July 16, 1957 A. A. DICKE 2,799,125

ROTARY KNIFE GRINDERS

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Fig 1

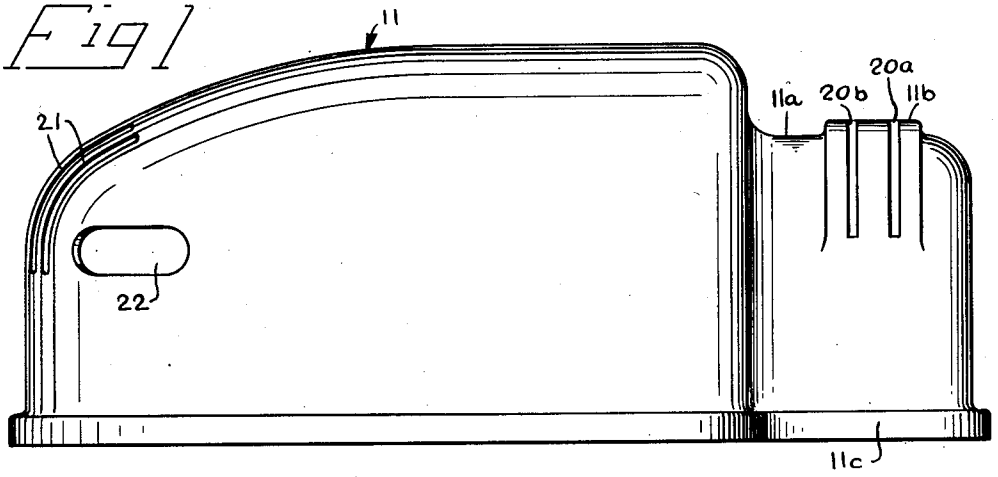
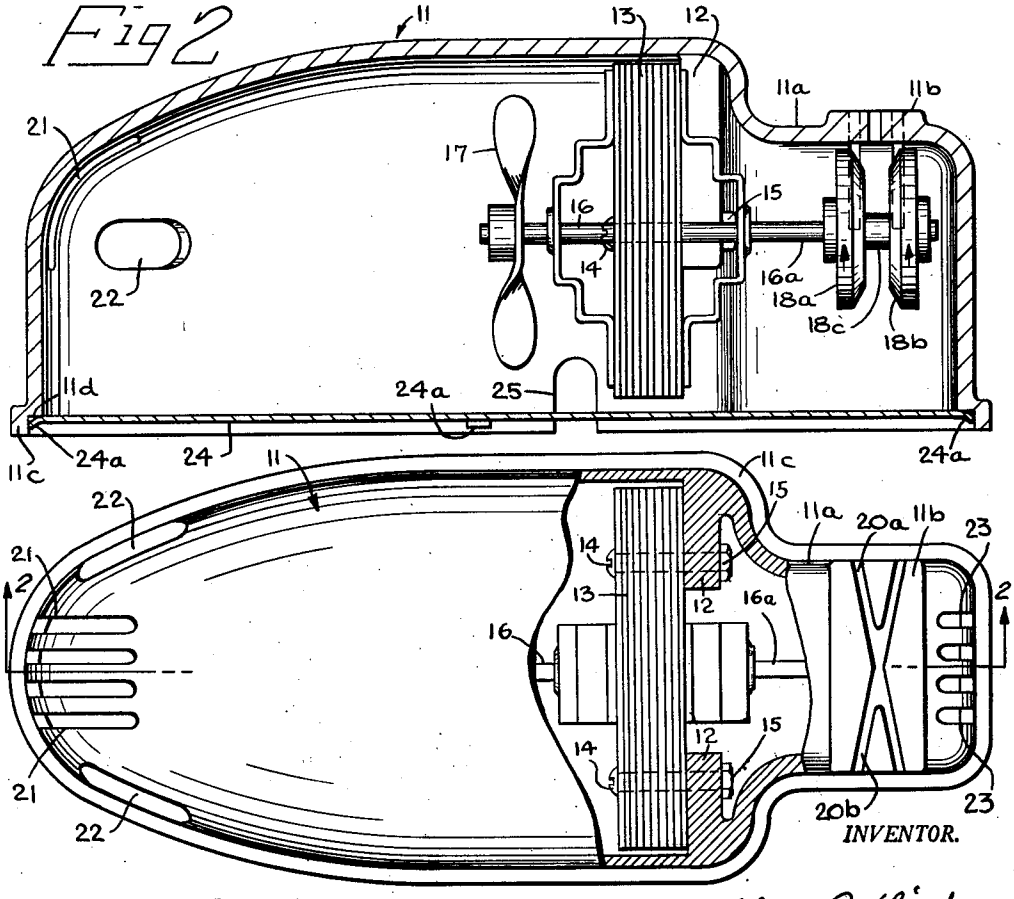


Fig 2



INVENTOR.

