Aug. 27, 1946. E. M. LOONEY 2,406,467

FIXTURE FOR GRINDING WHEEL AND TOOL FORMS

Filed Aug. 5, 1944 2 Sheets-Sheet 1

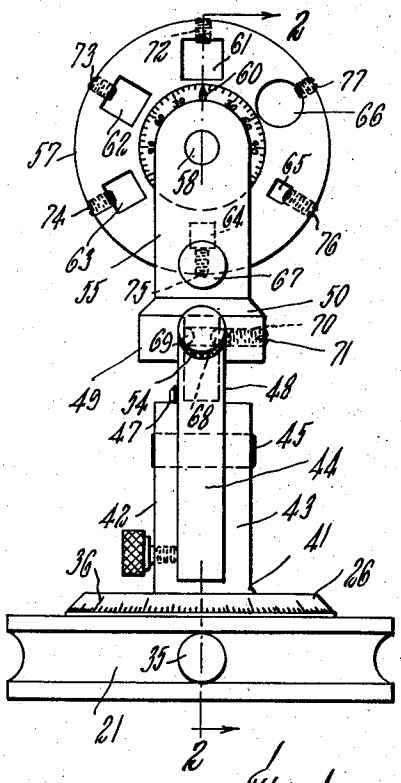


Fig. 1.

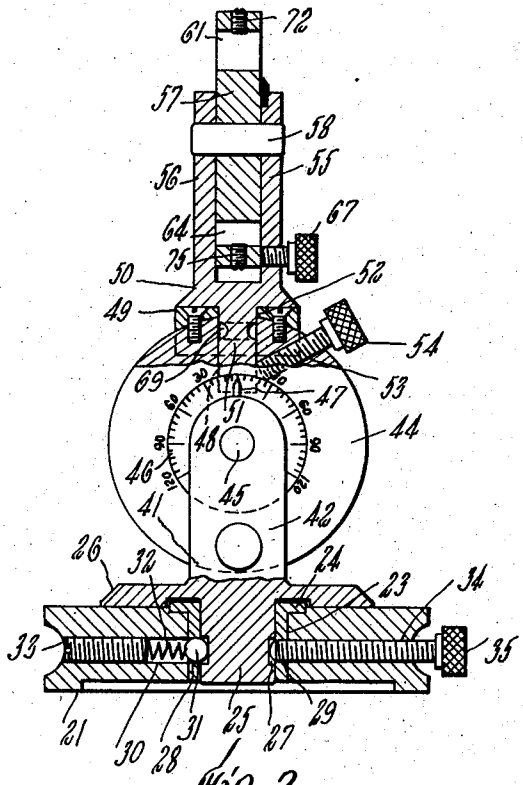


Fig. 2.

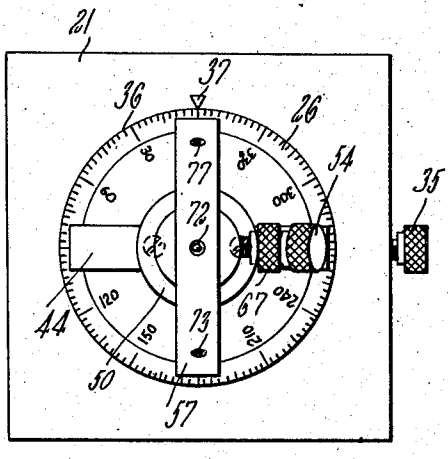


Fig. 3.

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FIXTURE FOR GRINDING WHEEL AND TOOL FORMS

Filed Aug. 5, 1944 2 Sheets-Sheet 2

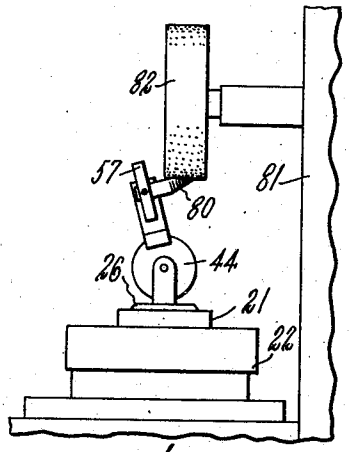



Fig. 4.

