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GRINDING METHOD

Filed April 18, 1963

Fig. 1.

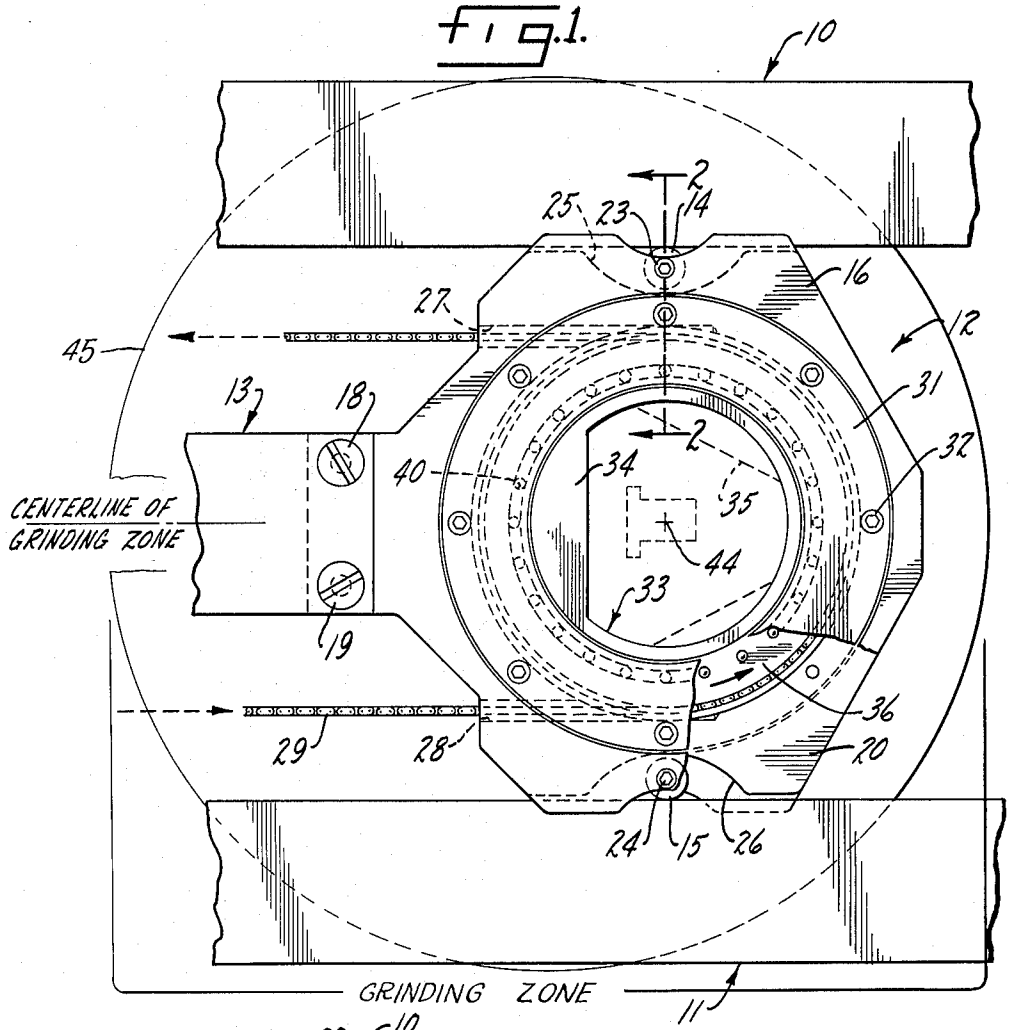
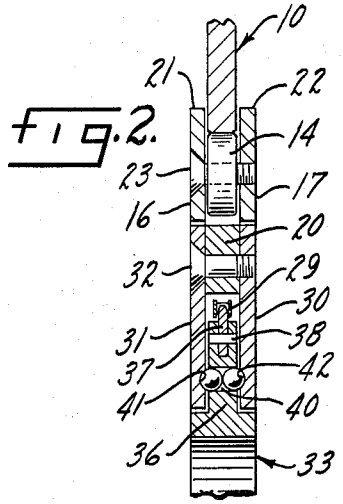


Fig. 2.



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GRINDING METHOD

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This invention relates generally to grinding, and specifically to a method of grinding.

Accordingly a primary object of the invention is to provide a mehod of grinding workpieces, particularly odd-shaped pieces, to very close tolerances.

Another object is to provide a mehod of grinding in which the workpiece is controllably rotated as it travels in a grinding zone.

Yet another object is to provide a method of grinding workpieces which must be rotated as they are ground for best results in a double-disc grinder.

Other objects and advantages of the invention will become apparent from the following description of the invention.

The invention is illustrated more or less diagrammatically in the accompanying drawing wherein:

FIGURE 1 is a side elevation, with parts broken away for clarity, of the workholder assembly; and

FIGURE 2 is a view taken substantially along the line 2—2 of FIGURE 1.

Like reference numerals will refer to like parts throughout the following description of the drawing.

Referring first to FIGURE 1, a pair of guide rails are indicated generally at **10** and **11**. A workholder assembly, indicated generally at **12**, is supported at the advancing end of a pusher bar **13**, the workholder assembly riding along the guide rails **10** and **11** on a pair of rollers **14** and **15**.