Allen A. Dicke

Fig 3

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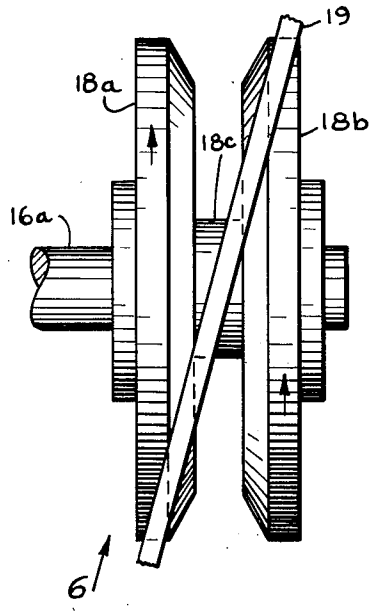


Fig 4

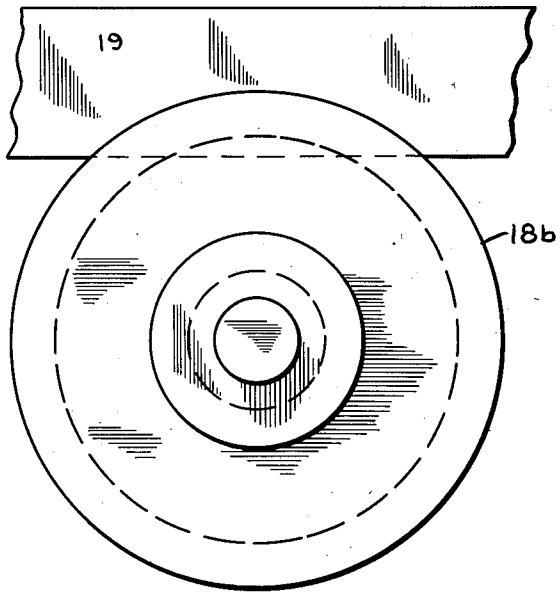


Fig 5

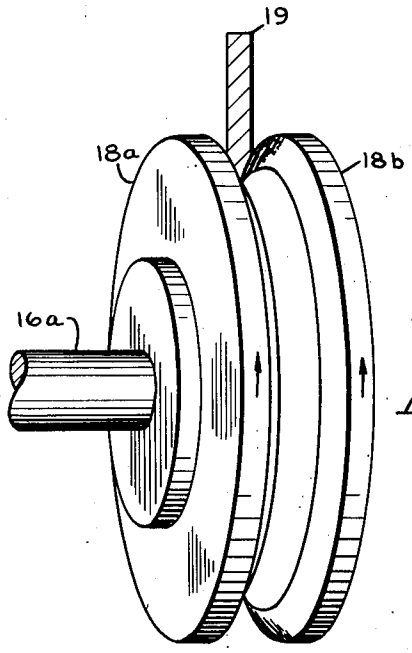


Fig 6

INVENTOR.

Allen A. Dicke

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ROTARY KNIFE GRINDERS

Allen A. Dicke, New Bremen, Ohio

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5 Claims. (Cl. 51—80)

This invention relates to rotary knife grinders.

An object thereof is to provide such a grinder which grinds both sides of the edge at the same time, the grinding occurring, however, at spaced points along the edge.

Another object is to provide such a grinder comprising two coaxial bevelled grinding surfaces facing each other, said surfaces comprising sections of the same hyperboloid of revolution, together with guide means of the knife to be ground for guiding said knife at such an angle that it contacts one bevelled grinding surface at one side of the axis of rotation along a line in said hyperboloid surface and contacts the other bevelled grinding surface at the other side of the axis of rotation along the same line in said hyperboloidal surface.

It is an object to provide such a grinder in which the bevelled edges are separated the knife being guided in slots in a vertical plane (assuming the axis of rotation to be horizontal) but in a plane at a small angle to the axis of rotation. This results in the grinding of the two sides of the knife a short distance apart along the edge thereof.

Another object is to provide a suitable knife guide providing for a plurality of positions for the knife so that the edge thereof may be ground to different predetermined angles.

