A. C. BOYLE, JR.

GRINDING AND POLISHING MACHINE.

APPLICATION FILED JAN. 15, 1915.

1,182,137. Patented May 9, 1916.

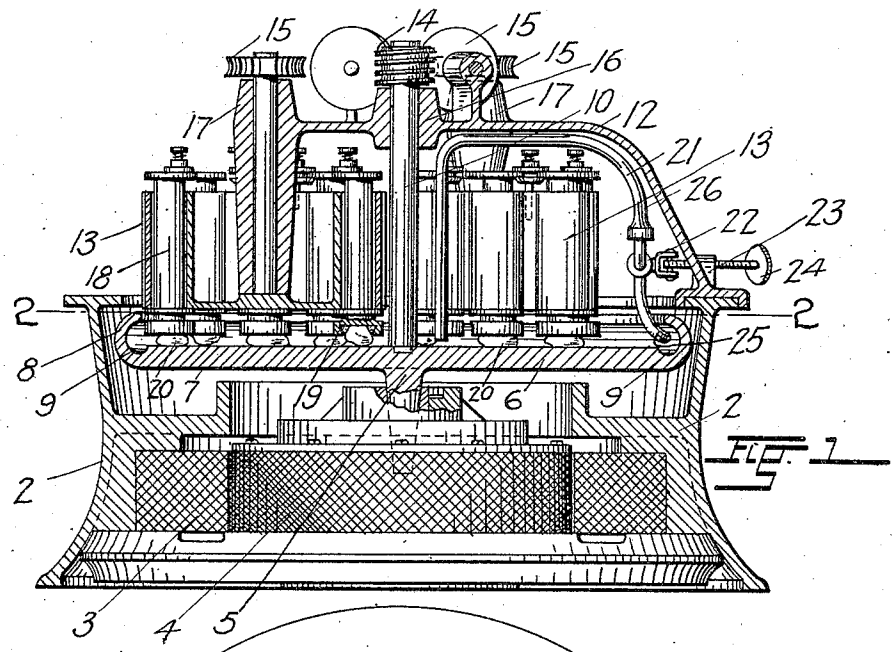


FIG. 1

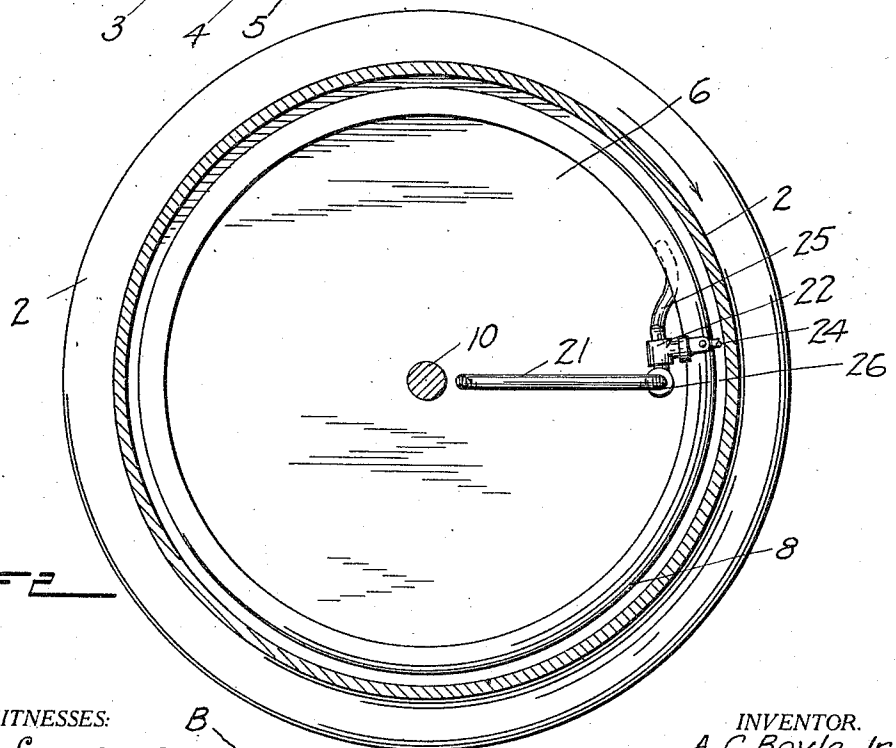


FIG. 2

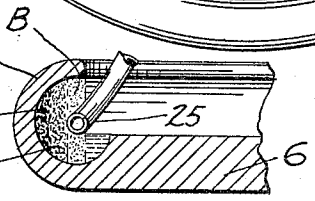


FIG. 3

WITNESSES:

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ALBERT C. BOYLE, JR., OF LARAMIE, WYOMING.

GRINDING AND POLISHING MACHINE.

1,182,137. Specification of Letters Patent. Patented May 9, 1916.

Division of Patent No. 1,134,944, issued April 6, 1915, Serial No. 696,176, filed May 9, 1912. This application filed January 15, 1915. Serial No. 2,350.

