Dec. 9, 1958 F. G. AULT 2,863,265

MEANS FOR APPLYING COOLANT DURING GRINDING OPERATIONS

Filed Oct. 24, 1957 2 Sheets-Sheet 1

Fig. 1.

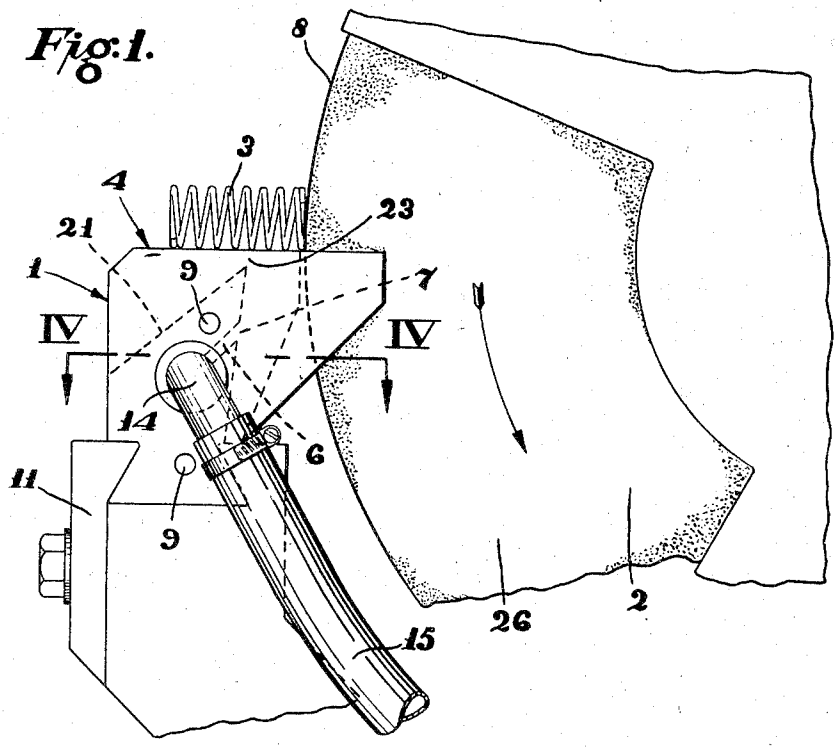
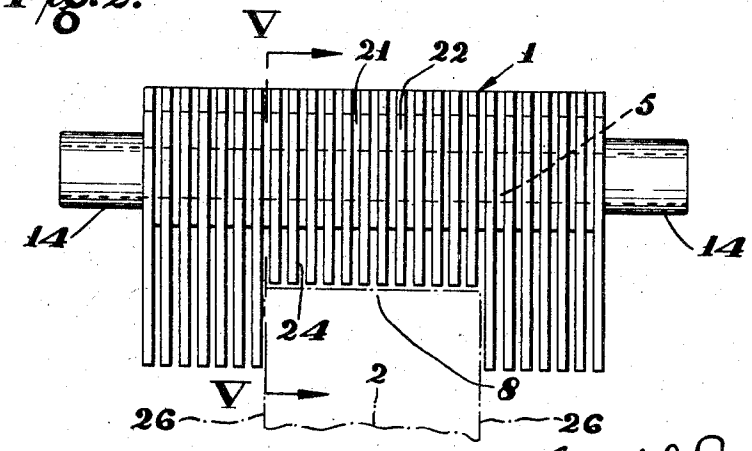


Fig. 2.



Frederick George Ault
INVENTOR
BY Joseph J. Jackson
his ATTORNEY

Dec. 9, 1958 F. G. AULT 2,863,265

MEANS FOR APPLYING COOLANT DURING GRINDING OPERATIONS

Filed Oct. 24, 1957 2 Sheets-Sheet 2

Fig. 3.

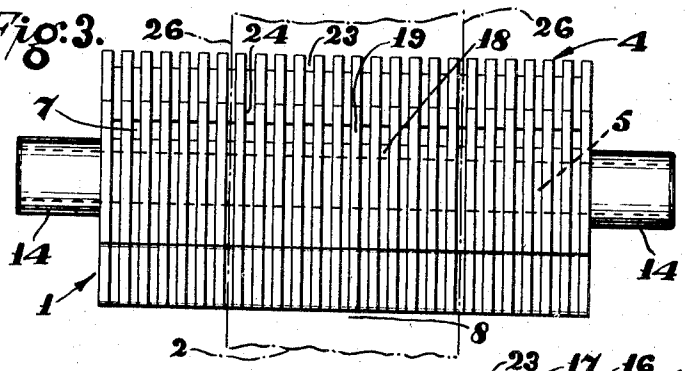


Fig. 4.

