United States Patent

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[54] RADIUS-SETTING GAUGE

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[52] **U.S. Cl.**.....**33/185**, 125/11.7

[51] **Int. Cl.**.....**B27g 23/00**

[58] **Field of Search**.....33/169 C, 172 D, 181 R, 185 R; 125/11.4, 11.7, 11

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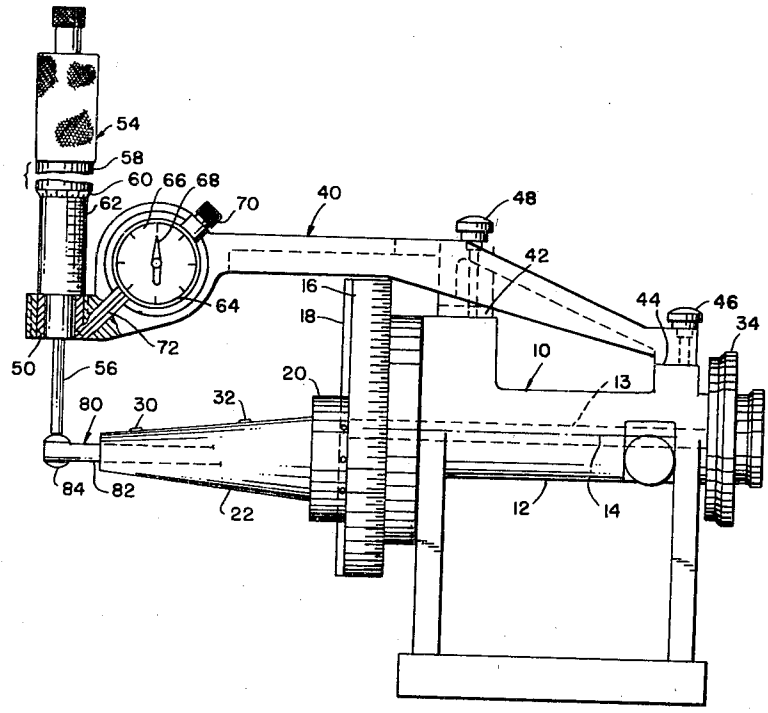
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[57] **ABSTRACT**

A radius-setting gauge for direct attachment to the frame of a radius dresser, including a movable micrometer to be set to the required radius, and an indicator for indicating the position of the micrometer.