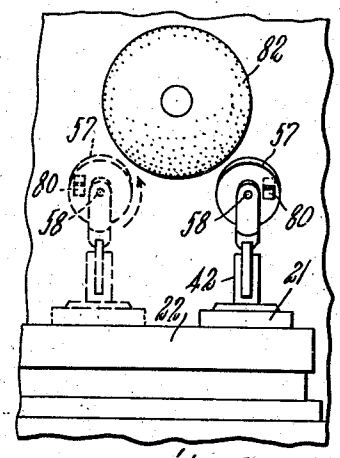



Fig. 5.

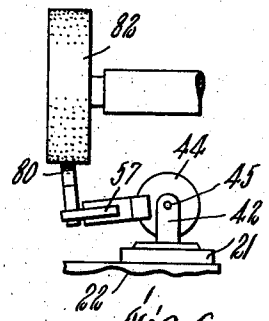



Fig. 6.

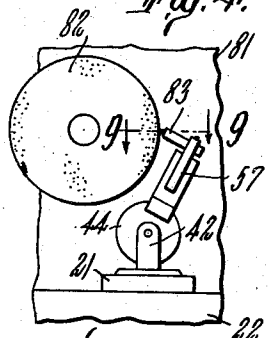



Fig. 7.

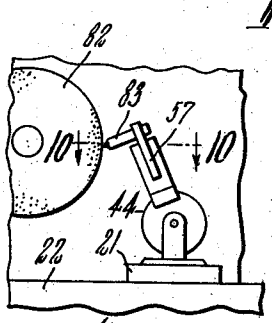



Fig. 8.

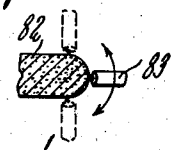



Fig. 9.

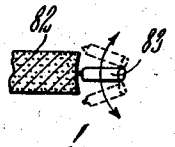



Fig. 10.

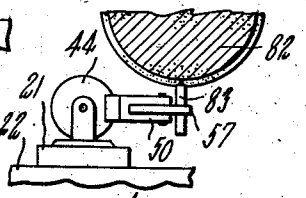



Fig. 11.

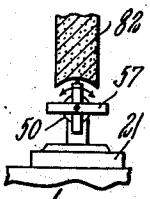



Fig. 12.

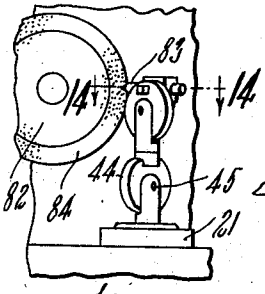



Fig. 13.

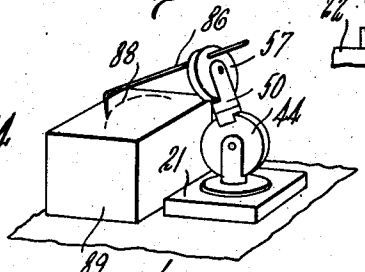



Fig. 15.

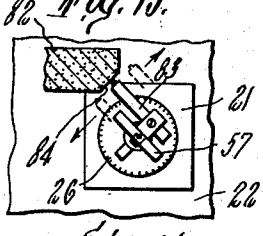



Fig. 14.

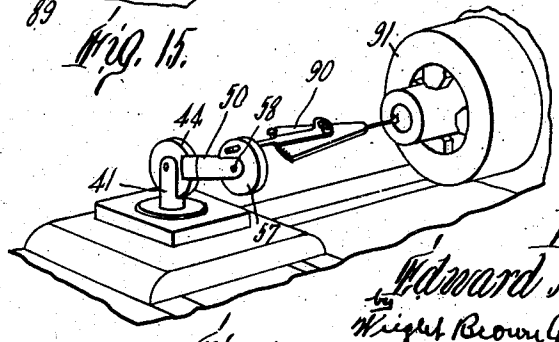



Fig. 16.

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2,406,467

# UNITED STATES PATENT OFFICE

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## FIXTURE FOR GRINDING WHEEL AND TOOL FORMS

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Application August 5, 1944, Serial No. 548,157

4 Claims. (Cl. 51—220)

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This invention relates to tool holders or fixtures, and more particularly to a universally adjustable tool fixture for holding tools of various kinds for the sharpening or grinding operations thereon, or for wheel dressing to various contours, or for performing various gaging or testing operations.

