April 5, 1966 F. J. RADEMACHER 3,244,162

GRINDING WHEEL DRESSING MEANS AND PROCESS

Filed Oct. 27, 1964 2 Sheets-Sheet 1

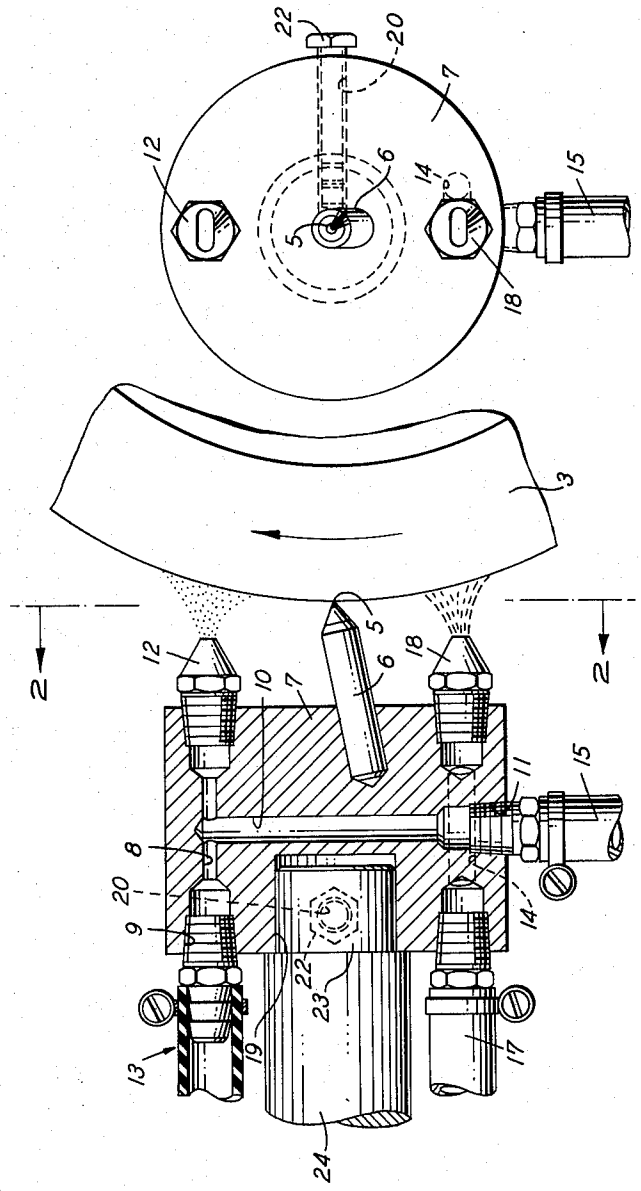

FIG. 2

FIG. 1

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GRINDING WHEEL DRESSING MEANS AND PROCESS

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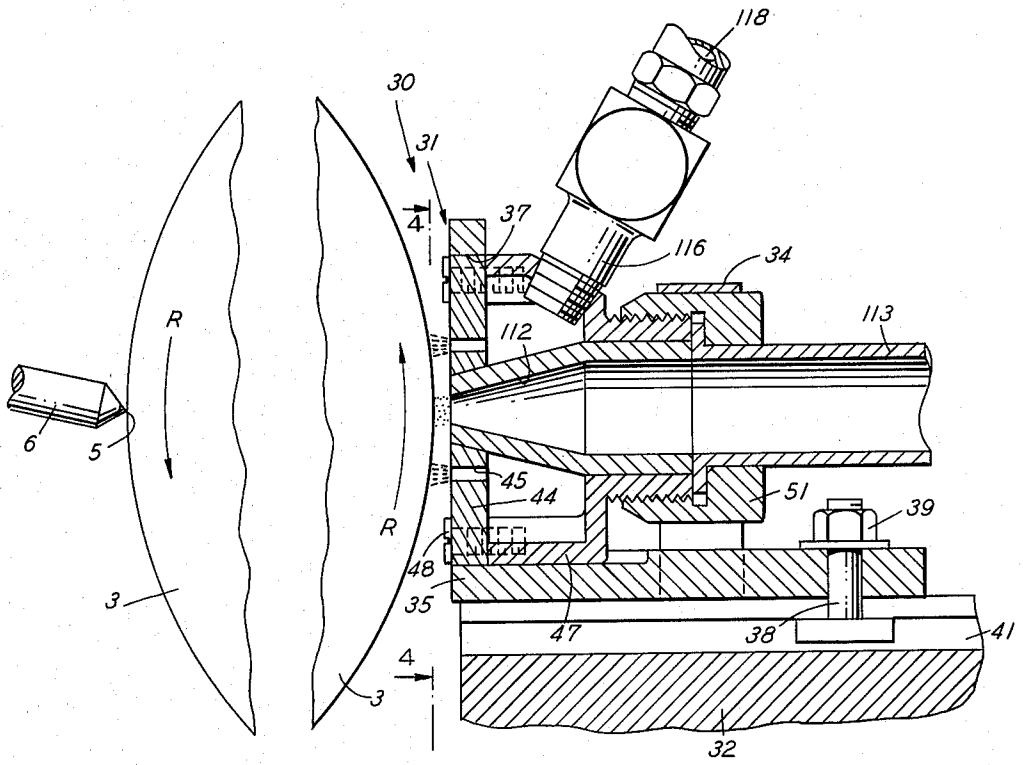