6 Claims, 3 Drawing Figures



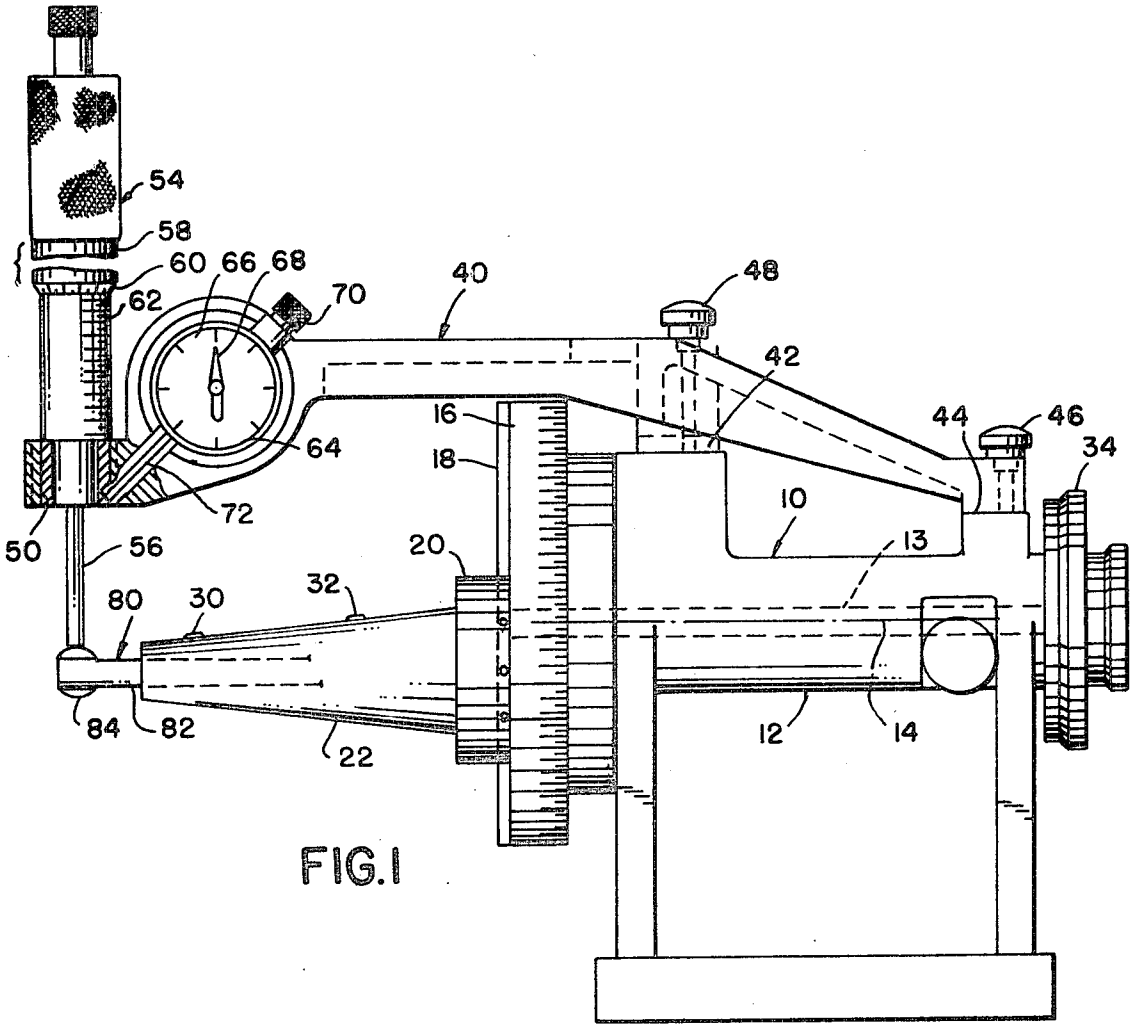


FIG.1

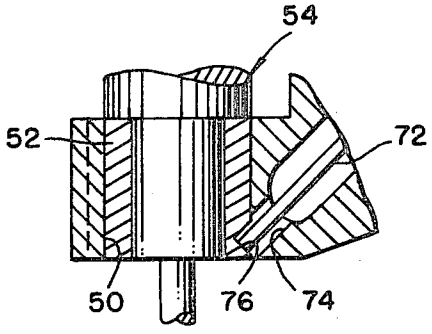


FIG.3

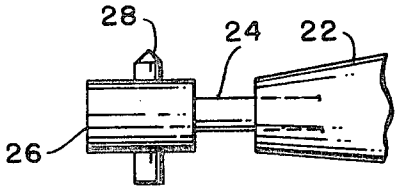


FIG.2

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RADIUS-SETTING GAUGE

SUMMARY OF THE INVENTION

Radius dressers are provided for use with grinding wheels and include means for rotating a dressing diamond in an arc of predetermined radius while in proximity to the periphery of a grinding wheel. With this arrangement, back and forth oscillation of the diamond in its arc as the wheel is rotated will result in dressing or trimming the periphery of the wheel to a corresponding cross-sectional radius. The diamond is adjustable so that it may be employed to dress a convex or concave surface of arcuate cross section on the wheel.

According to the present invention, means are associated directly with the dresser to facilitate adjustment of the diamond to a position in which it is caused to traverse an arc of the required radius. Specifically, this is accomplished by providing a rigid arm attachable in exactly fixed relation to the frame of the dresser, the arm having thereon a micrometer having an extension or stem extending toward the axis of rotation of the spindle on the dresser. The micrometer as a whole is movable on the arm radially with respect to the axis of the dresser spindle. Suitable position determining and indicating means, such as a dial indicator, is mounted on the arm and has a stem engageable with means movable with the micrometer.

A setup pin is provided having a head having opposed spherical portions. The pin is mounted on the dresser on an adjustable slide with its axis parallel to the axis of the spindle. The micrometer is set to extend the stem to a position where it will be engaged by the spherical head. Thereafter, the slide carrying the setup pin is moved toward the micrometer until the micrometer as a whole is moved away from a seat to some intermediate position. At this time the position of the micrometer is noted by observing the reading on the dial indicator.

