May 11, 1937. H. HOLMBOE 2,080,206

SPRAY NOZZLE

Filed Aug. 14, 1935

Fig. 1.

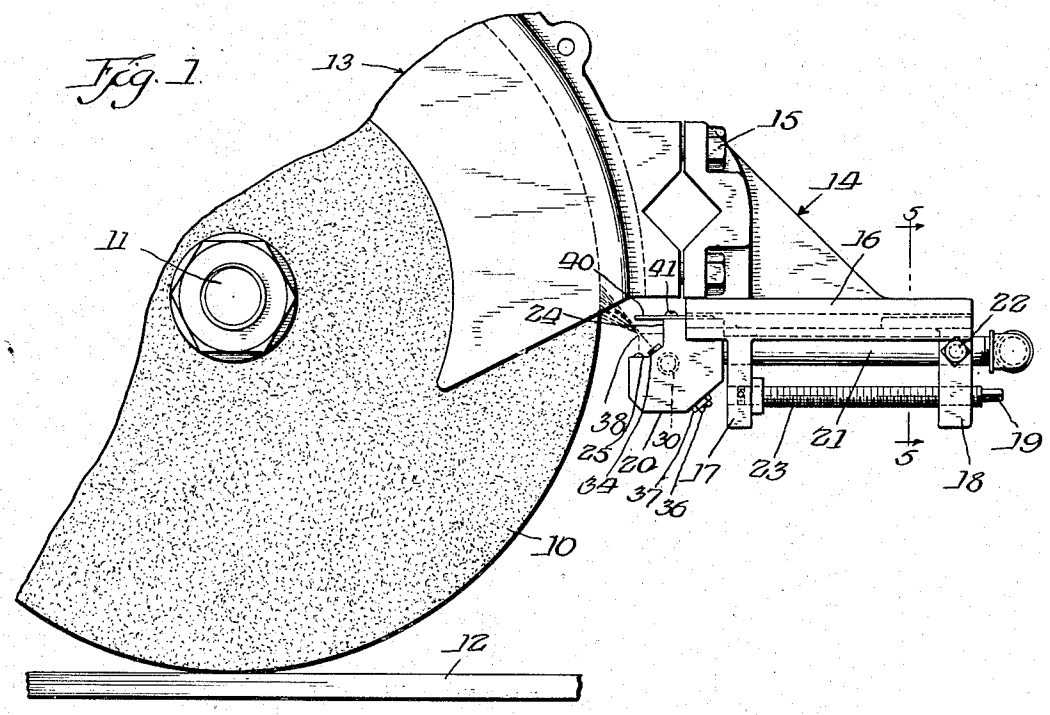


Fig. 2.

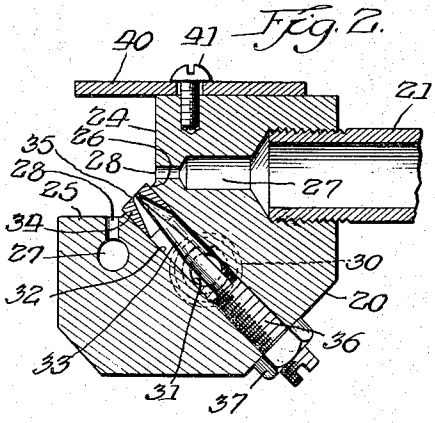


Fig. 3

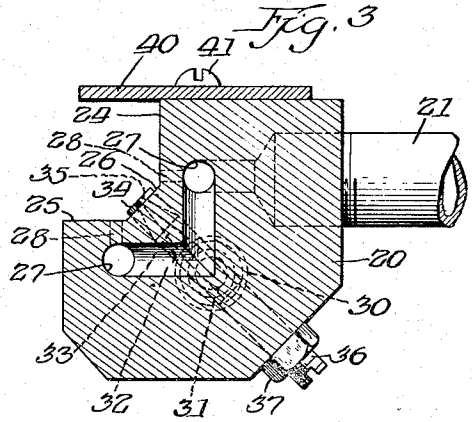


Fig. 4.

