

J. MARCY.
METHOD OF CUTTING CYLINDERS.
APPLICATION FILED AUG. 19, 1920.

1,404,989.

Patented Jan. 31, 1922.

2 SHEETS—SHEET 1.

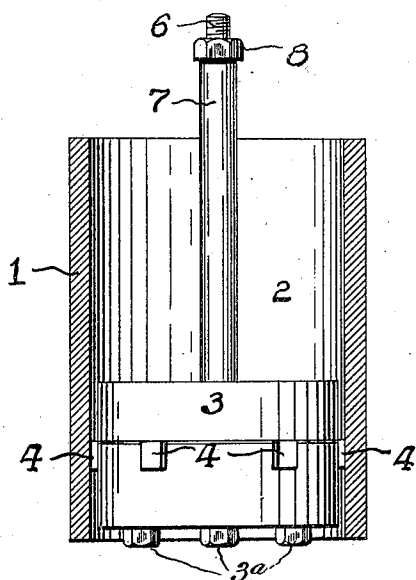


Fig. 1.

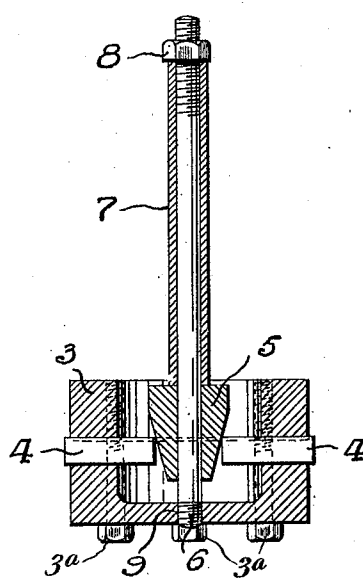


Fig. 2.

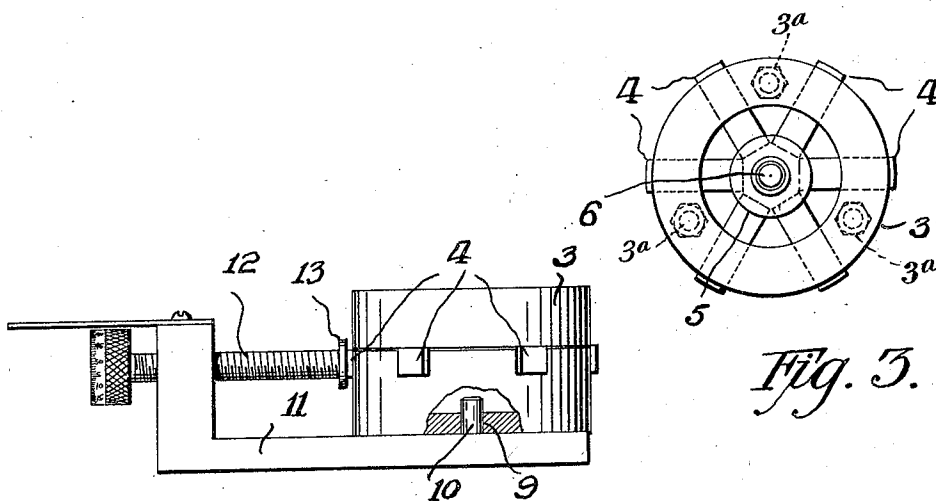


Fig. 3.

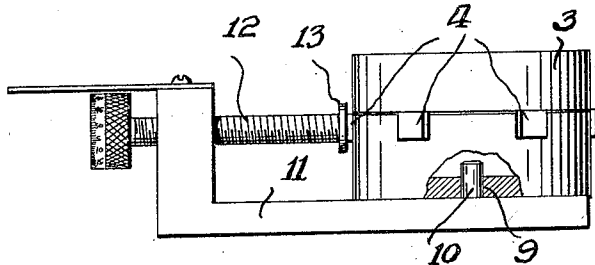


Fig. 4.

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2 SHEETS—SHEET 2.

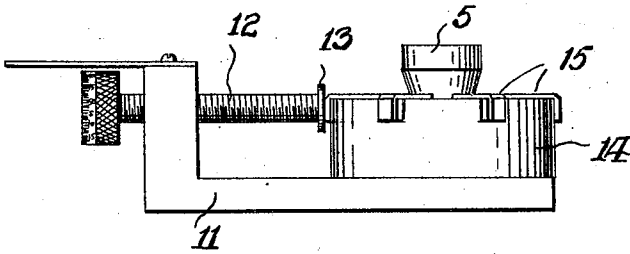


Fig. 5.

Fig. 6.

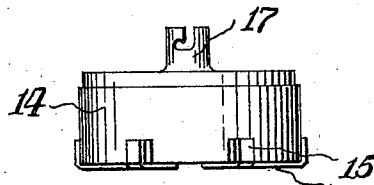


Fig. 7.