Thereafter, the dresser is rotated through 180° to bring the opposite spherical surface of the head of the setup pin into proximity to the stem of the micrometer which is then permitted to engage the head of the setup pin. The reading of the dial indicator is noted and if it is identical with the reading obtained when the first surface of the heat engaged the stem of the micrometer, then the spherical head of the setup pin is centered on the axis of the spindle.

If the reading of the dial indicator, after the spindle has been rotated through 180°, differs from the original reading, then the slide carrying the setup pin is adjusted until identical readings are obtained with the spindle in positions 180° apart.

At this time the dial of the dial indicator is zeroed. Since the micrometer extension engages the setup pin at a point located above the axis of rotation of the dresser by a distance equal to one-half the diameter of the head of the setup pin, the device is calibrated so that if a diamond is substituted for the setup pin, and maintains the micrometer in the same position, and zeros the indicator, its operating radius will be equal to the radius of the ball head of the setup pin. If a different radius is required, a corresponding adjustment of the micrometer is made and when the diamond has been thereafter adjusted to a position which, through its engagement with the extending stem of the micrometer, has moved the micrometer to position the dial indicator at zero, the diamond will have been adjusted to the required position.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevation, partly in section, of a radius dresser and a self-contained but detachable setting gauge.

FIG. 2 is a fragmentary elevation of a diamond trimming tool associated with the radius dresser.

FIG. 3 is an enlarged fragmentary view showing the coaction between the micrometer and dial indicator.

DETAILED DESCRIPTION

The setting gauge disclosed herein and the radius dresser for which it is designed, constitute a novel combination although the particular radius dresser to which the gauge is applied has been in use. However, it has not been used in combination with a setting gauge attachable through the dresser to form a self-contained adjustable radius dresser. The radius dresser comprises a frame **10** having an elongated spindle housing **12** through which extends a rotatable spindle **13** the axis of which is indicated at **14**. Attached to the forward end of the spindle **13** is a member **16** having guide means such as a key **18** provided thereon and extending radially of and crossing the axis **14** of the spindle **13**. The base **20** is adjustable along the guide **18** and may be fixed in adjusted position by suitable means (not shown). Extending from the base **20** is an elongated sleeve **22** which is adapted to receive a pin **24** at the outer end of which is mounted a block **26** adapted to support a diamond trimming element **28**. The pin **24** is received in an opening in the sleeve **22** and may be given a slight angular adjustment by means of screws **30** and **32**, the screw **32** constituting a fine-adjustment screw for the diamond **28**.

Attached to the rear end of the spindle **13** is a spindle rotating knob **34** by means of which the spindle may be rotated back and forth so as to swing the diamond **28** in an arcuate path about the axis **14** of the spindle. It will be readily apparent that the radius of the arcuate path in which the point or trimming surface of the diamond **28** swings, may be adjusted by adjustment of the base **20** along guide **18**.

The problem which is solved by the present combination of structure is to position the diamond **28**, either by adjustment of the base **20** or by adjustment of the pin **24**, so that the cutting or trimming point of the diamond is spaced from the axis **14** of the spindle **13** by precisely the required amount. Heretofore, this has been accomplished by means of gauges set up on the surface supporting the radius dresser or a special surface plate. In accordance with the present invention, means associated directly with and attachable to the dresser are provided for the purpose of adjusting the radius of movement of the diamond as required.

For this purpose there is provided a rigid arm **40** which is intended for quick attachment to and detachment from the frame **10** of the dresser. The arrangement is such that when attached thereto, the arm **40** assumes identical positions. In order to accomplish this, accurately finished surfaces indicated generally at **42** and **44** are provided on the frame **10** of the dresser and the arm **40** has corresponding accurately finished locating surfaces engageable therewith. In addition, attachment screws **46** and **48** are carried by the arm and have threaded extensions engageable in threaded recesses provided in the seats **42** and **44** to insure positive and accurate location of the rigid arm **40**.

