Jan. 22, 1957 J. W. KLUMPP 2,778,167

ROTARY HONE

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Fig. 1

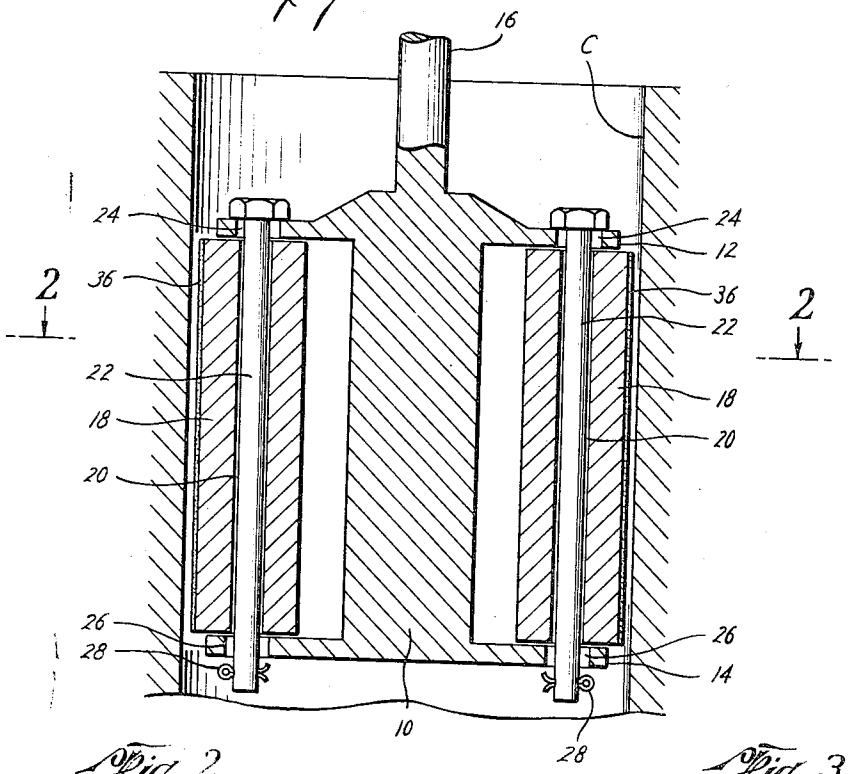


Fig. 2

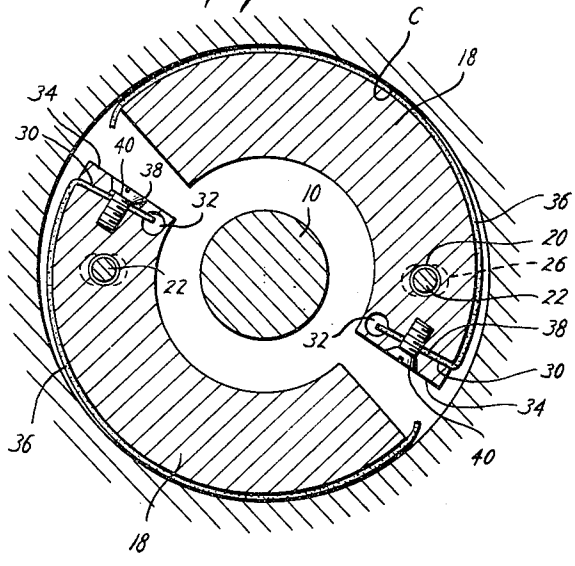
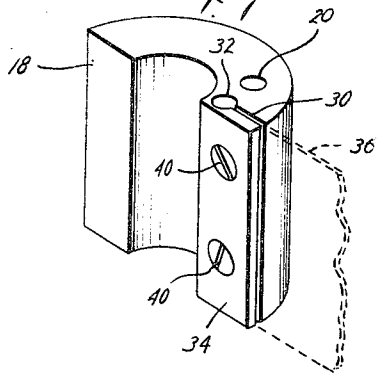


Fig. 3



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ROTARY HONE

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4 Claims. (Cl. 51—184.1)

This invention relates to a rotary hone, and more particularly to a device for honing the interiors of cylinders.