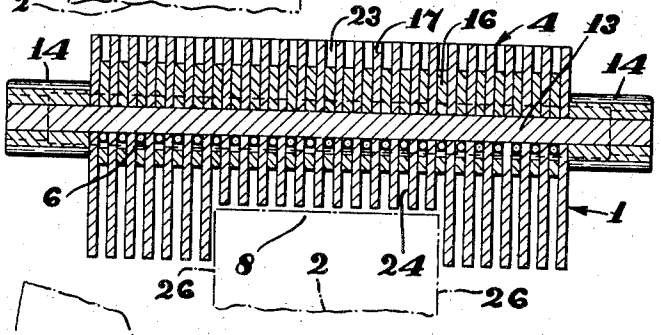


Fig. 5.

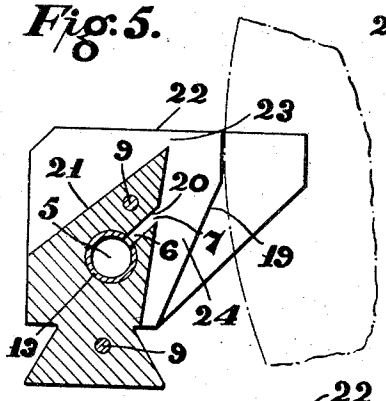


Fig. 6.

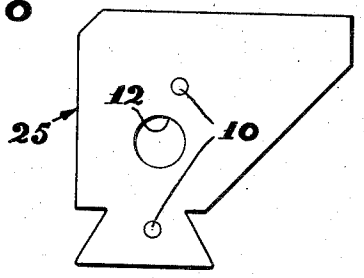


Fig. 7.

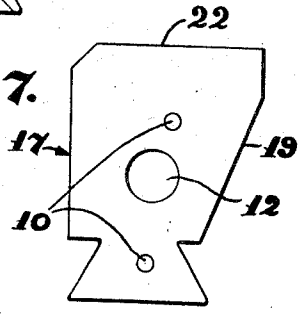
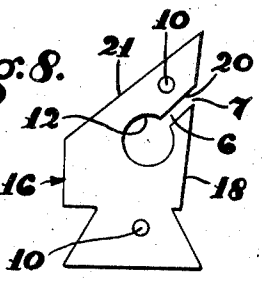


Fig. 8.



Frederick George Ault
INVENTOR
BY Joseph J. Jackson
his ATTORNEY

United States Patent Office

2,863,265

Patented Dec. 9, 1958

2,863,265

MEANS FOR APPLYING COOLANT DURING GRINDING OPERATIONS

Frederick George Ault, West Bromwich, England, assignor to George Salter & Co. Limited, West Bromwich, England, a British company

Application October 24, 1957, Serial No. 692,173

Claims priority, application Great Britain January 15, 1957

6 Claims. (Cl. 51—267)

This invention relates to means for applying liquid coolant to grinding wheels during the operation of grinding workpieces and is especially suitable for high-speed grinding wheels where hand-controlled grinding is carried out.

In grinding operations the application of a liquid coolant medium is generally desirable in order that localized overheating of the work is avoided, thereby improving the quality of the surface finish obtained and reducing risk of damage or alteration of the structure of the material. The coolant medium also fulfils the important function of removing the particles of grit and dust which are produced during the grinding operation and which may constitute a serious health hazard if allowed to be released freely into the atmosphere. In many cases, however, where hand-controlled grinding has been carried out on high-speed grinding machines it has not heretofore been satisfactory to employ a liquid coolant because known arrangements of applying the coolant has resulted in the latter being thrown out and sprayed about by the rotating grinding wheel, thus obscuring the work from view and covering the operator's hands so as to make grinding process an unpleasant operation to perform. Also, in known arrangements, the tendency of rotating grinding wheels to throw off the liquid coolant under centrifugal action may result in the wheel being dry at the point of grinding of the workpiece unless copious volumes of the coolant are applied under pressure. In consequence it has been a practice in hand-controlled high-speed grinding to carry out the operation "dry" and to employ elaborate and costly dust extraction methods.

