May 18, 1926. 1,585,515

E. V. SCHAAL

MECHANICAL SPECIMEN POLISHING DEVICE

Filed June 29, 1921 2 Sheets-Sheet 1

Fig. 1.

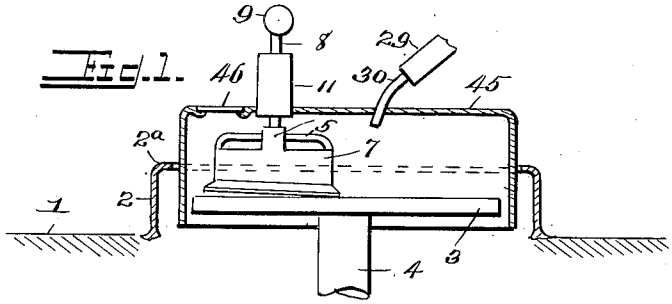


Fig. 2.

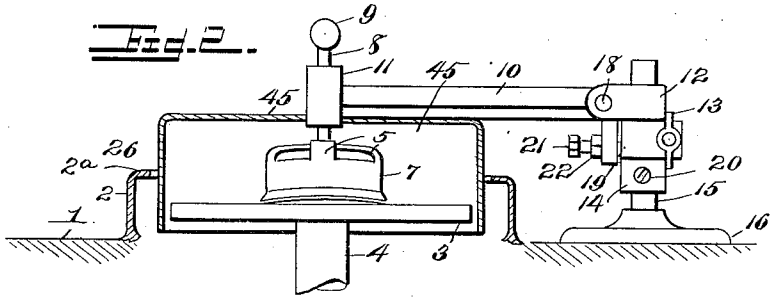
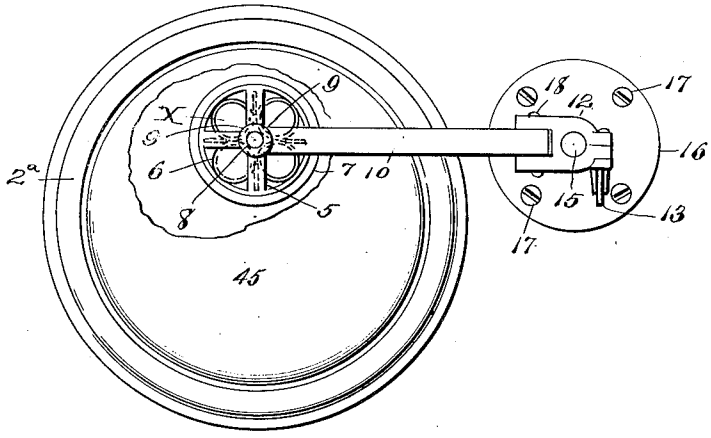


Fig. 3.



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Fig. 4.

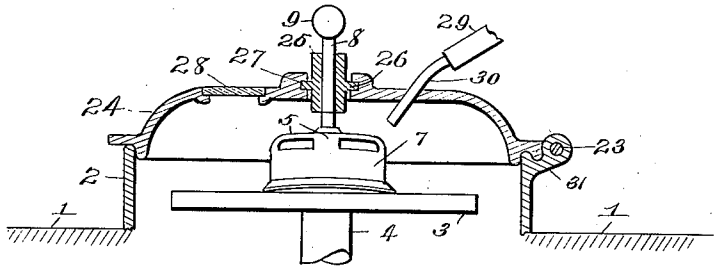


Fig. 5.

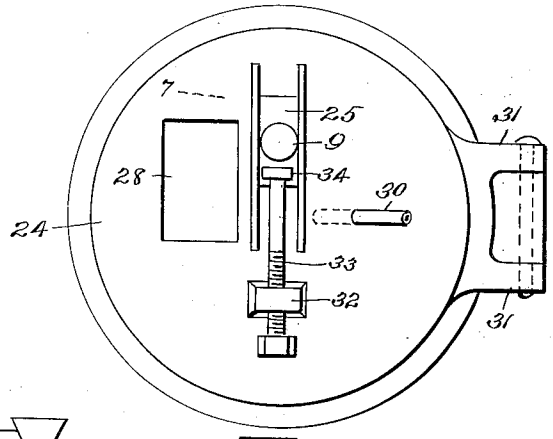
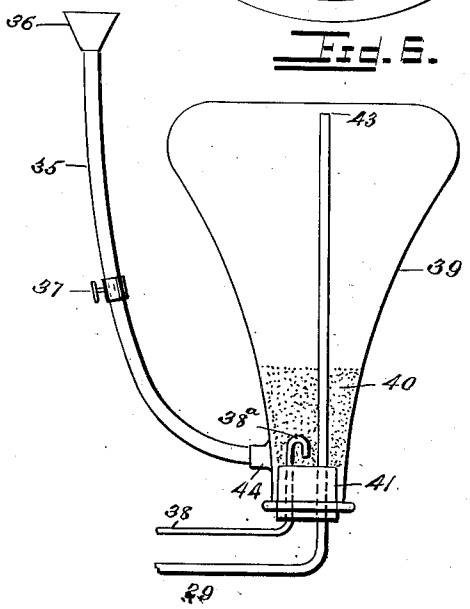


Fig. 6.