The workholder assembly **12** includes a pair of substantially identical side plates **16**, **17**, which are secured by screws **18**, **19**, to pusher bar **13**. The side plates are spaced from one another by a spacer **20** whose boundaries are partially co-extensive with the boundaries of the side plates. The spacer is also connected to the pusher bar **13** by the screws **18** and **19**. The upper and lower edges of the side plates extend above and below, respectively, the upper and lower edges of the spacer to form a pair of flanges **21**, **22**, which are spaced apart a distance sufficient to straddle the guide rails **10** and **11**. The rollers **14** and **15** are suspended between the flanges **21** and **22** by bolts **23**, **24**, as best seen in FIGURE 2. The rollers are located in the center of cut-away areas **25**, **26** in the spacer. Spacer **20** is bored as at **27**, **28**, to form a passageway for a roller chain **29**.

A pair of annular retainer plates are indicated at **30** and **31**. The retainer plates are secured to spacer **20** by a plurality of bolts **32**.

A workholder is indicated generally at **33**. In this instance the workholder is formed with a circular internal bore except for a chordial section **34** for reception of an odd-shaped workpiece **35** whose outline is indicated by dotted lines in FIGURE 1. The workholder includes a tongue portion **36** which extends radially outwardly about the circular periphery of the workholder. The tongue is received between the overhanging flanges formed by retainer plates **30** and **31**. An insert sprocket **37** is secured to the tongue **36** by a plurality of pins or wedges **38**.

The tongue portion **36** of the workholder is apertured at a plurality of locations, one of which is indicated at **40** in FIGURE 2. The apertures are radially equidistant from center **44** and they may be equidistantly spaced circumferentially from one another. The opposed, inner faces of retainer plates **30**, **31** have bearing races **41**, **42**, formed therein, the bearing races being aligned with the

apertures **40**. A pair of ball bearings is received in each bore **40**, the ball bearings resting in races **41** and **42** of the retainer plates **30**, **31**.

Preferably retainer plates and workholder are hardened. The width of the assembly will, of course, be narrower than the clearance between the grinding discs if the apparatus is used with a double disc grinding machine. If only one side of a workpiece is to be ground the side of the workholder assembly facing the grinding disc must be displaced inwardly a distance sufficient to clear the disc as the workholder traverses the grinding zone.

The use and operation of the invention are as follows:

Assume that a workpiece of a generally triangular configuration, such as workpiece **35** in FIGURE 1, is to be ground between the discs of a double disc grinding machine, one of which is illustrated at **45** in FIGURE 1. The workpiece is inserted into the workholder **33** by any suitable feeding device. The entire assembly is advanced toward the grinding zone by a force exerted on the pusher bar **13**.

Roller chain **29** is rotated as the workholder assembly advances toward the grinding zone. Any suitable structure may be employed to rotate the chain, including a fixed driving sprocket located intermediate the end travel points of the roller chain or a driving sprocket which moves with the pusher bar. The particular relationship between the roller chain driving means and the workholder assembly and its driving portion may be varied. It is, however, essential that the roller chain rotate with respect to the pusher bar.

Movement of the roller chain in a direction indicated by the dotted arrows causes workholder **33** to rotate in the direction of the curved arrow since the roller chain is in engagement with the insert sprocket **37**. Workholder **33** rotates freely with respect to retainer plates **30**, **31** due to the action of ball bearings **41**, **42** which ride in the bearing races formed in the internal, opposite faces of retainer plates **30**, **31**.

The workholder, and the workpiece carried by it, rotate about a fixed center of rotation **44** which may fall within or without the boundaries of the workpiece.

In the illustrated embodiment the center of rotation falls in an internal aperture in the workpiece **35**. Center of rotation **44** traverses a linear path since guide rails **10** and **11** are parallel to one another. In this instance the center of rotation **44** is shown as lying on the horizontal center line of the grinding discs and accordingly the center of rotation will follow a rectilinear path which is co-extensive with the horizontal center line of the grinding discs as the workpiece passes through the grinding zone. It should be clearly understood, however, that this particular arrangement may be varied within the scope of the invention.

Although a preferred embodiment has been illustrated and described and several alternative embodiments have been discussed, it will at once be apparent to those skilled in the art that further modifications and variations may be employed within the scope of the invention. Accordingly it is intended that the scope of the invention be limited, not by the foregoing exemplary description, but solely by the scope of the hereafter appended claims when interpreted in light of the pertinent prior art.

I claim:

1. In the method of grinding a planar surface on a workpiece, the steps comprising

orienting a workpiece having a planar surface to be ground with the planar surface disposed in a plane generally coincident with the grinding plane of a rotating, axially fixed grinding wheel in a grinding zone,

moving the center of the workpiece laterally past the

grinding wheel along a continuously advancing rectilinear path of travel which is oriented at right angles to the axis of rotation of the grinding wheel,

maintaining the planar surface to be ground in the grinding plane as the workpiece is advanced into, through, and out of the grinding zone to a point in its path of travel at which the workpiece leaves contact with the grinding wheel, and

positively imparting rotational movement having a constant peripheral velocity to the workpiece during the time it is in contact with the grinding wheel.

2. The method of claim **1** further including the step of moving the workpiece past a pair of rotating, axially fixed grinding wheels in a grinding zone,

said grinding wheels having grinding surfaces which lie in two parallel grinding planes whereby a pair of parallel surfaces on the workpiece may be simultaneously ground.

3. The method of claim **1** further characterized in that the rectilinear path of the center of rotation of the workpiece is substantially parallel to a center line of the grinding zone.

4. The method of claim **3** further characterized in that the rectilinear path of the workpiece is co-extensive with a center line of grinding zone.

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