The forward or free end of the arm **40** is provided with a through opening **50** which may conveniently be of generally rectangular cross section and which receives a tubular slide **52** for free vertical movement thereon. Conveniently, antifriction balls (not shown) are provided in suitable ways between the surfaces of the opening **50** and the slide **52**. Mounted in fixed position in the slide **52** is a micrometer gauge indicated generally at **54** having a stem **56** which occupies the plane in which the diamond **28** swings. The extension **56** extends radially toward the axis of the spindle **13**. The micrometer gauge includes a rotatable barrel **58** including graduations **60** associated with indicia **62** to provide for a measured extension of the stem **56** from the locating surface provided by the upper surface surrounding opening **50** in the end of arm **40**.

The arm **40** includes an enlarged generally circular opening **64** which includes a dial indicator **66** having a pointer **68** and a knob **70** for rotating the dial to bring the zero indication thereon into any predetermined position.

The dial indicator **66** includes a stem **72** which extends through a diagonal opening **74** communicating with the through opening **50**. The slide **52** which carries the micrometer **58**, is provided with a notch **76** against which the end of the dial indicator stem **72** engages. With this arrangement vertical movement of the slide **52** and the associated micrometer **54** results in related movement of the dial indicator stem **72** and accordingly, rotation of the pointer **68** thereon.

In order to provide initial setup or calibration of the instrument there is provided a setup pin indicated generally at **80** which includes an elongated cylindrical pin **82** having a head **84**. The head **84** may be spherical or it may simply have two diametrically opposed portions which are spherical, the rest of the head being relieved. It is however essential that the center of the sphere or of the spherical portions be located on the axis of the pin **82**. Moreover, it is essential that the diameter of the spherical head portion be accurately known. Finally, it is essential that in setup the elongated cylindrical pin **82** of the setup pin shall occupy a position parallel to the axis **14** of the spindle **13**. Since the adjustment screws **30** and **32** may be used to displace the pin **24** which carries the diamond **28**, as seen in FIG. **2**, for fine adjustment, it is important to determine that the screws **30** and **32** are so adjusted when using the setup pin **80** that the cylindrical pin thereof shall be in strict parallelism with the axis **14** of the dresser.

With this arrangement the micrometer is set to read a dimension which will extend the stem to be engaged by the head **84** of the setup pin. At this time the base **20** carrying the sleeve **22** is adjusted vertically to bring the spherical head **84** of the setup pin into proximity to the axis **14** of the dresser spindle **13**. The micrometer stem **56** at this time is fixed in adjusted position such that the micrometer as a unit is displaced upwardly from its lower stopped or rest position determined by engagement with the top surface of the outer end of the arm. This upward displacement of the sleeve **52** and the micrometer carried thereby, will result in actuation of the dial indicator **66** and rotation of the pointer **68** thereof to some intermediate position.

At this time the micrometer is lifted to clear the stem **56** from the head **84** of the setup pin and the spindle of the dresser is rotated 180°. The micrometer is then lowered until the stem **56** engages the spherical surface of the setup pin opposite the surface thereof which was first contacted. If the dial indicator at this time reads exactly the same as when the first surface of the setup pin was contacted, then the base **20** is in the position such that the head **84** is centered with respect to the spindle axis **14**. If this condition does not exist then minor adjustments of the base **20** are made until identical readings are obtained on the dial indicator with the head **84** of the setup pin rotated through 180°. At this time the micrometer is in a position such that the lower end of its stem **56** is spaced above the axis **14** of the dresser spindle by precisely the radius of the spherical head **84**. At this time the dial of the dial indicator is adjusted to read zero with respect to the pointer **68**, irrespective of the position occupied by the pointer. The setting instrument is now calibrated.

In order to set a diamond to any desired radius for trimming a grinding wheel, the setup pin is now removed and the pin **24** carrying the diamond dressing or trimming element is positioned in the sleeve **22**. To avoid injury to the diamond and to avoid wear on the lower end of the stem **56** of the micrometer, it is usual to insert a thin anvil of known thickness therebetween. The micrometer is now adjusted to provide the required extension of the stem **56** for any desired radius of curvature, taking into account the thickness of the interposed anvil if this is used. Thereafter, the structure is adjusted either by adjusting the base **20** of the sleeve **22** along the guide **18** or by adjusting the angularity of the diamond pin **24** through the agencies of the screws **30** and **32** until this adjustment has lifted the micrometer to the position in which the dial indicator reads zero. At this time the trimming point of the diamond **28** is at the required radius.

