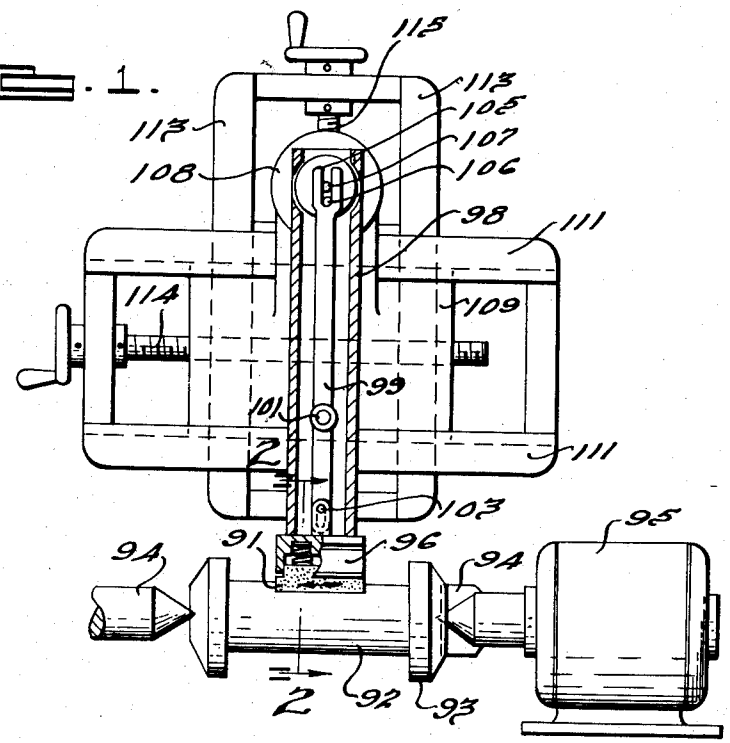
Nov. 17, 1942. K. W. CONNOR 2,302,105

ABRADING DEVICE

Original Filed April 27, 1936

Fig. 1.



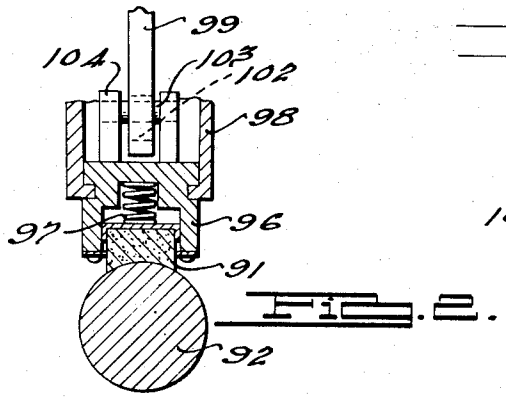


Fig. 2.

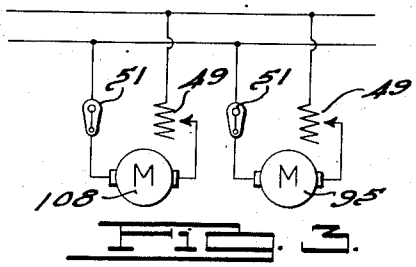


Fig. 3.

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Patented Nov. 17, 1942

2,302,105

UNITED STATES PATENT OFFICE

2,302,105

ABRADING DEVICE

Kirke W. Connor, Detroit, Mich., assignor to Micromatic Hone Corporation, Detroit, Mich., a corporation of Michigan

Original application April 27, 1936, Serial No. 76,520, now Patent No. 2,200,573, dated May 14, 1940. Divided and this application May 1, 1939, Serial No. 271,604

1 Claim. (Cl. 51—67)

This invention is a division of my application, Serial No. 76,520, filed April 27, 1936, which matured as Patent No. 2,200,573, May 14, 1940, and relates to a honing method and device which employs a single abrading element which is rapidly oscillated and advanced relative to a surface to be honed to produce an accurate and highly polished surface.

In my Patent No. 2,108,029, dated February 8, 1938, and assigned to the assignee of the present invention, a method and apparatus are disclosed wherein a plurality of honing elements are rapidly reciprocated in timed relation to the speed of rotation of the tool to produce a predetermined angular intersection of the paths of abrasion during the time the tool and work are fed relative to each other. Certain features embodied in the invention of the above mentioned application appear in the present invention.

