be at a higher speed than the revolving movement because the tool will be rotated at the speed of the motor, while the revolving or planetary motion will be through a reduction gear.

Depending from the slide 15 and carried with it is a stationary, tubular casing 48; that is, the casing 48 is stationary with respect to the slide but moves with it. Rotatably mounted within the tubular casing 48 is a hollow shaft 49 which extends beyond both ends of the casing 48. The upper end of the shaft 49 carries a gear 50 which is driven by a pinion 51, loose on a shaft 52, mounted in the hollow portion of the slide 15, and supporting a bevel gear 53 which is driven by a gear 54 on the shaft 55, mounted in the brackets 56 and 57. The shaft 55 carries a worm gear 58 meshing with worm 59 on the motor shaft 46, so that the shaft 52 may be rotated at a speed less than the speed of the shaft 46, and when the clutch member 60 is moved into engagement with the pinion 51, the pinion will rotate at the speed of the shaft 52. The pinion 51 is also in mesh with the gear 50 so that when the pinion 51 rotates, the gear 50 will rotate, imparting a rotative movement to the hollow shaft 49. The shaft 49 carries, at its lower end, a head 61, in which is eccentrically mounted a sleeve 62 having bearings 63 therein which support the shank 64 of the grinding tool 65, and a rotatable hollow shaft 66 within the hollow shaft 49 and connected at its upper end to motor shaft 46 so that the speed of the tool 65 will be the same as the speed of the motor shaft 46. The sleeve bearing 63 is provided with teeth 67 to receive the threads of the worm 68 on the worm shaft 69 (see Fig. 4), so that the bearing can be turned to vary its eccentricity to adjust the grinding tool 65 with respect to the work.

It will be apparent that since the shank of the tool is eccentrically mounted with respect to the head and concentrically mounted with respect to the motor shaft, that the tool will rotate about the axis of the motor shaft and also revolve with a planetary motion over the surface of the work upon which it is acting.

In grinding cylinders, the tool can be initially set at the top of the cylinder and then the machine can be set in operation. The motor shaft will rotate the tool 65 and cause it to revolve, provided, of course, that the clutch 60 has been thrown into engagement with the pinion 51 and if the collar 28 is in engagement with one of the gears 22 or 23, the slide will progress slowly toward the end of the cylinder until it has reached the limit of its movement in one direction, at which time the clutch actuator 33 will contact with one of the collars 37 and 38, causing a reversal of the clutch actuator and thereby a reversal of direction of the movement of the slide until the clutch actuator contacts with the collar at the other end of the standard, when the slide will again be reversed. Therefore, it will be seen that when the device is properly adjusted and set in operation, the grinder may continue indefinitely without special attention from the operator because when the screw 68 has been operated to effect the eccentricity of the head so as to determine the depth of the cut of the surface to be ground off, the machine may operate without attention, due to the fact that since the desired surface has been ground off, the machine could continue to operate without taking off any more surface than that for which it was set.

The device can be utilized for many differ-

ent purposes but I have shown it as applied to an engine so as to appropriately illustrate its function.

While I have illustrated and described the invention as being applied with the standard in a vertical position and the grinding tool progressively fed downwardly, it is obvious that the machine may be operated horizontally or in an inverted position, or, in fact, at any angle which may be found expedient. Therefore, I do not wish to be limited to the application of the invention as shown.

What I claim and desire to secure by Letters-Patent is:

1. A portable grinder comprising a standard, a slide mounted on the standard, a feed screw carried by the standard, spaced bevel gears on the feed screw, a clutch interposed between the gears and movable to alternately engage said gears, a bevel gear in mesh with said spaced gears, a shaft supporting it, another bevel gear on said shaft, a driving shaft, a bevel gear in mesh with the last named gear, a grinding tool rotated by the driving shaft, a bearing member for the grinding tool, in which the grinding tool is eccentrically mounted, and means for rotating the bearing member from the drive shaft.

2. A portable grinder comprising a hollow standard, a slide mounted on the standard and having spaced tongues, a feed screw carried by the standard and in threaded engagement with the tongues, spaced beveled gears mounted in the tongues and surrounding the feed screw, a clutch interposed between the gears and movable to alternately engage said gears, the clutch having rotative movement with the screw, a beveled gear in mesh with the spaced gears, a shaft supporting it, another beveled gear on the shaft, a driving shaft, a beveled gear in mesh with the last named gear, and a grinding tool rotated by the driving shaft.

3. A portable grinder comprising a hollow standard, a slide mounted on the standard and having spaced tongues, a feed screw carried by the standard and in threaded engagement with the tongues, spaced beveled gears mounted in the tongues and surrounding the feed screw, a clutch interposed between the gears and movable to alternately engage said gears, the clutch having rotative movement with the screw, a beveled gear in mesh with the spaced gears, a shaft supporting it, another beveled gear on the shaft, a driving shaft, a beveled gear in mesh with the last named gear, a grinding tool rotated by the driving shaft, a bearing member for the grinding tool in which the grinding tool is eccentrically mounted, a gear on the bearing member, a shaft carried by the slide, a pinion on the shaft engaging the gear on the bearing member, and means for rotating the last named shaft from the driving shaft.

In testimony whereof I affix my signature.

CHARLES R. ROSS.