An object of the invention is to provide an improved universally adjustable tool fixture, in which the tool carrying member is arranged to be quickly and easily set in any one of a plurality of predetermined positions.

Another object of the invention is to provide an improved tool holder fixture including a base and means supported from the base for carrying a tool in a number of desired positions, and in which the tool carrying means is readily detachable from the base.

Another object of the invention is to provide an improved tool holder fixture in which the tool holding member is rotatably mounted about a predetermined axis and is formed with a series of tool receiving openings of various sizes and shapes arranged in circular array with respect to the axis of rotation of the member.

Another object of the invention is to provide an improved tool holder fixture including a base having a member mounted thereon for horizontal rotation, a second member carried by the first member and arranged for vertical rotation with respect to the first member, a third member carried by the second member and rotatable relative thereto, the construction and arrangement of the parts being such that the horizontally rotatable member is capable of being disposed in any desired predetermined angular relationship on the base, the second rotatable member is capable of being disposed in any desired predetermined vertical angular relationship with the first rotatable member, and the third member is adapted to carry a tool and dispose the same in any desired angular position.

With the foregoing and other objects and advantages in view, the invention consists in the preferred construction and arrangement of the several parts which will be hereinafter fully described and claimed.

In the accompanying drawings:

Figure 1 is a front elevation of an adjustable tool fixture embodying the present invention, showing the same in one position;

Figure 2 is a vertical transverse section taken along the line 2—2 of Figure 1;

Figure 3 is a top plan view;

Figures 4, 5 and 6 are diagrammatic elevational views showing the device in a plurality of positions and in association with a grinding wheel;

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Figure 7 is an elevational view showing the device arranged to support a tool for the purpose of dressing or truing a grinding wheel having a convex periphery;

Figure 8 is a view similar to Figure 7 showing the device associated with a grinding wheel for dressing a concave periphery;

Figure 9 is a horizontal section taken along the line 9—9 of Figure 7;

Figure 10 is a horizontal section taken along the line 10—10 of Figure 8;

Figures 11 and 12 are views similar to Figures 8 and 10, respectively, showing another arrangement of the adjustable tool fixture in association with a grinding wheel having a concave periphery;

Figure 13 is an elevation of another form of grinding wheel showing the adjustable tool fixture in association therewith;

Figure 14 is a horizontal section taken along the line 14—14 of Figure 13; and

Figures 15 and 16 are perspective views showing arrangements of the improved adjustable tool fixture for purposes of testing or gaging work.

Referring to the drawings and especially to Figures 1, 2 and 3, the improved adjustable tool fixture comprises a base 21 which may be held by a magnetic chuck or other suitable support, such as indicated at 22, Figure 4, whereby said base is fixed or rigidly held in a fixed position.

The base 21 is formed with a vertical bore 23 in which is mounted a tubular bushing 24 that constitutes a bearing for a trunnion 25 depending from the bottom of a member 26.

The construction is such that the member 26 is rotatably mounted on the base 21 for horizontal rotation, that is, about a vertical axis.

In order to prevent accidental lateral shifting movement upwardly of the member 26 with respect to the base 21, the depending portion or trunnion 25 of said member, is formed with an annular groove 27 which registers with a pair of diametrically disposed openings 28 and 29 formed in the bushing 24.

Formed in the base 21 is a horizontally disposed bore or opening 30 which alines with the groove 27 and opening 28, when the parts are assembled in the manner shown in Figure 2.

A ball 31 is normally retained in the cavity provided by the groove 27 and opening 28 by a spring 32, mounted in the bore or opening 30 and retained therein by a screw threaded plug

33 having threaded engagement with a screw threaded portion of said bore or opening. The spring pressed ball acts as a latch releasable by application of sufficient force to permit disassembly of the member 26 and parts carried thereby from the base 21 when desired.

Also formed in the base 21 and diametrically disposed with respect to the bore or opening 30, is a second threaded bore or opening 34 which alines with the groove 27 and the opening 29.

A set screw 35 is mounted in the bore or opening 34, the inner end of said screw being arranged to be disposed within the annular groove 27 and to engage the inner wall of said groove when said set screw is turned inwardly tightly, to thereby rigidly retain the member 26 from rotating with respect to the fixed base 21, when the device is set in a predetermined position.

