J. J. McINTYRE,
BALL GRINDING MACHINE,
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UNITED STATES PATENT OFFICE.

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BALL-GRINDING MACHIN.


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To all whom it may concern:

Be it known that I, John J. McEntyre, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented a new and useful Improvement in Ball-Grinding Machines, of which the following is a specification.

This invention relates to the means employed for pressing one toward the other of the cooperative plates or disks of machines devised for grinding or lapping or finishing metallic balls.

In a common type of such machines the balls to be ground, lapped or finished are fed between two plates or disks, one of which has a rotatory movement for rolling the balls between the plates and the other a reciprocatory movement for applying the required pressure to the balls being rolled between the plates. Spring and weights have been found unreliable for imparting the required pressure to the reciprocatory plate. Oil and similar liquids under pressure have been found unsatisfactory, due to leakage and waste resulting from the impossibility of keeping the joints between the moving parts tight owing to the variation of the moving parts and the rolling process.

Compressed air alone is of little practical value as the moisture contained therein rusts the surfaces and causes the moving parts to bind and become inoperative.

The object of the present invention is to provide a pneumatic system for producing the required pressure on the balls between the rolling plates, which is supplied with means whereby a vapor or spray of oil is injected with the air into the cylinder back of the piston so as to keep the parts in good operative condition without the waste and the other disadvantages of leaking oil and the necessity of providing a pumped lubricating circulation.

The figure of the accompanying drawings shows a side elevation with parts cut in section of a ball grinding machine which is provided with the features of this invention.

In the machine illustrated the rotatory disk 1 with grinding or lapping face 2 of usual form and material is fixed upon the shaft 3 that is provided with a driving pulley 4 and is mounted in bearings in the top of the standard 5.

The non-rotatory disk 6 with operating face 7 of usual form and material is secured to the end of a piston 8 that is free to reciprocate in the cylindrical casing 9 at the top of the standard 10. This disk which is free to reciprocate with the piston may be held from rotation by the engagement of a stud 11 that projects from the back of the disk into engagement with a bracket 12. The piston shown has a cylindrical chamber 13 and extending into this chamber is a circular hub 14 that projects from the cap 15 which is bolted to the end of the casing.

Packing rings 16 are placed in grooves in the hub to keep the joint between the inner wall of the piston and the outer wall of the hub tight. In the hub is a chamber 17 and projecting into the chamber from the hub chamber is an injector nozzle 18. Entering the outer end of the hub and communicating with the chamber therein is a pipe 19 provided with a stop valve 20 of common form. This pipe is designed to be connected with any convenient source of air under pressure. Communicating with the pipe 19 between the valve and the hub is a pipe 21 which is provided with a stop valve 22 and at its upper end has an open receptacle 23.

In using this apparatus a desired quantity of oil is poured into the receptacle, the air inlet valve 20 is closed and the exhaust valve 22 is opened. Under these conditions the oil will flow from the receptacle down through the piping to the chamber in the hub. The exhaust valve 22 is then closed and the air inlet valve 20 is opened to admit the necessary amount of compressed air to force the reciprocatory piston and non-rotating disk forward and give the required pressure on the balls between the plates. As the compressed air passes through the hub over the oil in the hub chamber it picks up a small quantity of oil and disperses it from the injecting nozzle in the form of a vapor or fine spray which coats the interior of the piston chamber with a film of oil that will keep the parts in good working condition.

After the rolling of the balls is completed the air inlet valve is closed and the exhaust valve is opened allowing air from the piston chamber to escape through the oil receptacle and thus relieve the pressure on the chamber piston and balls between the rolling disks. But little lubricant is used and as often as that which is let into the chamber in the hub becomes exhausted by being sprayed into the piston and carried out by the exhaust.
of the air, the supply in the hub chamber may be renewed, as above described, by filling the oil receptacle and allowing the oil to flow down through the exhaust opening.

5 The invention claimed is:

1. A ball grinding machine having a rotary disk, a reciprocatory disk, a piston attached to the reciprocatory disk, means for admitting air under pressure to the back of the piston, and means for injecting oil with the air back of the piston.

2. A ball grinding machine having a rotary disk, a reciprocatory disk, a chambered piston attached to the reciprocatory disk, a casing enclosing the piston, said casing having an air and oil inlet opening through it to the chamber in the piston, and means for admitting oil and air to said opening in the casing and the chamber in the piston.

3. A ball grinding machine having a rotary disk, a reciprocatory disk, a chambered piston attached to the reciprocatory disk, an enclosing case having a chambered hub extending into the piston, said chamber in the hub communicating with the chamber in the piston, means for admitting oil to the chamber in said hub, and means for admitting air under pressure to said chamber.

4. A ball grinding machine having a rotary disk, a reciprocatory disk, a chambered piston attached to the reciprocatory disk, a duct for admitting air under pressure to the chamber in the piston, and means for admitting oil to and allowing air to escape from said duct.

5. A ball grinding machine having a rotary disk, a reciprocatory disk, a chambered piston attached to the reciprocatory disk, an enclosing case, a cap closing the end of the case, a chambered hub projecting from the cap into the piston, a nozzle extending from the chamber in the hub into the chamber in the piston, an air inlet pipe communicating with the chamber in the hub, an oil inlet and air exhaust pipe communicating with the air inlet pipe, and stop valves for opening and closing the air and oil pipes.

6. A ball grinding machine having ball rolling disks, a piston for moving one disk toward and from the other disk, a casing enclosing the piston, an oil chamber with means for admitting oil thereto in the casing, and means for admitting air under pressure through said oil chamber into the casing back of the piston.

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