It is accordingly an object of the present invention to provide improved and novel means for effectively applying coolant liquid to grinding wheels during the operation of grinding workpieces, said means being particularly suitable for high-speed grinding wheels intended for hand-controlled grinding operations.

According to the present invention, means for applying liquid coolant medium to grinding wheels during the operation of grinding workpieces comprises a delivery device having a work-supporting surface and constructed so that the coolant medium may be passed therethrough and be supplied to the grinding face of the wheel adjacent the point of grinding of the workpiece.

Also, according to the invention, means for applying liquid coolant medium to grinding wheels during the operation of grinding workpieces, comprises a device having, or adapted to be associated with, a work-supporting part and provided with an interior main coolant supply channel or passage with branch passages leading therefrom to an exterior surface which is adjacent, or adapted to be positioned adjacent, the grinding face of the grinding wheel, below the point of grinding. Preferably, the delivery device constitutes a work rest and is of a laminated or sectional construction so that it can be built up to the required size and shape to suit the workpiece and the particular grinding wheel in use. The delivery device should be of such a form as to be able to control the flow of air produced by the rotating grinding wheel so as to promote the flow of the coolant liquid into contact with the grinding wheel and workpiece, and then away from the contact point between work and wheel, back to waste-collecting means.

One embodiment of the present invention is illustrated, by way of example, in the accompanying drawings, in which

Figure 1 is a side elevational view showing a coolant delivery device constituting a work rest in position adjacent the grinding face of a grinding wheel.

Figure 2 is a plan view of the work rest of Figure 1.

Figure 3 is a front elevational view of the work rest.

Figure 4 is a horizontal section on line IV—IV, Figure 1.

Figure 5 is a vertical section on line V—V, Figure 2.

Figures 6, 7 and 8 show the different types of individual plates from which the work rest is built up.

Referring now to the drawings, the work rest **1**, which is suitable for use with a high-speed peripheral grinding machine intended for hand-controlled grinding operations, is adapted to be mounted close to a horizontal diameter of the grinding wheel **2** adjacent the periphery thereof so that a workpiece being ground (indicated at **3**) can be supported on the top surface **4** of the work rest. The said work rest **1** has a laminated construction, being composed of a plurality of separate flat plates, shown individually in Figures 6 to 8, stacked together, and it is provided internally with a main coolant supply channel or passage **5** from which branch passages **6** communicate with openings **7** adjacent the grinding face **8** of the wheel **2**.

The work rest **1** is built up by stacking the component plates, each in a vertical plane, in a horizontal direction transversely across the peripheral grinding face **8** of the wheel **2**, the assembled stack being held together by riveted clamping rods **9** passed through aligned holes **10** in the plates and being supported upon a suitable base **11**. Each plate is also formed with a central opening or hole **12** of circular section, and in the assembled stack these central openings or holes **12** are aligned and have passed therethrough a drilled tube or conduit **13** which forms the main coolant supply channel or passage **5** extending horizontally through the work rest, the position of the drillings corresponding with the branch passages **6**. The ends **14, 14** of this tube or conduit **13** are adapted to be connected to a supply pipe or conduit **15** for supplying the coolant liquid (see Figure 1).

The component plates of the work rest may be formed initially from rectangular blanks, and are of two main forms which are adapted to be arranged alternately in the assembled stack. Plates of the one main form (shown in Figure 8) will be hereinafter referred to as coolant supply plates and are denoted by the reference numeral **16** whilst those of the other form (shown in Figure 7) are denoted by the reference numeral **17** and will be referred to as spacing plates. In both the coolant supply plates **16** and the spacing plates **17** the front side edge **18** or **19**, respectively, that is, the edge opposed to the grinding face **8** of the wheel **2**, is inclined so as to slope rearwardly from the top. In each of the coolant supply plates **16** there is formed a slot **20** extending upwardly from the central opening or hole **12** of the main coolant supply channel to the upper part of the front side edge **18** of the plate, this slot **20** forming the branch channel or passage **6** for delivery of the coolant liquid to the grinding wheel. The coolant supply plates **16** are also formed with the top rear corner of the initially rectangular blank cut away from the upper end of the front side edge so

as to provide a rearwardly and downwardly sloping top edge 21.