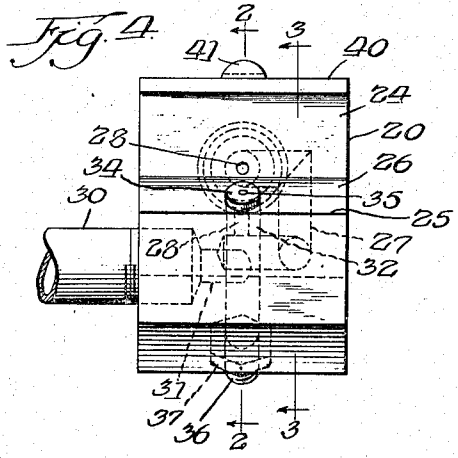
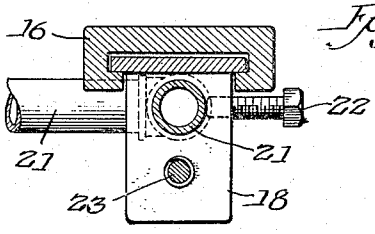


Fig. 5.



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SPRAY NOZZLE

Harold Holmboe, Chicago, Ill.

Application August 14, 1935, Serial No. 36,186

7 Claims. (Cl. 51—267)

The invention relates to improvements in spray nozzles to be used in connection with grinding or polishing wheels for producing a finely atomized liquid spray in the vicinity of the grinding wheel for precipitating the fine dust particles given off during the grinding operation and for humidifying the air around said wheel.

The invention generally relates to the provision of novel means for delivering a finely atomized liquid, which may be atomized by high pressure air or other gases, or by pressure only, to the working surface of abrading wheels in general to insure a wet working surface and a humid atmosphere around the wheel but which will not result in the dripping of moisture from the wheel.

A further object of the invention is to provide an improved spray nozzle having an adjustable mounting on the frame of the grinding wheel for varying the distance of the atomized liquid spray in relation to the grinding surface of the wheel and which will incorporate means for regulating the volume of the liquid to be atomized.

More specifically, the invention contemplates a spray nozzle positioned with respect to the working surface of the grinding wheel to direct the atomized liquid at an angle to the working surface thereof and before the same comes in contact with the material being ground or polished. The spray produced by said nozzle permeates the air around the wheel, keeping the working surface of the wheel uniformly wet, thereby improving the cutting qualities of the wheel and increasing the rate of grinding or polishing.

With these and various other objects in view the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawing and claims appended hereto.

In the drawing which illustrates an embodiment of the device and wherein like reference characters are used to designate like parts—

Figure 1 is a fragmentary elevational view showing a conventional grinding or polishing wheel having one embodiment of the invention fixed to the frame thereof;

Figure 2 is a vertical sectional view taken through the spray nozzle substantially on the line 2—2 of Figure 4;

Figure 3 is another vertical sectional view through the spray nozzle on line 3—3 of Figure 4;

Figure 4 is a front elevational view of the nozzle showing the several openings for discharge of the liquid and gas, respectively; and

Figure 5 is a sectional view taken through the supporting bracket for the spray nozzle substantially along line 5—5 of Figure 1.

Referring particularly to Figure 1, a conventional abrading wheel 10 is disclosed, suitably fixed to and rotated by shaft 11 and which is positioned for contact with the work piece 12 to be ground or polished, as the case may be. The frame of the grinder indicated in its entirety by 13 has suitably secured thereto a bracket 14 by means of the securing bolts 15. The bracket is provided with a base portion 16 channeled throughout its length to form a guideway as shown in Figure 5. Depending from the base at one end thereof is a fixed support 17 and mounted for movement within the guideway is a movable support 18.