FIG. 2

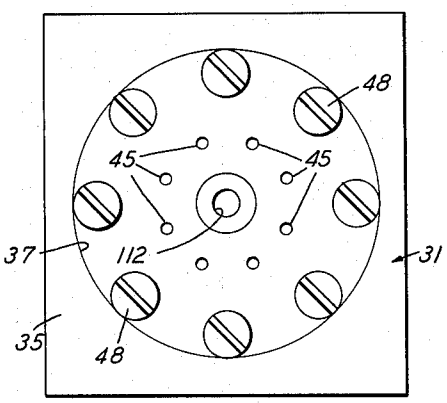

FIG. 4

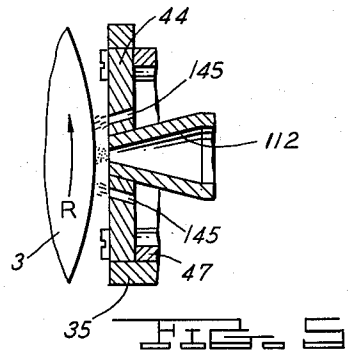

FIG. 5

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GRINDING WHEEL DRESSING MEANS AND PROCESS

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11 Claims. (Cl. 125—11)

This application is a continuation-in-part of application Serial No. 278,182, filed May 6, 1963, now abandoned.

This invention relates to improvements in means and process for dressing grinding wheels.

In the grinding and polishing industry workpieces of metallic and other materials are acted upon by coarse and fine grained abrasive wheels, the wheel surfaces become clogged with workpiece particles which progressively reduce the grinding and polishing efficiency. It has been the practice in the art to apply wire brushes and/or sharp pointed tools, such as diamond tips, to the grinding wheel surface to loosen and remove the embedded particles from the abrasive wheel surface and thus restore the wheel surface to satisfactory grinding or polishing effectiveness.

It is an objective of the present invention to provide grinding and polishing wheel truing means which has application to rough as well as precision abrasive applications.

A further objective is to provide a grit spray grinding and polishing wheel truing means so as to have the grit particles surrounded by fluid spray outlets.

Another objective is to provide improved means and process whereby the life of diamond tool wheel dressers is substantially extended and for more efficient wheel dressing accomplished with concomitant increase in grinding wheel life and savings in grinding.

The objectives of the present invention include the provision of a structure capable of accomplishing the above objectives with a minimum of material cost and fabricating expense, and at the same time being composed of simple and ruggedly constructed elements which are very reliable in operation.

The foregoing objectives and other advantages of the present invention will become apparent during the course of the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a side elevational view of improved means and process embodying the present invention;

FIG. 2 is an elevational view of a part of the structure of FIG. 1 as viewed along the line 2—2 thereof.

FIG. 3 is a sectional side elevational view of a second embodiment of the improved means and process of the present invention,

FIG. 4 is a front view of the plate member taken along line 4—4 in FIG. 3; and

FIG. 5 is a partial sectional side elevational view of the plate member showing a modified plate outlet system.