The main body of the member 26 may be of annular form, as shown best in Figure 3, with the outer peripheral edge of said member beveled or disposed at an angle and having formed thereon calibrations 36.

As shown, the calibrations 36 may designate each degree of a circle, and the relative position or angular arrangement of the member 26 with respect to base 21 may be readily determined by the operator of the device noting the position of the calibrations 36 with a pointer 37 fixedly mounted on the upper surface of the base 21.

In Figures 1, 2 and 3 the device is shown with the several adjustable parts thereof set at zero angle positions. The manner in which the device is adapted to be adjusted will be hereinafter more fully described.

Projecting upwardly from the member 26, is a standard 41 having a pair of vertically disposed parallel legs 42 and 43, arranged in suitable spaced apart relation so as to receive therebetween an annular member 44.

The annular member 44 is mounted in the standard 41 for vertical rotation about a horizontal axis provided by a pivot pin 45 carried by the legs 42 and 43.

One face of the member 44 is formed with calibrations 46, and the leg 42 is provided with an upwardly projecting finger 47 adapted, during rotation of the member 44, to indicate the angle at which said member is positioned with respect to the vertical standard.

Formed in the annular member 44 and extending inwardly from the outer periphery thereof is a slot or opening 48.

The slot or opening 48 is radially disposed with respect to the center of rotation of the member 44, the longitudinal center line of said opening coinciding with the point of the calibrations 46 indicating zero angle degrees, as shown in Figure 2.

Surrounding the mouth of the opening 48 and mounted on the outer periphery of the member 44, is an annular block 49 having a flat outer or top face that constitutes a seat for the bottom of a second standard or post 50.

The post 50 is formed with a depending portion or trunnion 51 that passes through an opening 52 in the block 49 and is disposed within the opening or slot 48.

At a suitable point adjacent to the opening or slot 48, the member 44 is formed with a threaded bore 53 that extends from the periphery of said member inwardly at an angle and intersects the opening or slot 48 at a point adjacent to the inner end thereof.

A set screw 54 is mounted in the bore 53, the



inner end of the set screw being arranged to engage the trunnion 51 so as to rigidly hold the standard or post 50 in a predetermined fixed position relative to the annular member 44, for a purpose to be hereinafter more fully described.

In order to prevent axial shifting movement of the post 50 with respect to the member 44 when the set screw 54 is out of engagement with the trunnion 51, a suitable locking means is provided. This locking means includes a ball 68 disposed partly in a peripheral groove 69 formed in the trunnion 51, and partly in a socket 70 in the post 50 and held therein by a set screw 71 threaded into the socket 70, as shown in Figure 1.

The manner in which the post or standard 50 is mounted in the annular member 44 is such that said post is rotatable about an axis at right angles to the axis of rotation of the annular member 44.

The standard or post 50 has a pair of vertically disposed parallel legs 55 and 56, arranged a suitable distance apart so as to receive therebetween an annular tool holding member 57.

The tool holder 57 is mounted in the post or standard 50 for rotation about an axis provided by a pivot pin 58 carried by the legs 55 and 56 at right angles to the rotation axis of the trunnion 51.

One face of the tool holder 57 is formed with calibrations 59, and the leg 55 is provided with an upwardly projecting finger 60 adapted, during rotation of the tool holder 57 to indicate the angle at which said tool holder is positioned with respect to the longitudinal center line of the post or standard 50.

Formed in the body of the tool holder 57, is a series of openings 61, 62, 63, 64, 65 and 66. As shown in Figure 1 these openings are of various sizes and configurations so as to accommodate tools of various types. In the present instance, six tool receiving openings are shown formed in the tool holder 57. These openings are arranged with centers spaced equidistances apart, or as shown, the centers of the openings are spaced 60 degrees apart in relationship to the location of the calibration 59.

So that the tool holder 57 can be retained in a predetermined fixed position with respect to the post or standard 50, the leg 56 carries a set screw 67 which is so arranged that the inner end of the set screw can impinge against a face of the tool holder when the set screw is turned in tightly, to thereby prevent rotation of the tool holder with respect to the post or standard 50.