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UNITED STATES PATENT OFFICE.

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MECHANICAL SPECIMEN-POLISHING DEVICE.

Application filed June 29, 1921. Serial No. 481,321.

This invention relates in general to mechanical specimen holders for metallurgical polishing wheels and more particularly to such a device as may be capable of easy adjustment of the speed of rotation of the polishing wheel.

It is proposed to provide a device for retaining metallurgical specimens on a polishing wheel, or disc, which rotates about a vertical axis, the device being essentially an inverted cup, mounted on a spindle and tilted in such a manner as to cause its rim to rest, under its own weight only, on the polishing wheel at only one point, namely, the lowest point on the rim of the tilted cup member.

It is an object of my invention to provide a novel and improved means for highly polishing metallurgical specimens. Such specimens must be very carefully treated when it is desired to examine them minutely for signs of crystallization or breaking down of the metal. While my device is disclosed as a polishing machine for polishing metallurgical specimens, it is by no means limited to such use but is capable of ready adaptation to polishing specimens of any material.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention, the specific illustration of which appears in the attached drawings in which:

Fig. 1 is a view in section through the splash pan, showing the cup in proper tilted relation with the polishing wheel.

Fig. 2 is a view in section through the splash pan and bench showing in side elevation the cup and also the lever and hinge members for adjustment thereof, and a dust cover for the cup and polishing wheel.

Fig. 3 is a top plan view of the device showing diagrammatically the specimens within the retainer.

Fig. 4 is a view similar to Fig. 1, showing a modified form of the device with a cover therefor.

Fig. 5 is a top plan view of the modification shown in Fig. 4.

Fig. 6. is a diagrammatical view of the apparatus for mixing the powdered polishing material in water solution.

Referring more particularly to the drawings, 1 represents a work bench to which is attached a circular splash pan 2 with an inturned rim flange 2^a. Integrally mounted on a shaft 4 and adapted to rotate therewith is a circular polishing wheel or disc 3 with a substantially flat upper surface. Slidably and rotatably mounted in a collar member 11, is a spindle 8, having screw threads at one end to receive a spindle knob 9, and at the other end to receive a cup or specimen retainer, 7.

Integral with said collar 11 is a spindle support arm 10 extending horizontally and terminating within the recess between the two arms of the hinge block 12 and retained therein by a bolt 18. Also mounted on the bench 1, is a plate 16, attached thereto by bolts or screws 17, and adapted to support the standard 15 upon which the hinge block 12 is mounted. Also mounted on the standard 15 is a supporting collar 14 provided with a set screw 20, and adapted to support the hinge block 12 provided with a winged clamp screw 13 to retain the arm 10 in adjusted lateral position and an arm 19 depending from said arm 10, and provided with a cap screw 21 and lock nut 22 for the purpose of retaining said arm 10 in adjusted horizontal or tilted position.

As more clearly shown in Fig. 3, the cup or specimen retainer consists of an inverted cup shaped member 7, provided with four radially extending arms 5 and adapted to carry a plurality of hollow cylindrical members 6 for retaining the specimens X.

The point of bearing of the tilted rim of the cup 7 upon the rotating polishing wheel 3 is near the center of the wheel, and is a means of rotating the cup in either direction and at a variable speed irrespective of that of the wheel by suitable adjusting means to be described. The specimens X to be polished, having previously been properly mounted, rest on the wheel 3 by their own weight only, and are retained by the cup. The result of the rotation of the polishing wheel is the rotary motion of the specimens X about the axis of the cup.

In case of very small specimens, it is often found necessary to mount them in a soft metal moulded in the shape of a cylinder or elliptical cylinder of the proper size before placing same in the cup. The spindle 8 of

the cup 7 has its bearing in a member 11 engaged to a stationary part of the polishing machine in such a manner as to allow lateral adjustment of the cup as well as vertical adjustment for the purpose of inserting or removing the specimens from the cup member.

It is found advisable at times to provide a cover for the device in order to prevent dust particles from collecting on the wheel. It is readily seen that the presence of dust particles on the wheel would cause scratches to appear on the specimen during the polishing process. With this object in view, a cover 45 is provided, said cover being attached in any suitable manner to collar member 11. The cover 45 is of the shape of an inverted vessel and provided at its closed end with an aperture to receive the collar 11 to which it is secured, a sufficient clearance being provided between its lower rim and the splash pan to allow it to be swung out away from said splash pan 2 when the cup 7 is removed from the polishing wheel 3. Cover plate 45 is further provided with an inspection window 46, for the purpose of watching the specimens during the polishing process. A tube 30 is extended through and attached to cover plate 45, and is adapted to receive a flexible hose member 29 for the purpose of conveying an abrasive material suspended in a suitable liquid from the mixing apparatus (to be described) to the polishing wheel 3. The abrasive material will hereinafter be referred to as "abrasive mixture."