Referring to the drawings in greater detail, 3 indicates an abrasive grinding wheel being dressed by a diamond tool 5 which is sintered in a tool holder 6 secured in a wheel dresser head 7 which is improved in accordance with the present invention. The head 7 includes means for grit blasting the working face of the wheel 3 simultaneously with and spaced from the area of action of the diamond tool 5 which means comprises a venturi 8 through which air under pressure is passed upon being introduced into inlet means 9 in the head 7, a suction passageway 10 for the grit which interconnects with the venturi 8 at its throat as shown and which is provided with inlet means 11. The outlet of the venturi is connected to a grit blasting nozzle 12.

Conduit means 13 and 15 interconnect the inlet means

9 and 11, respectively, to sources of pressure air and abrasive grit. The head 7 also includes means for cooling the wheel simultaneously with and at the area of action of the diamond tool 5 which means includes a coolant passageway 14 for water or other coolant liquid, inlet means 16 and conduit means 17 which interconnect such means 16 to the coolant source. The outlet of the passageway 14 is connected to a directional fluid nozzle 18. In the use of the means and in practice of the process abrasive grit from the conduit means 15 is sucked into the wheel dresser head 7 and into the air stream from the conduit means 13. The mixture of air and grit is ejected out of the head 7 via the grit blasting nozzle 12 and is blasted against the working face of the grinding wheel 3 as shown in FIG. 1. Also as shown water or other coolant under pressure from the conduit 17 is ejected out of the nozzle 18 and directed over the diamond tool 5 to cool it.

The head 7 is provided with mounting means in the form of a central bore 19 inwardly from its rear face and a transverse threaded aperture 20 which receives a fastener 22 for bearing against a shank 23 which is received within the bore 19. The shank 23 is integral with the dressing spindle 24 which is a part of the grinding machine (not shown) and which is arranged by mechanism (also not shown) to traverse the working face of the wheel 3 from one side thereof to the other.

The loading of such working face with metal particles which necessitates its redressing is dissipated principally by such grit blasting which saves on the wear to which the diamond tool is subjected. The latter may be used strictly for truing the wheel whenever this is required after the working face is first dressed solely by grit blasting. The removal of the loading on the wheel by such grit blasting is extremely efficient. It is also much faster and consequently there is less downtime on the grinding machine. The grinding process is greatly improved and there is less wear and tear and more efficient utilization of the power of the grinding machine.

Anyone skilled in the grinding business can select the proper grit size depending upon the average grit size of the particular wheel and the work being ground. For example, in ingot grinding using a 12–20 grit wheel a number 8 grit has been found to be satisfactory. The grinding machine may be provided with collecting and recirculating apparatus for the spent grit used in the means and process of the present invention.

Referring generally to FIGS. 3 and 4 another embodiment of the invention will be discussed. There is shown an abrasive grinding wheel 3 rotating in the direction R. The wheel 3 has a diamond tool 5 mounted in a tool holder 6 to diamond dress the wheel 3 when needed. The diamond tool 5 for this illustration is approximately 180 degrees from the nozzle head assembly 30.

The assembly member 30 includes a directional plate nozzle assembly 31 and a dresser mount support 35. The directional plate nozzle assembly 31 is held in the support 35 by a securing belt 34 and the mount opening 37. The support 35 is adjustably secured to a machine support means 32 by bolt 38 and nut 39 in slot 41.

The directional plate nozzle assembly 31 is mounted to discharge both the fluid and the grit materials. Conduit means 118 is secured to nozzle body 47 and supplies the fluid to the abrasive grinding wheel 3 through plate outlets 45 of plate member 44. The plate member 44 is secured to nozzle body 47 by screws 48. The grit blast nozzle 112 is connected to conduit means 113 and is held in the nozzle assembly 31 by nozzle cap 51, as viewed in FIG. 3. The grit material is forced through conduit 113 and nozzle 112 onto the abrasive grinding wheel 3. It is the purpose of this grit to knock the material clogged

within the wheel's surface loose to provide a surface that can be conditioned for grinding or polishing.

FIG. 4 shows the outlets 45 surrounding the grit blasting nozzle 112. The cone effect that is thus established controls the grit. In this way the grit and removed clogging material are washed away and not permitted to circulate in an uncontrolled manner in the area.

FIG. 3 discloses the plate outlets 45 in a parallel relationship to each other.

FIG. 5 shows a second embodiment of the plate member 44 having converging plate outlets 45.