The bracket as above described is provided for the purpose of supporting the spray nozzle 20 adjacent the periphery of the grinding wheel, the spray nozzle having threaded engagement with the air supply pipe 21 which passes through an opening in support 17 of slightly larger size than the exterior of the tube to permit movement of the same with respect to the support. The pipe 21 also extends through an opening in the movable support 18, as shown in Figure 5, but in this case the parts are fixedly secured together by the set screw 22 so that movement of the member 18 will cause corresponding movement of the spray nozzle. Movement of member 18 within the guideway formed in bracket 14 to adjust the position of the spray nozzle with respect to the grinding wheel is accomplished by an elongated screw 23 having one end rotatably secured to support 17 and having its other end threaded in support 18. The extremity 19 of the elongated screw is shaped so that any available tool such as a wrench or a special key, if desired, can be used to rotate said screw.

The spray nozzle as shown in Figures 2 and 3 consists of a body member of substantially L-shaped formation in vertical cross section to provide right angle surfaces 24 and 25, respectively, and a connecting surface 26 disposed at an angle substantially forty-five degrees with respect to said first mentioned surface. The body member is provided with angular passages 27 communicating at one end with the air supply pipe 21 and having a pair of outlets 28 extending to surface 24 and to surface 25, respectively. The air or other gas supplied by pipe 21 is therefore exhausted through the openings 28 which are

disposed at right angles to each other and which gas streams will meet at a distance from the surfaces 24 and 25 and substantially in alignment with the center of the angular connecting surface 26.

The liquid to be atomized is supplied to the spray nozzle 20 by pipe 30, Figure 4, and the body of the spray nozzle is provided with a passage 31 connecting said pipe with a diagonal passage 32 housing the needle valve 33. The end of said passage adjacent surface 26 is provided with an insert 34 having a small orifice 35, the size of which can be regulated by varying the position of the needle valve 33 with respect to the same. The needle valve is provided with a threaded end 36 which is threaded into the lower portion of passage 32 and held in the desired position by the lock nut 37. The liquid from pipe 30 is delivered to the diagonal passage 32 and issues from orifice 35, the amount of liquid discharged by said orifice being regulated by the size of the same, which can be varied by screwing the needle valve forward or rearward with respect to said orifice. The stream of liquid issuing from said orifice is directed into the path of the gas streams from the outlets 28 and the various outlets for the gas and liquid are so arranged that the streams meet at a common point indicated in Figure 1 by numeral 38. As a result the liquid is broken up by said gas streams into a finely atomized spray and is directed at an angle to the working surface of the abrading wheel 10. An adjustable plate 40 is secured to the top surface of the spray nozzle by screw 41 and functions to prevent grinder dust from clogging the liquid outlet.

The spray nozzle and supporting means therefor, including the bracket 14, will vary in size and shape according to the design of the grinder or machine to which it is attached, but the principles of operation as above outlined will remain the same. The action of the gas streams which may comprise air and which issue under pressure from outlets 28 is to break up the liquid into finely atomized particles which are uniformly distributed in the form of a flat fan-shaped spray. This is directed against the working surface of the grinding wheel at an angle thereto and in advance of the work piece 12, it being understood that the direction of the abrading wheel 10, as shown in Figure 1, is clockwise. The flat fan-shaped spray insures a wet grinding or polishing surface on the wheel and also a humid atmosphere around the wheel, but the moisture is not concentrated to an extent which will produce dripping. The spray has the effect of wetting and precipitating the fine dust particles produced by the grinding operation and which would otherwise float in the air. By maintaining the working surface of the wheel uniformly wet the cutting qualities of said wheel are thereby improved and the rate of grinding or polishing is increased.

As the grinding wheel wears down the position of the spray nozzle 20 can be varied by rotation of elongated screw 23, which results in movement of the support 18 and corresponding movement of said spray nozzle. In this manner the distance between said nozzle and the working surface of the wheel can be maintained substantially uniform for all grinding operations. Also adjustment of the needle valve can be changed from time to time to regulate the quantity of liquid to be atomized to suit conditions.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawing, as various other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. The combination with a grinding or polishing wheel, of means for humidifying the air in the vicinity thereof, comprising a spray nozzle for directing a spray of finely atomized liquid toward the working surface of the wheel, said spray nozzle being positioned to direct said spray at an angle against the direction of rotation of the wheel, and means locating the spray nozzle adjacent the wheel and at a point in advance of the point of grinding with respect to the direction of rotation of said wheel.