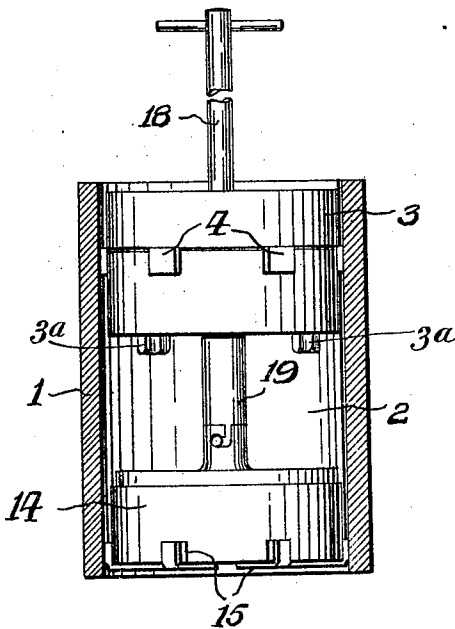
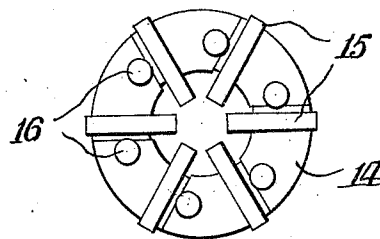


Fig. 8.



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METHOD OF CUTTING CYLINDERS.

1,404,989.

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Application filed August 19, 1920. Serial No. 404,540.

To all whom it may concern:

Be it known that I, JOHN MARCY, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Methods of Cutting Cylinders, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a method of cutting cylinders and other bodies having bores or cylindrical openings which must have the walls thereof true, and as an example of such a structure there may be cited a cylinder or engine block adapted to have a piston reciprocated therein. On account of piston rings the walls of an engine cylinder become scored and irregular, and from time to time it is necessary that the cylinder walls be recut to insure a non-leakable connection between the cylinder walls and a reciprocable piston therein.

My invention aims to provide means, as hereinafter set forth, for expeditiously and economically cutting or re-surfacing the inner walls of a cylinder, either by power or hand, and part of the operations are carried on with well-known commercial devices, so to carry my invention into practice, it is only necessary to provide certain other devices whereby a cylinder may be accurately cut.

The various devices entering into my invention and the successive steps involved in the method of cutting will be hereinafter more fully described and then claimed, and reference will now be had to the drawings, wherein—

Figure 1 is a longitudinal sectional view of a cylinder showing a cylinder gauge therein;

Fig. 2 is a longitudinal sectional view of the cylinder gauge;

Fig. 3 is a plan of the gauge;

Fig. 4 is a side elevation of a micrometer gauge showing the manner in which it is set by the cylinder gauge;

Fig. 5 is a similar view showing the setting of a reamer by the micrometer gauge;

Fig. 6 is a side elevation of the reamer;

Fig. 7 is a plan of the same, and

Fig. 8 is a longitudinal sectional view of the cylinder showing the manner of using the cylinder gauge and reamer.

In the drawings, the reference numeral 1 denotes, by the way of an example, a cylinder

having a wall 2 to be cut and to ascertain the radius or diameter of the cylinder I employ a cylinder gauge which may be of various forms, but a preferred type has been shown in Figs. 1, 2 and 3. The gauge comprises a cylindrical two-part body 3 having radially disposed slidable gauge members 4 and each gauge member may be fixed relatively to the body 3 by any suitable clamping means, for instance, screws 3^a, clamping the parts with the gauge members 4 therebetween. I employ a setting cone 5 for shifting the members 4 when the screws 3^a are loose, and said cone is slidably mounted on a rod 6 carried by the gauge body 3 and shifted on said rod against the inner ends of the gauge members 4 by a sleeve 7 and a nut 8 or other rotatable device. The rod 6 constitutes means for placing the gauge body in the cylinder 1 and by adjusting the nut 8 the sleeve 7 may be shifted on the rod 6 to cause the setting cone 5 to distend the gauge members 4, so that the outer ends of said members will engage the cylinder wall 2, at any place in the cylinder where the gauge may be placed. By simultaneously distending the gauge members 4 and possibly rotating the gauge in the cylinder the inner diameter of the cylinder can be obtained and such diameter will be represented on the cylinder gauge by the distance between the outer ends of diametrically opposed gauge members. After this operation, which represents the first step of my method, the gauge is removed from the cylinder with the gauge members 4 set and held by the clamped parts of the body 3 so as not to become accidentally displaced.