Referring more specifically to the embodiment illustrated in Figs. 4 and 5, 2 represents a splash pan to which is hinged a cover 24 by means of a bolt 23 passing through the two arms 31 and through a projection of the splash pan as shown in Fig. 5. Cover plate 24 is provided with a centrally located aperture and is also provided with a radial groove 27 adapted to receive laterally extending lugs 26 on the bearing member 25. Slidably and rotatably mounted within the member 25 is a spindle 8, having a cup 7 attached at one end and a spindle knob 9 at the other end. A glass window 28 may be inserted at any convenient point in the cover plate 24 for the purpose of watching the specimens during the process of polishing.

For the purpose of adjusting the position of the cup upon the polishing wheel the sliding bearing member 25 is provided with a raised interiorly screw threaded portion 34 adapted to receive a screw threaded bolt 33 which also passes through a block 32. In order to shift the cup it is only necessary to rotate the adjusting screw threaded bolt 33 until the desired position is attained.

When in readiness for operation the polishing wheel must be provided a polishing material. Such polishing materials as finely divided particles of alumina, tripoli, or magnesia, in suspension in water, have been found satisfactory for this purpose. This abrasive mixture is fed through a flexible tube 29 to a rigid tube 30 arranged in the cover plate 24, and is finally brought into contact with the polishing wheel 3, as shown in Fig. 5.

Fig. 6 illustrates an improved method for mixing the polishing powder in a water solution. The polishing powder 40 is placed in a funnel shaped glass flask 39 and is retained therein by a stopper 41. The flask 39 is provided with a water inlet 44 to which is attached a flexible filling tube 35. For subsequent additions to the supply of powder, more powder, mixed with water may be poured into the funnel 36 through tube 35 provided with a cock 37, and into the flask 39. As the water bubbles up through the powder 40, carrying with it only the most finely divided particles of the powder, through the outlet 43 to the tube 29 through an aperture in the stopper 41, water is forced through tube 38, said tube terminating in a hook 38^a to prevent the tube from becoming clogged.

The operation of the device will be easily understood from the foregoing description. The metal to be examined under the microscope is, after preliminary preparation, placed in the retaining cup. The polishing wheel is provided with polishing solution and rotated. The cup is then adjusted laterally at any desired distance from the center of the polishing wheel. The cup is so tilted that it rests, under its own weight only, on the polishing wheel in such a manner that the only point of bearing of the cup on the wheel is the one contacting point of the tilted rim of the cup. The cup is therefore rotated in either direction by adjustment of the tilted rim to either side of the center of the wheel and the speed of rotation of the cup depends upon the proximity of the point of loose engagement of the tilted rim and the wheel, to the center of the wheel. As this contact approaches the wheel's center, the speed of rotation of the cup is lessened, and as said point of contact departs from said center, the speed of rotation of the cup is accordingly increased. The lateral shift of the cup with relation to the center of the wheel and means for accomplishing same has already been described. The specimens are thus caused to rotate about the axis of the cup and at the same time are free to turn about their own axes since they are loosely retained within the retaining members 6. By shifting the point of contact of the tilted rim with respect to the wheel from one side of the center thereof to the other side, an opposite direction of rotation of the cup is attained.

In accordance with the provisions of the patent statutes, I have described the prin-

ciple of operation of my invention, together with the apparatus which I now disclose as the specific embodiments thereof, but desire to have it understood that I do not wish to so limit the scope of my invention, in which I claim:

1. In a device for polishing specimens, a rotatable polishing wheel, a cup-shaped retainer for said specimens, said retainer being rotatably and vertically slidably mounted on a frame supported spindle in such a manner as to cause the retainer to bear on said wheel in tilted relation therewith, said wheel being adapted to impart a rotary motion to said retainer and of the said specimens therein relative to said container, and means for adjusting the position of said retainer with relation to the center of said wheel for the purpose of regulating the speed of rotation of said retainer.

2. In a device for polishing specimens, a polishing wheel, a cup-shaped member comprising a plurality of compartments for retaining said specimens, said cup member being mounted upon a spindle disposed at an angle to the vertical so as to cause the cup member to bear, under its own weight, in tilted relation with and upon said polishing wheel, said cup and said specimens being adapted to be rotated by said wheel, and means for adjusting said cup laterally and vertically with relation to said wheel.

In testimony whereof I affix my signature.

EARL V. SCHAAL.