To all whom it may concern:

Be it known that I, ALBERT C. BOYLE, Jr., a citizen of the United States, residing at Laramie, in the county of Albany and State of Wyoming, have invented certain new and useful Improvements in Grinding and Polishing Machines, of which the following is a specification.

This invention relates to improvements in grinding and polishing machines and more particularly in machines of the type shown and described in my U. S. Patent No. 1,134,944, issued April 6, 1915, of which the present application is divisional.

The principal object of the present invention is to provide in a machine of the character stated, a lap-wheel of novel construction and therewith coöperative means which permit of the selection of different kinds of abrasive material while the machine is in operation and which automatically conveys the selected abradant to the point at which the grinding action takes place, after it has been impelled by centrifugal force toward the peripheral portion of the wheel.

By the use of my invention the abrasive material is automatically and continuously supplied to the points of the grinding surface of the wheel at which it engages the specimens or other articles under treatment.

Different kinds of abrasive material are automatically classified according to their specific gravity and the sizes of their solid constituents. The selection of the abrasive material during the movement of the wheel makes it possible to effect coarse and fine grinding and consequent rapid and slow execution of the work while the machine is in operation, and the necessity of supplying fine abrasive for final grinding after the machine has been in operation for some time, is avoided.

As the liquid originally fed onto the wheel, is used over and over again, the machine is economical in this respect as well as in the use of grinding material. The machine requires little or not attention and dry grinding and its detrimental results on the frictionally engaging substances is completely avoided.

In the accompanying drawings in the various views of which like parts are similarly designated, Figure 1 is a vertical section through my improved grinding machine, Fig. 2, is a horizontal section taken along the line 2—2, Fig.1, and Fig. 3 a section through the peripheral portion of the lap wheel employed in the machine, showing the recessed rim in which the abrasive powders and liquids are classified by centrifugal force, and the adjacent portion of the means by which these classes are separately returned to the working part of the grinding surface.

The grinding machine as shown in the drawings, comprises a hollow base 2 in which are mounted for coöperation, the annular stator 3 and the rotor 4 of an electric motor.

The rotary element of the motor which is supported for movement about a vertical axis, has an axial angular socket in which is fitted the correspondingly formed shank 5 of the lap-wheel 6 which consists of a circular disk 7 surrounded by an upwardly curving, interiorly concave rim 8 and which is provided in adjacency to said rim with a concentric shallow circular depression 9. A shaft 10 erected upon the lap in the vertical axis of the same is rotatably fitted in a bearing 16 which forms part of a spider 12 supported upon the rim of the base 2.

Cylindrical specimen carriers rotatably mounted in bearings 17 on the same spider are operatively connected with the shaft by means of transmission devices 14 and 15 of the gear-and-worm type, applied at their upper ends. The carriers consist of cylindrical shells provided with peripheral equidistant recesses in which spring-pressed specimen holders 18 are mounted for vertical movement. The holders are at their lower ends provided with suitable means such as the chucks 19 shown in the drawings, for securing the specimens 20 or other articles to be ground by the action of the lap-wheel with which they are in engagement.

A conduit 21 composed of two tubular members which are connected by means of a union 22, is adjustably mounted upon a block 23 secured upon the rim of the base. The adjustable connection of the conduit with the block is effected through the medium of an adjusting screw 24 which extends through a threaded opening in the block and which has a swivel connection with the union 22. The lower member 25

of the conduit has its lower portion bent in a direction opposite to that in which the lap-wheel rotates, the open end of the said portion extending within or in close proximity to the concavity of the rim 8. The upper member 26 of the conduit extends from the union upwardly in the direction of the shaft of the lap 10, and at a point adjacent the same, downwardly to a point in close proximity to the central portion of the grinding surface of the wheel.

In the operation of the grinding machine, the specimens secured at the lower ends of the holders on the carriers 13, are by spring pressure as well as by gravity, maintained in frictional engagement with the upper or grinding surface of the lap-wheel. The motor mounted in the base of the machine imparts through the medium of its rotor, a rotary movement to the lap-wheel about its vertical axis and it effects simultaneously through the intermediary of the transmission devices operatively connected with the upper end of the shaft 10, rotary movements to the carriers. The specimens at the ends of the holders are thus moved across the lap in circular paths while the lap itself rotates about its axis in the direction of the arrow shown in Fig. 2, with the result that the specimens are presented to the grinding force in an infinite number of positions, and every part of each specimen, irrespective of its structure, will thus at one time or another be subjected to the grinding or polishing action of the abradants on the lap.

At the initial point in the operation of the machine, a suitable pulverulous abradant is supplied together with a liquid, to the grinding surface of the lap wheel. As the lap-wheel rotates at a comparatively high rate of speed, the materials are after their action upon the specimens with which the lap engages, impelled by centrifugal force to the periphery of the wheel and into the concavity of its upwardly curving rim. The constituents of the material are by the same force classified in concentric layers within the concavity in accordance with their different specific gravities, the coarsest matter being outermost as shown at A in Fig. 3, the lightest material, innermost as at B, and the matter of intermediate size or weight at points between the two extreme layers as indicated at C.