The foregoing construction provides an additional useful function in that after the diamond has been adjusted as described above, the knob **34** may be rotated back and forth slightly to observe if the micrometer is lifted slightly by such operation. This will occur if the diamond dresser happens to have a high point displaced laterally from the assumed high point which would in fact become the dressing portion during normal use. If this occurs then, of course, a further adjustment is required to set the high point of the dresser at the required radius.

With the foregoing construction there is provided a self-contained setting instrument attachable directly to the dresser which can be used to provide accurate setting of the diamond to swing in the desired arc for trimming concave or convex arcuate cross section surfaces on the grinding wheel. In normal usage, after calibration of the setting gauge, adjustment of the diamond to any required radius is a simple and quick operation.

Since the setting gauge is quickly detachable from the dresser by simple loosening of the two screws **46** and **48**, the setting gauge may be removed from the dresser when not in use and quickly replaced whenever required.

What I claim as my invention is:

1. A radius-setting gauge for use with a radius dresser having a frame, a rotary spindle in said frame, and a dressing element rotatable with and adjustable radially of said spindle, said gauge comprising:

a rigid arm;

means for attaching said arm to the frame of said dresser in accurately located position with one end portion located in the plane of rotation of the element;

a micrometer carried by said arm at the said one end portion and having an adjustable stem extending toward the element;

a slide mounting said micrometer for sliding movement therewith relative to said arm in a direction radially of the spindle of the dresser;

a dial indicator carried by said arm having a plunger operatively coupled with said slide; and

a setup pin for said dresser adapted to be mounted as an extension of the dresser spindle, said pin having a head provided with opposed setup surfaces of known equal spacing from the axis of said pin in position to engage the stem of said micrometer.

2. A gauge as defined in claim **1** in which the head of said setup pin comprises opposed concentric spherical surfaces, the center of said surfaces being located on the axis of said pin to be thereby positioned on the axis of the dresser spindle.

3. A gauge as defined in claim **1**, said arm having a through opening at its outer end, said slide being freely movable in said opening from a rest position radially outwardly from the axis of the spindle of the radius dresser, said micrometer being fixedly carried by said slide for movement therewith radially of said spindle as a result of engagement with the end of the stem of said micrometer by said setup pin or said element.

4. A gauge as defined in claim **3**, said arm having an inclined opening in communication with said through opening, said dial indicator having a stem extending through said inclined opening into engagement with said slide for actuation thereof.

5. The method of adjusting a radius dresser having a frame, a rotary spindle in said frame, and a diamond support rotatable with and adjustable radially of said spindle to a required radius which comprises mounting directly on the radius dresser frame in fixed position an arm supporting a micrometer having a stem extending radially toward the axis of said spindle and a measuring device, said micrometer being bodily movable radially of the axis of said spindle parallel to the direction of movement of said stem, said measuring device having an extending stem movable upon movement of said micrometer;

mounting on said diamond support a setup pin having a pair of opposed surfaces spaced apart in a direction perpendicular to the axis of said spindle;

setting said micrometer to extend the stem in position to be engaged by said pin;

moving said diamond support toward said micrometer to displace said micrometer by engagement between one of said surfaces and the end of said stem, reading the indicated position of said micrometer on said measuring device while the micrometer is positioned by engagement with said pin;

rotating said spindle to bring the other of said surfaces into engagement with the stem of said micrometer;

measuring the second position of said micrometer;

adjusting said diamond support until the two positions of said micrometer are identical to determine a zero micrometer position;

replacing said setup pin with a dressing diamond, setting said micrometer to a dimension corresponding to the required radius setting for said diamond, after the two indicated positions are identical, zeroing the measuring device to provide for a zero reading thereof when said diamond is adjusted to move the micrometer to a preset

dimension thereof; and

adjusting said diamond support to displace said micrometer to its zero position.

6. The method as defined in claim 5 which comprises swinging said diamond through a small arc while in contact with the micrometer to measure that the area thereof furthest from the axis of the spindle is set to the required radius for trimming.

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