The spacing plates 17 have a horizontal top edge 22 which forms the top surface 4 of the work-rest and which is slightly higher than the top of the adjacent coolant supply plates 16 so as to leave a gap 23, and the front side edges 19 of the spacing plates 17 extend further towards the grinding wheel 2 than do the coolant supply plate front side edges 18, projecting beyond the latter so as to provide guide walls 24 for controlling and directing the flow of coolant as it issues from the openings 7 of the delivery passages 6. It will be understood that the work rest 1 is built up to the size required by stacking together the requisite number of plates, and the coolant supply plates 16 and spacing plates 17 are arranged alternately, as previously indicated, so that the top surface 4 of the work rest upon which the workpiece 3 is supported has the appearance of a plurality of parallel ribs formed by the top edges 22 of the spacing plates 17, separated by downwardly-sloping grooves formed by the sloping top edges 21 of the coolant supply plates 16 between the sides of the spacing plates. The front face of the work rest 1 opposite to the grinding face 8 of the wheel has a similar ribbed appearance, the ribs in this case being formed by the projecting guide walls 24 of the spacing plates 17 which are separated by vertically-extending grooves into which the upwardly-directed coolant delivery passages 6 discharge.

As shown, the work rest 1 is conveniently built up to a size wider than the peripheral face 8 of the grinding wheel, and for this purpose a further different form of plate, as shown in Figure 6 and denoted by the reference numeral 25, is conveniently used. These plates 25 are similar to the spacing plates 17 but are of a larger size, extending further forward so as to overlie a portion of each side face 26 of the grinding wheel 2.

In use, the liquid coolant, which may be water or a soluble oil, is discharged from openings 7 of the upwardly-extending delivery passages 6 below the level of the top 4 of the work rest 1 and, the flow being directed upwardly under a small pressure, the liquid can build up a pool in contact with the grinding wheel face 8 and workpiece 3 applied to the wheel adjacent said top 4 of the work rest, thereby effectively preventing overheating of the workpiece and collecting the particles of grit and dust produced during the grinding operation without being sprayed out as in known arrangements. The coolant liquid is then either carried downwards beneath the grinding wheel, or escapes over the top of the coolant supply plates 16 through the gap 23 and down the sloping top edges 21 thereof, means (not shown) being provided for collecting the waste liquid in a suitable trap or settling tank, whence it may be returned to the coolant circulation system for filtration and cleaning. The action of the coolant liquid in building up a pool in contact with the workpiece and grinding wheel is assisted by a controlling influence of the work rest and workpiece on the flow of the air stream produced by the rotating grinding wheel. This air stream which is normally carried round with the rotating wheel and which, in high speed machines, tends to prevent any coolant liquid reaching the surface of the wheel is deflected by the work rest or workpiece (in this respect the sloping top edges 21 of the coolant supply plates 16 are found particularly advantageous) and favourable conditions are set up in the space adjacent the front of the top of the work rest 1 and surface 8 of the grinding wheel 2 for the concentration of the liquid coolant. In the case of a solid workpiece the gap 23 between the top of the spacing plates 17 and the top of the slightly lower coolant supply plates 16 is of importance in enabling the coolant to escape by way of the downwardly-sloping grooves formed by the sloping top edges 21 of the coolant supply plates 16.

The above description of an embodiment of the invention is by way of example only and it will be clear that other constructions of coolant delivery devices may be devised within the scope of the invention.

I claim:

1. A device for applying liquid coolant medium to grinding wheels during the operation of grinding workpieces comprising a body composed of a plurality of flat plates stacked together transversely across the peripheral grinding face of the grinding wheel, clamping means for holding together said plates in assembled relationship, an interior main coolant supply passage formed by a tube passed through aligned openings in said plates and adapted to be connected with an external supply of liquid coolant medium, and branch passages formed by channels provided in alternate plates of the assembled stack forming the body, said branch passages being in communication with the interior main coolant supply passage and leading to outlet apertures in the respective edges of said alternate plates which are opposed to the grinding face of the grinding wheel during use, said outlet apertures being below the level of the tops of said alternate plates which tops are lower than the top edges of the intermediate plates so as to leave gaps for the escape of coolant liquid, the said top edges of the intermediate plates forming a surface for supporting the workpiece during the grinding operation.