The invention finds particular application in connection with the honing of the cylinders of internal combustion engines for the purpose of reconditioning of the same, but it will be understood that the invention is not limited to such use and may be employed for the honing of the interiors of the cylinders of many different types of machines, either during the manufacture of the same, or for purposes of repair and maintenance of such equipment.

In the finishing of cylinders, such as the cylinders of automobile engines and the like, it has been customary to hone the interiors of such cylinders by means of grind stones or like means which must be very accurately constructed and which soon become worn to an extent which renders them no longer useful for that purpose.

Attempts have been made heretofore to overcome this difficulty and to reduce the expense of such honing operations by the provision of various types of honing devices, which could be adjusted to compensate for wear or in which special materials or means are employed to maintain the accuracy of the results obtainable. Such expedients have, however, not proven entirely satisfactory due to the high cost of manufacture of the implements or the difficulty of maintaining them in condition to produce the high tolerances required.

The present invention has for its chief object the overcoming of the above difficulty by the provision of a rotary honing device which is operated by centrifugal force, whose parts need not be constructed to close tolerances, yet by the use of which highly accurate results are readily obtainable.

Another object of the invention is to provide a honing device, which is easily operated and which does not require careful adjustment, and by which uniformly accurate results are obtainable.

A further object of the invention is the provision of a honing device of the rotary type embodying a rotatable body upon which weight members are pivotably carried for horizontal swinging movement under the influence of centrifugal force, and including renewable abrasive elements in the form of sheets of abrasive material, which may be applied to the members in position to engage the surrounding interior surface of a cylinder, whereby the cylinder may be ground to a smooth finish.

Another object of the invention is to provide a cylinder honing device which is self adjustable to conform to the diameter of a cylinder to be honed and in which the abrasive becomes progressively finer as the honing proceeds, whereby the honing operation may be completed without interruption for the purpose of changing the abrasive or adjusting the hone.

A still further object of the invention is the provision of a cylinder honing device which is of simple design and rugged construction, capable of long withstanding

the extreme conditions of hard usage and wear to which objects of this character are likely to be subjected.

The above and other important objects and advantages of the invention may best be understood from the following detailed description, constituting a specification of the same, when considered in conjunction with the annexed drawings, wherein—

Figure 1 is a vertical, central cross-sectional view of a preferred embodiment of the invention showing the same in position in a cylinder to be honed;

Figure 2 is a cross-sectional view, taken along the line 2—2 of Figure 1, looking in the direction indicated by the arrows; and

Figure 3 is a perspective view, on a somewhat reduced scale, showing one of the centrifugally operated members of the invention separated from the remainder of the structure and illustrating the details of construction of the same.

Referring now to the drawings in greater detail, the invention includes a body **10** provided with longitudinally spaced, external flanges **12** and **14** at its opposite ends, and a stem **16** extending longitudinally beyond one of said flanges, this structure constituting a rotatable frame upon which centrifugally operated weight elements **18** are pivotably supported for horizontal swinging movement. Each of the weight elements **18** is preferably of semi-cylindrical shape, of a length to fit between the flanges **12** and **14**, and provided with a longitudinal bolt receiving opening **20** therethrough.

The weight elements are pivotably secured between the flanges **12** and **14** by means of bolts or pins **22**, which extend through openings **24** and **26** in the flanges and through the openings **20** of the weight elements whereby the elements are pivotably supported for horizontal swinging movement and will swing outwardly under the influence of centrifugal force upon rapid rotation of the body. The openings **24** and **26** in the flanges **12** and **14** may be somewhat elongated to permit radial movement of the bolts **22** therein, whereby the weight elements may have some body movement radially relative to the axis of the body **10**. Bolts **22** may be provided with cotter pins, as indicated at **28**, or other means whereby the bolts are retained against displacement from the flange openings.

Each of the weight elements **18** is preferably provided with a longitudinal, radially outwardly opening slot **30**, which terminates inwardly of the element in a longitudinal bore **32**, whereby the element is formed with a plate-like portion **34** having a flexible connection with the element. Strips or sheets **36** of abrasive paper or cloth are applied to the outer surfaces of the weight elements, each such sheet having a marginal portion **38** which extends into the slot **30** of the element, and is clamped therein by screws **40**, or other suitable means, extending through the plate-like portion **34** and threadably attached to the element. The sheets **36** may be of sufficient width to cover the entire outer faces of the weight elements.