In the present invention a single honing element is employed which eliminates any binding and uneven wear on the stones which may occur when a plurality of the stones are employed in a single tool. It is substantially impossible to grade the abrading stones relative to hardness so that when a group of stones are employed, the wearing qualities of some are materially greater than those of others and, as a result, certain stones wear faster than others, causing a binding between the stones when depending upon each other for support within the work piece and uneven wearing of the stones.

Due to the rapid oscillation of the honing stone, a method of grinding is provided which simulates that of hand polishing wherein the hand is rapidly oscillated to move an abrading element over the surface to be honed. A feed movement is introduced between the oscillating stone and the work to extend the abrading operation uniformly over the surface.

Accordingly, the main objects of my invention are; to provide a method whereby an abrading stone is rapidly oscillated during the time a feed movement is provided between the work and the stone; to provide rapid reciprocation of a single honing element having an engaging surface congruent to that of the work and advancing the work and honing stone relative to each other to cover the entire surface to be finished; and, in general, to provide apparatus for accurately machining surfaces to a high mirror finish, which is simple in construction, positive in operation and economical of manufacture.

Other objects and features of novelty of my invention will be either specifically pointed out or will become apparent when referring, for a better understanding of my invention, to the following description taken in conjunction with the following drawing, wherein:

Figure 1 is a view, partially in section, of a device operating on the external surface of a cylindrical work piece and embodying features of my invention;

Fig. 2 is an enlarged broken sectional view of structure illustrated in Fig. 1, taken on the line 2—2 thereof; and,

Fig. 3 is a wiring diagram which may be employed for controlling the operation of the motors illustrated in Fig. 1.

In Fig. 1 I have illustrated a form which my invention may assume, embodying a honing stone 91 having a concave surface engaging a cylindrical surface 92 of a work piece 93. The work piece is supported on centers 94 and driven in rotation by a motor 95. The honing stone 91 is mounted in an oscillatable head 96 and is biased outwardly therein by springs 97.

The head 96 is mounted for lateral oscillation on the end of a housing 98, supported on the end of a link 99. The link 99 is pivoted at 101 and is provided on its lower end with a slot 102 through which a pin 103 in the projecting lug 104 of the head 96 extends. The opposite end of the link 99 is provided with a slot 105 in which a pin 106 projects, which pin is mounted in off center relation to a shaft 107 of a motor 108. The eccentric location of the pin 106 causes the link 99 to oscillate and to thereby rapidly oscillate the head 96. The housing 98 is supported on a carriage 109 which operates in ways 111 supported by a second carriage 112 which is operated in ways 113 at right angles to the ways 111. The carriage 109 is actuated by suitable means herein illustrated as a lead screw 114, while carriage 112 is illustrated as being actuated by a lead screw 115.

In operation, the motor 95 drives the work piece 93 in rotation at a predetermined speed relative to the oscillation of the honing stone 91 controlled through actuation of rheostats 49 as illustrated in Fig. 3. The stone is moved into predetermined relation to the surface 92 of the work piece 93 by the operation of the lead screw 115 to move the carriage 112 downwardly toward the work piece. During the abrading operation, the honing stone 91 and work piece 93 are fed relative to each other axially of the latter to have the abrading operation spread over the entire length of the surface to be machined. In the structure illustrated, the operation of the

lead screw 114 moves the carriage 109, and therefore, the abrading stone 91, along the surface 92 parallel to the axis of the work piece 93. In this manner, a very accurate and highly polished surface is provided, which surface is known in the art as a "mirror finish."

While I have described and illustrated but a single embodiment of my invention, it will be apparent to those skilled in the art that various changes, omissions, additions and substitutions may be made therein without departing from the spirit and scope of my invention as set forth in the accompanying claim.

What I claim is:

In an abrading device for finishing the external surface of a cylindrical object, including, in combination, a slide movable normal to the axis of the workpiece, a slide movable parallel to the axis of said workpiece, a pivotal lever on said first slide for reciprocating said second slide, a concave grinding block supported in said second slide for oscillation by said lever parallel to the axis of the workpiece, means for oscillating said lever, and means for rotating said workpiece.

KIRKE W. CONNOR.