It is another object to so arrange the knife guiding slots relative to the grinding wheel shaft and the radial extent of said beveled surfaces, and the spacing of said grinding surfaces is so chosen that the edge of a knife blade being ground is nearer to the axis of the shaft than any part of the grinding surfaces so that wearing away of the grinding surfaces will not form a groove therein.

Another object is to provide such a knife grinder comprising a one-piece housing having a motor compartment and a grinding wheel compartment and formed internally with two vertical abutment surfaces in the motor compartment against which the motor is clamped so that it is supported by the housing with the grinding wheel or wheels in the grinding wheel compartment in the proper registration with one or more guide slots formed in the grinding wheel compartment section of said housing, so that the parts may be readily assembled in proper relationship.

Other objects will appear from the following description of an illustrative embodiment of the invention taken together with the attached drawings wherein:

Fig. 1 is a side elevation of a knife grinder illustrating one form the invention may take.

Fig. 2 is a vertical, longitudinal, cross sectional view thereof taken on the line 2—2 of Fig. 3, certain parts being shown in full.

Fig. 3 is a top view, the top wall being broken away in part to show the motor in top plan view.

Fig. 4 is an enlarged fragmentary top view showing part of a knife in grinding position, the housing being omitted.

Fig. 5 is an end elevation of the parts shown in Fig. 4.

Fig. 6 is a view thereof looking in the direction of the arrow 6 in Fig. 4.

Referring to said figures, 11 represents a housing including an extension 11*a* serving to house the grinding wheels and provided with guides for the knife, said housing being provided with two lugs 12 against which the motor 13 is held by means of screws 14, passing through the motor and said lugs, and preferably held by nuts 15 (Figs. 2 and 3). The motor shaft 16 preferably has a rearward extension upon which is carried the ventilating fan 17, and it has a forward extension 16*a* upon which are mounted the grinding wheels 18*a* and 18*b*, separated by a spacing collar 18*c*.

The housing extension 11*a* is preferably formed with a thickened section 11*b* provided with one or more slots such as 20*a* and 20*b*, which extend down to approximately the plane of the shaft 16*a*. The guide slots 20*a* and 20*b* are preferably placed at different angles to the vertical plane perpendicular to the horizontal axis of the shaft 16*a* and grinding wheels 18*a* and 18*b*, whereby different conformations of the cutting edge of the knife 19 may be generated as desired. Another advantage of using the two intersecting knife grinding slots 20*a* and 20*b* is that it permits grinding of the knife to the same rearward part of the knife edge. When only one such slot is used one side of the knife will be ground to a point nearer the handle than the other side. By using the two intersecting slots both sides are ground to the same point, particularly when the angles of the two slots are the same. The same advantage applies to the grinding of the knife edge near the point.

The bevelled edges of the grinding wheels approximate frusto-conical surfaces. It is believed that the ideal surface is that of a hyperboloid of revolution, viz: the surface generated by a single point tool moved in the line of the edge of the knife to be ground but at a distance from the axis of rotation. In this way, the knife edge will be in contact with the grinding surfaces along a line in each bevelled surface of the wheels. Therefore, wear will be distributed over the entire bevelled surfaces, giving long life to the wheels. The surface of such a hyperboloid of revolution closely approximates a cone, within the limits used, but it is nevertheless slightly concave.

The casing is preferably provided with ventilating openings 21 and 22 through which ventilating air may be drawn into the housing by the fan 17, and ventilating openings 23 to serve as exits for the ventilating air are desirably provided at the other end of the housing.

The lower edges of the housing 11 and its extension 11*a* are provided with an enlargement or skirt 11*c*, providing a shoulder 11*d* against which may bear a bottom plate 24, preferably of thin sheet metal. This bottom plate is slotted at various points to provide a plurality of tongues 24*a* which extend somewhat beyond the periphery of the bottom plate and, therefore, serve to hold the bottom plate in assembled position. When the bottom plate is pressed into the bottom of the housing, the tongues 24*a* will be bent downwardly relative to the plate and serve as secure fastening means therefor. The housing 11 is also provided with a U-shaped opening 25 for the electric supply cord. The cord is merely dropped into this opening where it will be held securely by the bottom plate 24.

In use, the motor is energized and thereupon the knife 19 is placed in the knife grinding slot 20*a* or 20*b* in a more or less horizontal position and allowed to rest lightly on the bevelled portions of the grinding wheel surfaces, and the knife is thereupon slid back and forth lengthwise of the knife until the edge is sharpened sufficiently. If the knife edge is curved upwardly near its end, it is advisable to raise the handle end as the knife is drawn outwardly. In this way the grinding of the sides of the edge may be carried out all the way to the point.