The present invention may be used on either straight or form abrasive grinding wheels. The method found best for truing an abrasive wheel is to feed the grit blasting system across the wheel. This will remove the clogging material; then the diamond tool will put the proper dress on the wheel. The diamond tool will only be required to remove a small amount of the wheel surface to provide the proper form and give a good cutting surface. The result is that the diamond tool and abrasive wheel lives are extended and a greater number of workpieces may be turned with each dress of the abrasive wheel. A typical grit used would be a 100 grit aluminum oxide under 50 to 250 p.s.i. The fluid pressures would be satisfactory for this application for example in a range from 60 to 300 p.s.i.

It will thus be seen that there has been provided by the present invention improved grinding wheel dressing means and process in which the foregoing object together with other thoroughly practical advantages has been successfully achieved.

While a preferred embodiment of the invention has been shown and described it should be understood that modifications, variations and changes may be resorted to without departing from the ambit of the invention as set forth in the appended claims.

I claim the following as my invention:

1. A dressing and truing device for a grinding wheel, comprising, in combination,
   (a) a nozzle head assembly adjacent said grinding wheel,
   (b) a dresser mount support adjustably securing said nozzle head assembly to a machine support means,
   (c) a grit blast nozzle connected to said nozzle head assembly and adapted to direct grit material against the surface of said grinding wheel,
   (d) a fluid delivery system separate from said grit nozzle connected to said nozzle head assembly for controlling the removal of said grit material on said grinding wheel, said fluid delivery system including:
      (1) a fluid outlet means, and,
   (e) a diamond tool connected to said nozzle head assembly and adapted to controllably engage the surface of said grinding wheel for truing thereof.

2. A dressing and truing device for a grinding wheel as set forth in claim 1 wherein,
   (a) said fluid outlet means including a plurality of fluid outlets parallel to each other and spaced around the grit blast nozzle.

3. A dressing and truing device for a grinding wheel as set forth in claim 1 wherein,
   (a) said fluid outlet means including a plurality of fluid outlets converging toward each other and spaced around the grit blast nozzle.

4. A dressing and truing device for a grinding wheel, including, in combination,
   (a) a nozzle head assembly adjacent said grinding wheel,
   (b) a dresser mount support securing said nozzle head assembly to a machine support means,
   (c) a grit blast nozzle connected to said nozzle head assembly and adapted to direct grit material against the surface of said grinding wheel,

   (d) a nozzle body surrounding said grit blast nozzle and secured to the dresser support mount,
   (e) a plate member having one or more fluid outlets and secured to said nozzle body,
   (f) means for bringing a first pressurized fluid to said nozzle body, said means being in communication with said fluid outlets,
   (g) means for bringing a second pressurized fluid to said nozzle body, said means being in communication with said grit blast nozzle,
   (h) means for bringing grit material to said nozzle body, said means being also in communication with said grit blast nozzle,
   (i) means for mixing said grit material with said second pressurized fluid before introduction into said grit blast nozzle, and
   (j) a diamond tool adapted to controllably engage the surface of said grinding wheel for truing thereof.

5. A dressing and truing device for a grinding wheel as set forth in claim 4 wherein,
   (a) said grit material is aluminum oxide,
   (b) said first fluid is a liquid, and
   (c) said second fluid is a gaseous fluid.

6. A dressing and truing device for a grinding wheel as set forth in claim 4 wherein,
   (a) the axes of said fluid outlets are parallel to the axis of the grit blast nozzle.

7. A dressing and truing device for a grinding wheel as set forth in claim 4 wherein,
   (a) the axes of said fluid outlets converge toward the axis of said grit blast nozzle.

8. A method of dressing and truing a grinding wheel which consists of,
   (a) dressing the surface of said grinding wheel by means of a blast of grit material,
   (b) surrounding said blast of grit material with a liquid spray, and
   (c) truing the surface of said grinding wheel with a diamond tool.

9. The method of claim 8 wherein,
   (a) the dressing of the surface of the grinding wheel is effected simultaneously with the truing of the surface of said grinding wheel.

10. The method of claim 8 wherein,
   (a) the dressing of the surface of the grinding wheel is effected independently of the truing of the surface of said grinding wheel.

11. The dressing and truing device for a grinding wheel as set forth in claim 5 wherein,
   (a) said first fluid is at a pressure between about 60 pounds per square inch and about 300 pounds per square inch, and
   (b) said second fluid is at a pressure between about 50 pounds per square inch and 250 pounds per square inch.

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