In making use of the invention constructed as described above, the sheets of abrasive with the abrasive surfaces outermost are attached to the weight elements in the manner described and the stem **16** is connected to a motor or other source of power by which the body may be rotated. The weight elements are then moved inwardly toward the body and the device is inserted in a cylinder, indicated at C, which is to be honed, with the abrasive side of the sheets **36** in position to contact the interior of the cylinder.

It will be apparent that upon rapid rotation of the body **10** the weight elements **18** will swing outwardly under the influence of centrifugal force to move the

abrasive sheets into contact with the interior of the cylinder, whereby the wall of the cylinder may be ground and polished.

The grinding effect of the abrasive on the cylinder wall may be readily controlled by suitable regulation of the speed of rotation of the body, it being readily apparent that the pressure exerted against the cylinder wall by the weight elements may be increased by increasing the speed of rotation of the body. By constructing the weight elements with the diameter of their outer faces only slightly less than the diameter of the cylinder the abrasive sheets may be made to contact the cylinder wall throughout nearly the entire areas of said outer faces, whereby a maximum honing effect may be obtained.

For the purpose of trueing the wall of the cylinder or removing imperfections or scoring from the same a relatively coarse abrasive may be employed, successively finer abrasive material being substituted during the honing operation until the desired smoothness is obtained. Moreover, it will be seen that as the honing proceeds the abrasive will become more and more worn, thus providing progressively finer honing, so that the maximum economy in the use of the abrasive sheets is secured.

It will thus be seen that the invention provides a honing device of simple design and economical construction, which is easily operated without special skill and wherein the parts may be readily replaced or interchanged when desired.

While the invention has been disclosed herein in connection with a certain specific embodiment of the same, it will be understood that this is intended by way of illustration only, and that numerous changes may be made in the construction and arrangement of the parts, without departing from the spirit of the invention or the scope of the appended claims.

Having thus clearly shown and described the invention, what is claimed as new and desired to secure by Letters Patent is:

1. In a rotary hone for honing the interior of a cylinder, a frame shaped to be inserted in a cylinder, means for supporting the frame in the cylinder and for rotating the same therein about an axis substantially parallel to the axis of the cylinder, weight means movably carried by the frame for outward radial movement relative to said axis upon rotation of the frame, said weight means having substantially semi-cylindrical external surfaces positioned in substantially parallel relation to said axis and abrasive means on said surfaces.

2. In a rotary hone for honing the interior of a cylinder, a frame shaped to be inserted in a cylinder and having a centrally disposed body portion, longitudinally spaced, external, annular flanges on the body portion, means on the frame for supporting the frame in a cylinder to be honed and by which the frame may be rotated about an axis substantially parallel to the axis of the cylinder weight elements disposed between said flanges means forming a pivotal connection between each of said elements and said flanges and movable radially relative to said axis and about which said elements are movable radially outwardly upon rotation of the frame, and abrasive means on said elements positioned to engage the interior of the cylinder upon such outward movement of the elements.

3. In a rotary hone for honing the interior of a cylinder, a frame shaped to be inserted in a cylinder, means for supporting the frame in the cylinder and for rotating the same therein about an axis substantially parallel to the axis of the cylinder, substantially semi-cylindrically shaped weight elements movably positioned on the frame, means forming a pivotal connection between each of said elements and the frame and about which the element may swing radially on an axis substantially parallel to the axis of the frame, and abrasive means on the outer faces of said elements.

4. In a rotary hone for honing the interior of a cylinder, a frame shaped to be inserted in a cylinder, means for supporting the frame in the cylinder and for rotating the same therein about an axis substantially parallel to the axis of the cylinder, longitudinally spaced, radially extending flanges on the frame and having openings located outwardly from the axis of the frame, weight elements disposed between the flanges, each of said elements having a bore therethrough positioned in alignment with an opening in each of the flanges, means positioned to move radially of the axis of the frame in the openings and rotatably engageable with the elements in said bores to connect the elements to the frame for radial movement relative thereto, and abrasive means on the elements disposed in facing relation to the interior of the cylinder.

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