During the rotary movement of the lap, the matter in which the end of the conduit member 25 extends, is drawn into and through the conduit 21 to be delivered through the orifice of the member 26 onto the central portion of the grinding surface of the wheel, and by changing the position of the member 25 with relation to the rim of the wheel by adjustment of the screw 24, its extremity may be placed within any one of the layers of abrasive matter within the concavity of the rim and the character of the abradant which by means of the conduit is continuously fed onto the central portion of the grinding surface may thus be readily varied in accordance with the requirements of the specimens under treatment.

The amounts of the abradant and liquid supplied to the central portion of the lap-wheel through the conduit 21 must necessarily be proportionate to the rate at which it is used at the points at which the grinding action takes place, and while in the drawings but one conduit has been shown, it will be understood that if so desired, two or more conduits may be similarly mounted on the machine to simultaneously feed the abrasive and the liquid onto the central portion of the lap-wheel.

From the above description it will be seen that by the use of my improved lap-wheel and the therewith coöperative feeding means, abradants of different degrees of coarseness or hardness, selected while the machine is in operation, are automatically and continuously supplied to the part of the lap-surface at which the grinding action takes place.

Having thus described my invention what I claim and desire to secure by Letters-Patent is:

1. In a grinding and polishing machine, a rotary lap-wheel having a peripheral recess to retain material impelled across its face by centrifugal force, and adjustable means adapted to automatically convey matter from a selected point in said recess, to a more central portion of the said face.

2. In a grinding and polishing machine, a rotary lap-wheel having a peripheral recess to retain material impelled across its face by centrifugal force, and a conduit having an inlet within said recess and an outlet nearer the central portion of the said face.

3. In a grinding and polishing machine, a rotary lap-wheel having a peripheral recess to retain material impelled across its face by centrifugal force, a conduit having an inlet within said recess and an outlet nearer the central portion of the said face, and adjusting means for varying the position of the inlet within the recess.

4. In a grinding and polishing machine, a rotary lap-wheel having an upwardly extending rim for retaining matter impelled across its face by centrifugal force, and means adapted to automatically convey matter retained by said rim to a point nearer the center of the said face.

5. In a grinding and polishing machine, a rotary lap-wheel having an upwardly extending rim for retaining matter impelled across its face by centrifugal force, and a

conduit having an inlet adjacent said rim and an outlet nearer the center of the said face.

6. In a grinding and polishing machine, a rotary lap wheel having an upwardly extending rim for retaining matter impelled across its face by centrifugal force, and adjustable means adapted to automatically convey matter retained by said rim, from a selected distance from the same to a point nearer the center of the said face.

7. In a grinding and polishing machine, a rotary lap-wheel having an upwardly extending rim for retaining matter impelled across its face by centrifugal force, and a conduit having one of its ends extending adjacent said rim in a direction opposite to that in which the lap wheel rotates and having its opposite end disposed nearer the center of the said face.

8. In a grinding and polishing machine, a rotary lap-wheel having an upwardly extending rim for retaining matter impelled across its face by centrifugal force, a stationary bearing, an adjusting screw movably mounted thereon, and a conduit supported on said screw and having an inlet adjacent said rim and an outlet nearer the center of the said face.

9. In a grinding and polishing machine, a rotary lap-wheel having an upwardly extending rim for retaining matter impelled across its face by centrifugal force, and a conduit having one of its ends extending adjacent said rim, and at its said end an inlet face opposite to the direction in which the lap-wheel rotates and having its opposide end disposed nearer the center of the said face.

10. In a grinding and polishing machine, a rotary lap-wheel having a peripheral recess to retain material impelled across its face by centrifugal force, and a conduit having an inlet within the recess and an outlet nearer the center of the said face, the said conduit being adjustable to vary the position of an end thereof in a substantially horizontal plane with relation to the center of the wheel.

11. In a grinding and polishing machine, a rotary lap-wheel having a peripheral recess to retain material impelled across its face by centrifugal force, and a conduit having an inlet within the recess and an outlet nearer the center and adjacent the surface of the said face, the said conduit being arched to permit of the passage of articles between its ends during rotation of the wheel.

12. In a grinding and polishing machine, a rotary lap-wheel having an upwardly extending and interiorly concave rim for retaining matter impelled across its face by centirifugal force, and means adapted to automatically convey matter retained by said rim, to a point nearer the center of the wheel.

13. In a grinding and polishing machine, a rotary lap-wheel having an upwardly extending and interiorly concave rim and adjoining the same, an annular depression for retaining matter impelled across its face by centrifugal force, and means adapted to automatically convey matter retained by said rim, to a point nearer the center of the wheel.

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

ALBERT C. BOYLE, JR.

Witnesses:

BEVERLEY C. DALEY,

ARTHUR C. JONES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."