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⑸ Polishing machine.

⑸ A polishing apparatus comprises a rotatable table 10 on which the article to be polished 12 is mounted. An arm 18 carrying a rotatable polishing head 20 of abrasive material is mounted above the table 10 and is capable of being traversed towards and away from the table. The mounting of the polishing arm includes a pivot 28 so that the arm may be tilted under the action of a fluid operated cylinder 34 whereby to bring the polishing head 20 into contact with the surface to be polished 16. The fluid operated cylinder, preferably a pneumatic cylinder, is connected into a fluid circuit having a pressure regulator in its outlet so as to apply constant pressure to the arm 18.

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POLISHING MACHINE

This invention relates to a polishing machine and in particular to a machine for polishing the internal surface of a mould.

Metal moulds, for example moulds for glassware,
5 often require to have their internal mould surfaces smoothly finished. This can be accomplished by means of a polishing machine on which an operative applies manual pressure to an arm having a rotating polishing head which is traversed up and down the internal
10 surface of a mould. A high degree of skill is required in order to provide the correct pressure and produce a correctly polished product. In an attempt to automate this process, it has been proposed to provide a polishing machine in which the arm carrying the polishing
15 head is spring-biased so as to cause the polishing head to bear against the internal mould surface without manual pressure but this suffers from the disadvantage that the spring pressure varies according to the degree of tilt on the polishing arm which in turn varies
20 according to the shape of the inner mould surface so that the polishing effect is not even over the whole of the mould surface.

The present invention seeks to provide an automatic polishing machine improved in these respects.

25 In accordance with the present invention there is

provided a polishing apparatus which comprises a rotatable table upon which the article to be polished is mounted, an arm carrying a rotatable polishing head mounted above the rotatable table and capable of being traversed towards and away from the table, the mounting of the polishing arm including a pivot so that the arm may be tilted under the action of a fluid-operated cylinder whereby to bring the polishing head into contact with the surface to be polished, the fluid-operated cylinder being connected into a fluid circuit having a pressure regulator in its outlet.

The fluid-operated cylinder and associated circuit may be a hydraulic or pneumatic circuit, and is preferably the latter. By connecting the pressure regulator to the outlet or exhaust of the circuit the pressure in the cylinder is maintained constant and so the pressure applied to the polishing head through the arm also remains constant irrespective of the position of the arm and so the polishing action applied to the surface to be polished is uniform regardless of the shape of that surface.

The invention will be described further, by way of example, with reference to the accompanying drawing, which is a partial side view, partially in section, of an apparatus in accordance with the invention.

Referring to the drawing, polishing apparatus comprises a rotatable table 10 on which a work piece, in this case a glass mould 12 may be mounted by means of clamps 14. The internal surface 16 of a mould is the surface to be polished and this will generally not be plain cylindrical.

Mounted above the rotating table 10 is a polishing arm 18 carrying a polishing head 20 of abrasive material mounted in a chuck 22 driven from a motor 24, through a suitable belt drive (not shown) in order to rotate

the polishing head 20. The chuck and motor are mounted on a swinging bracket 26 pivotally attached at 28 to a carriage 30. The carriage is slidably mounted on vertical rods 32 and is driven by means not shown in the drawings to traverse down and up towards and away from the rotating table 10 respectively. Between the bracket 26 and the carriage 30 is mounted an air cylinder 34 which, when pressurised, will tilt the bracket 26 about the pivot 28 thereby moving the polishing arm 18 in the direction of arrow A, and thereby bringing the polishing head 20 into contact with the internal surface 16 of the article 12 to be polished.

The operation of the device is as follows. The article 12 is mounted on a rotatable table 10 as shown in the drawings and the carriage 30 traverses downwardly until the polishing head 20 is level with the lowest part of the internal surface 16 to be polished. Pressure is applied to the cylinder 34 thus tilting the bracket 26 and therefore the polishing arm 18 bringing the head 20 into contact with the internal surface 16. The motor 24 rotates the arm 18 and therefore the head 20 causing the abrasive head 20 to polish the portion of the surface 16 contacted. The table 10 is rotated ensuring that the whole circumference of the internal surface 16 is polished evenly. At the same time the carriage 32 is slowly traversed upwards so that the whole length of the internal surface is also polished. As the internal configuration of the article 12 changes, the arm 18 tilts following the internal contours of the surface 16. The cylinder 34 has an air pressure regulator on its outlet or exhaust side which can be preset at a desired pressure, for example 20 psi gauge. This ensures that the pressure within the cylinder is constant at the set regulated pressure and that the force applied through the arm 18 between the polishing head 20 and the internal surface 16 is also constant irrespective

of the degree of tilt (and therefore the internal configuration of the surface 16) of the arm 18. Limit switches can be provided so that the carriage 30 traverses up and down either indefinitely or for a given number of movements so that the apparatus, once set, can be left to run automatically without needing a skilled operator or even any attention at all in between changing work pieces 12.

The apparatus of the invention, operating under constant pressure gives an extremely even polish to the work piece and does not rely on operator skill in order to achieve this.

The speed of rotation of the table 10 and of the arm 18 are preferably infinitely variable between zero and maximum, and are furthermore preferably variable independently of one another so that different combinations of arm rotation and table rotation can be selected to suit particular conditions. One particular advantage of this is that 'our-of-round' cavities can be polished provided the speed of rotation of the table is slowed down within the response time of the swinging bracket 26 and air cylinder 34, so that the arm 18 and more particularly the polishing head 20 can accurately follow the contours of the cavity. This enables the apparatus of the invention to be extremely versatile in operation, and it can tackle many polishing jobs which would have taken a great deal of skill and difficulty to accomplish hitherto. Naturally, the shape of the cavity 16 to be polished should not contain any reentrant surfaces since the rotation of the table 10 would cause such to be passed over by the polishing arm 18.

CLAIMS

1. A polishing apparatus which comprises a rotatable table upon which the article to be polished is mounted, an arm carrying a rotatable polishing head mounted above the rotatable table and capable of being traversed towards and away from the table, the mounting of the polishing arm including a pivot so that the arm may be tilted under action of a fluid operated cylinder whereby to bring the polishing head into contact with the surface to be polished, and the fluid operated cylinder being connected into a fluid circuit having a pressure regulator whereby to ensure that the pressure applied to the polishing arm is constant.
2. An apparatus as claimed in claim 1 in which the pressure regulator is in the outlet of the fluid circuit.
3. An apparatus as claimed in either of claims 1 or 2 in which the fluid operated cylinder is a pneumatic cylinder.
4. An apparatus as claimed in any one of claims 1 to 3 in which the rotatable table and rotatable polishing head may be rotated at independently selected speeds.
5. An apparatus as claimed in any one of claims 1 to 4 in which the polishing arm is mounted so as to traverse up and down towards and away from the rotatable table.
6. An apparatus as claimed in claim 5 wherein limit switches are provided so as to set the number of traverses of the polishing arm.

7. An apparatus as claimed in any one of claims 1 to 6 in which the polishing head comprises an abrasive material.