2. A device for applying liquid coolant medium to grinding wheels during the operation of grinding workpieces as claimed in claim 1, in which the top edge of each of the said alternate plates slopes downwardly and rearwardly in a direction away from the grinding face of the grinding wheel.

3. Means for applying liquid coolant medium to grinding wheels during the operation of grinding workpieces, comprising a device including a body part having a work-supporting surface and composed of a plurality of flat plates stacked together transversely across the peripheral grinding face of the grinding wheel, clamping means for holding together said plates in assembled relationship and means for supporting said body part, an interior main coolant supply passage formed by a tube passed through aligned openings in said plates and adapted to be connected with an external supply of liquid coolant medium, and branch passages formed by channels provided in alternate plates of the assembled stack forming the body, said branch passages being in communication with the interior main coolant supply passage and leading to outlet apertures in the respective edges of said alternate plates which are opposed to the grinding face of the grinding wheel during use, said outlet apertures being below the level of the tops of said alternate plates which tops are lower than the top edges of the intermediate plates whereby gaps are provided for the escape of the coolant liquid, the said top edges of the intermediate plates forming the aforesaid work-supporting surface, and the front edges of said intermediate plates extending further towards the grinding face of the grinding wheels than the adjacent front edges of the said alternate plates so as to form guide channels for directing coolant liquid issuing from said outlet apertures towards the point of grinding of the workpiece.

4. A device for applying liquid coolant medium to grinding wheels during the operation of grinding workpieces, which device comprises a body part having a side face adapted to be directly opposed during use to a peripheral grinding face of the grinding wheel, said side face of the body part being ribbed to provide upwardly-extending channels open along their length, a work-supporting surface associated with said body part, an interior main coolant supply passage within said body part and adapted for connection with an external supply of liquid coolant medium, and branch passages leading from said main coolant supply passage to outlet apertures disposed below the level of the work-supporting surface and

within said upwardly-extending open channels whereby liquid coolant can be guided toward the point of grinding.

5. A device for applying liquid coolant medium to grinding wheels during the operation of grinding workpieces, which device comprises a plurality of flat plates stacked together in side-by-side relationship so as to extend transversely across a peripheral grinding face of the grinding wheel during use, some of said plates extending further forwardly than others so as to provide a plurality of upwardly-extending open channels in the side adapted to be directly opposed to the said peripheral grinding face, clamping means for holding said plates together in assembled relationship, a work-supporting surface associated with said body, an interior main coolant supply passage passing through aligned openings in said plates and adapted for connection with an external supply of liquid coolant medium, and branch passages passing through the plates of the assembled stack whose forward edges form the bases of the said upwardly-extending channels, said branch passages leading from the main coolant supply passage to outlet apertures disposed below the level of the work-supporting surface and within said upwardly-extending channels whereby liquid coolant can be guided towards the point of grinding.

6. A device for applying liquid coolant medium to grinding wheels during the operation of grinding workpieces, which device comprises a plurality of flat plates stacked together in side-by-side relationship so as to extend transversely across a peripheral grinding face of the

grinding wheel during use, some of said plates extending further upward than others so as to provide a plurality of upwardly-extending open channels in the side adapted to be directly opposed to the said peripheral grinding face, clamping means for holding said plates together in assembled relationship, an interior main coolant supply passage passing through aligned openings in said plates and adapted for connection with an external supply of liquid coolant medium, and branch passages passing through plates of the assembled stack whose forward edges form the bases of the said upwardly-extending channels, said branch passages being in communication with the interior main coolant supply passage and leading to outlet apertures in the respective forward edges of said plates, said outlet apertures being below the level of the tops of those plates having tops lower than the top edges of the intermediate plates so as to leave gaps for the escape of coolant liquid, the said top edges of the intermediate plates forming a surface for supporting the workpiece during the grinding operation.

References Cited in the file of this patent

UNITED STATES PATENTS

457,755	Wing	Aug. 11, 1891
2,730,845	Ernst	Jan. 17, 1956

FOREIGN PATENTS

134,767	Germany	Aug. 25, 1901