2. The combination with a grinding or polishing wheel, of means for humidifying the air in the vicinity thereof, comprising a spray nozzle for directing a spray of finely atomized liquid toward the working surface of the wheel, said spray nozzle being positioned to direct said spray at an angle against the direction of rotation of the wheel, and means locating the spray nozzle adjacent the wheel and at a point in advance of the point of grinding with respect to the direction of rotation of said wheel, said means being adjustable in a direction substantially normal to the working surface of the wheel.

3. The combination with a grinding and polishing wheel, of means for humidifying the air in the vicinity thereof, comprising a spray nozzle having an orifice discharging a fluid stream toward the working surface of the wheel and in a direction at an angle against the rotation of said wheel, said nozzle having openings for discharging fluid means in the path of said stream at a distance from the nozzle for atomizing said stream, and adjustable supporting means locating said nozzle adjacent the working surface of said wheel.

4. The combination with a grinding or polishing wheel, of means for directing a spray of finely atomized liquid against the working surface of the wheel, comprising a spray nozzle having an orifice discharging a fluid stream toward the working surface of the wheel and in a direction at an angle against the rotation of said wheel, said nozzle having openings disposed at right angles to each other delivering air blasts into the path of said stream, whereby said fluid stream is atomized at a point exterior of the nozzle, and adjustable means locating said nozzle adjacent the working surface of the wheel.

5. The combination with a grinding or polishing wheel, of means for directing a flat fan-shaped spray of finely atomized liquid into contact with the working surface of said wheel, comprising a spray nozzle including a body portion having a plurality of passages therein, one passage connecting with a source of fluid supply under pressure and leading to an orifice from which the fluid is discharged as a stream, said other passages joining and connecting with a source of air supply under pressure, and each of said other passages having an opening delivering an air blast into the path of said stream to cause atomization of the same at a point exterior of the nozzle, and adjustable means locating said spray nozzle adjacent the working surface of the wheel, said means positioning the nozzle so that said spray is directed toward the working surface

of the wheel at an angle against its direction of rotation.

6. The combination with a grinding or polishing wheel, of means for directing a flat fan-shaped spray of finely atomized liquid into contact with the working surface of said wheel, comprising a spray nozzle including a body portion having a plurality of passages therein, one passage connecting with a source of fluid supply under pressure and leading to an orifice from which the fluid is discharged as a stream, said other passages joining and connecting with a source of air supply under pressure, and each of said other passages having an opening delivering an air blast into the path of said stream to cause atomization of the same at a point exterior of the nozzle, said nozzle directing the spray of atomized liquid toward the working surface of the wheel and in a direction at an angle against the rotation of said wheel, and adjustable means locating the spray nozzle adjacent the working surface of the wheel and at a point in advance of the point of grinding with respect to the direction of rotation.

7. The combination with a grinding or polishing wheel, of means for humidifying the air in the vicinity thereof, comprising a spray nozzle including a body portion having a pair of surfaces disposed at right angles to each other and having a diagonal surface connecting the same, a passage in the body portion having an orifice located in the diagonal connecting surface, means supplying said passage with a fluid under pressure whereby the same is discharged from said orifice, other passages in the body portion having an opening in the right angle surfaces respectively, a source of air supply under pressure connecting with said passages whereby air blasts are discharged from said openings into the path of the fluid delivered by the orifice to produce a spray of finely atomized liquid, said spray nozzle being positioned so as to direct the spray toward the working surface of the wheel and at an angle against its direction of rotation, and adjustable means for locating the spray nozzle adjacent the working surface of the nozzle.

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