It is advisable to have the grinding wheels rotate in the direction shown by the arrows in Figs. 2, 4, and 6, viz:

their upper surfaces moving away from the operator (who is assumed to have the knife in the right hand, with the left hand overlying the housing **11**). This direction of rotation has the advantage that the tip of the knife will not dig into the grinding wheels, which can occur if the wheel is running toward the operator.

It is to be understood that the edge generated on the knife ground by this apparatus is not necessarily one formed by two intersecting planes, but the sides are in most cases somewhat concave. In other words, a "hollow-ground" edge is generated. Said surface is elliptical in cross section, as can be seen in Fig. 6.

While it is contemplated to drive the shaft **16***a* by power, such as by the electric motor **13**, it is to be understood that the invention may be embodied in a device in which the shaft **16***a* is not rotated by external power. In that case, the knife is placed in one of the guide slots **20***a* or **20***b* and drawn back and forth. This will cause both sides of the knife to be sharpened as the wheels revolve slowly back and forth.

It is also to be noted that it is usually desirable to allow for some axial play of the shaft **16***a* in its bearings. This causes the shaft to adjust itself axially so that both sides of the knife will be ground equally.

The angle of slant of the knife guiding slots relative to the plane of the wheels as shown in Fig. 4 is fifteen degrees but this angle may be as small as about one degree or as large as possibly forty-five degrees.

It is to be noted that the knife being ground is supported against movement toward the center of the grinding wheels only by its contact with the grinding wheels.

It will be noted that the construction shown and described will serve admirably to accomplish the objects stated above. It is to be understood, however, that the construction disclosed above is intended merely as illustrative of the invention and not as limiting as various modifications therein may be made without departing from the invention as defined by a proper interpretation of the claims which follow:

I claim:

1. In a rotary knife grinder, an electric motor having a rotatable shaft, grinding means on said shaft comprising spaced bevelled grinding surfaces rotating with said shaft, the bevelled surfaces facing toward each other, together with means for guiding a knife to be ground arranged to guide the knife in a plane intersecting said shaft midway between said bevelled grinding surfaces and at an angle less than 90° and greater than about 45°, the two bevelled grinding surfaces comprising sections of the same hyperboloid of revolution.

2. In a rotary knife grinder, a rotatable shaft, power means for rotating said shaft, grinding wheels on said shaft comprising two beveled, spaced grinding surfaces rotating with said shaft, said beveled surfaces facing toward each other, and comprising sections of the same hyperboloid of revolution, together with at least one knife

grinding guide slot in fixed relation to said beveled surfaces and lying in a plane intersecting said shaft midway between said hyperboloidal grinding surfaces, the angle of said slot relative to said shaft and the radial extent of said beveled surfaces and the spacing of said grinding surfaces being so chosen that the edge of a knife blade being ground between the grinding surfaces is nearer to the axis of the shaft than is the closest point of contact of the blade with the grinding surfaces.

3. The combination according to claim 1 in which the angle of said guide means relative to said shaft and the radial extent and form of said hyperboloidal grinding surfaces and the spacing of said surfaces is so chosen that the edge of a knife blade being ground between the grinding surfaces is nearer to the axis of the shaft than is the closest point of contact of the blade with the grinding surfaces.

4. In a rotary knife grinder, a one-piece housing formed with a top wall, a front wall, a rear wall, and two end walls and providing a motor compartment and a grinding wheel compartment which is narrower transversely than said motor compartment and which housing is formed internally with two generally vertical abutment surfaces in the motor compartment adjacent to the point where the narrower grinding wheel compartment joins the motor compartment, together with a grinding unit consisting of an electric motor in the motor compartment having two mounting surfaces clamped against said vertical abutment surfaces and also having a shaft extending into said grinding wheel compartment, and at least one grinding wheel mounted on said shaft, the top wall over said grinding wheel compartment being formed with at least one slot adjacent to said grinding wheel, whereby said slot forms guide surfaces for aligning the knife to be ground relative to said grinding wheel.

5. In a rotary knife grinder, a rotatable shaft, power means for rotating said shaft, at least one bevelled, grinding surface rotating with said shaft, said surface comprising a section of a hyperboloid of revolution, together with at least one knife grinding guide slot in fixed relation to said hyperboloidal surface and lying in a plane intersecting said shaft at an angle less than 90° and greater than 45°, and said hyperboloidal surface being so formed that a straight line in said surface lies in the plane of said slot.

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