The set cylinder gauge has the rod 6 removed so that the opening 9 in the gauge body 3 may accommodate a center pin 10 of a micrometer gauge 11, said micrometer gauge having a screw 12 that may be minutely adjusted. With the cylinder gauge set down over the pin 10, the screw 12 is adjusted until its head 13 engages the end of one of the gauge members 4, and by rotating the cylinder gauge on the center pin 10 it is possible to determine whether the micrometer screw 12 is properly set to represent a radius common to all of the gauge members 4 of the cylinder gauge. The micrometer screw 12 is not tightened against the end of the gauge member, but set so that the cylinder gauge can be bodily removed, leaving

the micrometer gauge set to represent a radius of the cylinder before being cut.

It having been ascertained how much of the surface must be removed from the wall 2 to eliminate scoring and other imperfections, for instance, the sixty-fourth part of an inch, the micrometer gauge 11 is now adjusted to increase the radius represented thereby one-sixty-fourth part of an inch.

Various forms of reamers or grinding devices may be used in the cylinder 1 for progressively cutting the wall 2 from one end of the cylinder to the opposite end and as an example of the reamer which I may employ, reference will now be had to Figs. 5 to 8 inclusive. The reamer comprises a body 14 having radially disposed jaws or cutters 15 each of which may be held in an adjusted position by a pin 16 or other clamping device. The reamer body 14 has a coupling member 17 so that an operating rod 18 may be detachably connected thereto, and the rod 18, like the rod 6, may be rotated by power or hand.

With the micrometer gauge 11 set to represent the radius of the finished cylinder, the unset reamer is placed on the micrometer gauge over the center pin 10. The setting cone 5 is placed in the reamer body 14 and as the reamer body is intermittently rotated to place each cutter or jaw 15 opposite the micrometer screw 12, the setting cone is tapped to shift the outer end of each reamer cutter into engagement with the head 13 of the micrometer screw 12. Each reamer jaw may thus be set so that all of the jaws will have the same radius from the center of the reamer body. The reamer body may then be removed from the micrometer gauge, the setting cone 5 removed from the reamer and the rod 18 or similar operating device connected to the reamer; it being understood that each of the reamer jaws has been fixed relative to the reamer body so as not to become accidentally displaced during the operation of the reamer in the cylinder.

The reamer is now started in one end of the cylinder 1 to cut or otherwise operate upon the wall 2 of the cylinder, and as before stated, this may be accomplished by power or hand at the outer end of the rod 18. As the reamer advances in the cylinder it is obvious that there may be some torque or twisting action of the rod 18, and to avoid this particularly when the reamer approaches the opposite end of the cylinder, I again resort to the use of the cylinder gauge 3. With the micrometer gauge 11 still set for the reamer, the cylinder gauge 16 is placed on the micrometer gauge and the gauge members again adjusted and set so that the gauge will fit in that end of the cylinder which has been previously cut by the reamer. A spacing sleeve 19 may be interposed between the gauge 3 and the

reamer 14, as shown in Fig. 8, and an operating rod employed that will extend through the cylinder gauge 3 and the sleeve 19 to permit of the reamer 14 being rotated and advanced in the cylinder 1. In a comparatively short cylinder it may not be necessary to again use the cylinder gauge as a guide for the operating means of a reamer, but when the cutting is performed by hand I prefer to use such a guide to facilitate cutting operation.

From the foregoing, it will be observed that I first ascertain the diameter of the cylinder wall 2 by a radial gauge; second, utilize the set radial gauge to set a micrometer gauge; third, reset the micrometer gauge to represent the amount of material to be removed from the cylinder wall; fourth, using the reset micrometer gauge to set a reamer so that the reamer may be employed for cutting the cylinder wall, and fifth, resetting the radial gauge according to the reset micrometer gauge so that the radial gauge may be used as a guide for the operating means of the reamer, particularly as the reamer approaches that end of the cylinder farthest from the application or source of power.

In carrying out the various steps of my method of cutting the cylinder I do not care to confine myself to the type of gauge or micrometer shown and it is obvious that various forms of reamers may be employed, therefore my invention is susceptible to such changes as fall within the scope of the appended claims.

What I claim is:—

1. A method of cutting a cylinder or similar structure consisting in using a gauge to ascertain the radius of the cylinder to be cut, resetting the gauge to correspond to the cylinder radius plus the depth of material to be removed, setting a reamer to correspond to the gauge, using the reamer to cut the cylinder, and then using the gauge in the cylinder as a guide for the reamer.

2. A method of cutting a cylinder consisting of using a radial gauge to ascertain the radius of an unground cylinder, setting a micrometer gauge according to the radial gauge, resetting the micrometer gauge to include the depth of material to be removed from the cylinder, setting a reamer according to the micrometer gauge, resetting the radial gauge to correspond to the reset micrometer gauge, using the radial gauge as a reamer guide in the cylinder, and then using the reamer to cut the cylinder.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN MARCY.

Witnesses:

ANNA M. DORR,
KARL H. BUTLER.