Associated with each of the openings 61 to 66 inclusive, are radially disposed set screws 72 to 77, inclusive, respectively, which are adapted to retain a tool in fixed position in the tool holder in well known manner.

Since the member 26 is rotatably mounted on the base 21 for horizontal rotation, and since the annular member 44 is mounted on the member 26 for vertical rotation, the tool holding member 57 is arranged to be disposed in any number of predetermined positions, due to the manner in which said member 57 is rotatably supported, as has been heretofore described, and, due to the provision of means in the member 57 for receiving tools of various types and sizes, the device of the present invention is capable of being used in the accurate production of cutting tools, and it makes it possible to regrind or sharpen tools of various types and to retain the respective contours of the tools so reground. By means of the calibrations or graduated scales which indicate

the angles of the various settings of the device, it is possible to record data for any form of cutting tool and to duplicate the tool.

It will be noted that adjustment may be effected about four different axes as follows: first, the axis of the trunnion **25**; second, the axis of the pivot pin **45** which is perpendicular to and intersects the axis of the trunnion **25**; third, the axis of the trunnion **51** which is perpendicular to and intersects the axis of the pivot pin **45**, and, fourth, the axis of the pivot pin **58** which is perpendicular to and intersects the axis of the trunnion **51**; and the axes of the standards lie in the central plane of the tool holder. Because of this relationship between the various axes, angular adjustment about any of them at equal distances on either side of the zero indication will cause equal and opposite tool adjustment. It is also to be noted that the post **50** may be swung through the vertical and through substantially 120° on either side of the vertical. This makes possible adjustment to any of the discussed positions shown in Figures 4 to 16, inclusive, as well as to many more not illustrated, and which may be found convenient for special purposes.

As shown in Figures 4, 5 and 6, when it is desired to grind or resharpen a tool, such as a threading tool **80**, the base **21** is mounted on the supporting element **22** of a grinding machine **81** having a suitable grinding wheel **82**. The tool holding member **57**, with the tool **80** mounted in one of the openings **61** to **66** therein, is disposed in the desired angular relationship with respect to the standard **41**, by shifting the positions of the members **26**, **44** and **57** from the zero angle position shown in Figures 1, 2 and 3, to the angular arrangement shown in Figures 4, 5 and 6. The surface portion of the tool **80** to be reground or dressed is thus held in the desired position so that when the tool **80** is moved into contact with the grinding surface of wheel **82** the desired operation will be accurately performed thereon. In Figure 4 there is shown the relative position of the parts when the fixture is arranged to sharpen or regrind one side face of a threading tool. The manner in which the other side face of the threading tool is ground is shown in Figure 5, the tool holding member **57** being turned about its axis **58**, and the manner in which the tool point is dressed to the desired front rake is shown in Figure 6, the member **44** being turned about its axis **45**.

Figures 7 to 14, inclusive, show various positions wherein the device is adapted for use for dressing grinding wheels.

Thus in Figures 7 and 9, by rocking the truing tool **83** clamped in the hole **66** of the disk **57** about the axis of the standard **42** which lies inwardly of the wheel edge the edge of the grinding wheel is trued convex, while the same action with the parts arranged as shown in Figure 8 with the axis of the standard **42** outwardly of the wheel edge, the wheel will be trued concave.

Figures 11 and 12 show a still different arrangement wherein rocking motion about its axis of the standard **50** will true the grinding wheel concave, this axis being below the wheel edge.

Figures 13 and 14 show an arrangement wherein by rocking the truing tool about the pivot **45** a bevel face **84** will be formed on the grinding wheel.

Figure 15 shows the device used in place of a surface gage. It employs a scribing point **86** which may be swung about the axis of the part **42** to scribe an arc **88** in a horizontal surface of a work piece **89**.

Figure 16 shows the device used as a support instead of a tool post for an indicator gage **90** employed to test whether a piece of work is properly centered with respect to a rotary chuck **91**. Any wabbling of the feeler will show magnified on the indicator arc. The usual tool post does not have the great facility of adjustment to bring the feeler into gaging position as does this device.

It will be noted that due to the manner in which the standard **42** is detachably connected with the base **21**, the portion of the fixture, including the several parts carried by said standard, can be readily assembled and disassembled with respect to the base **21**. When the parts are thus disassembled the parts can be easily packed in a machinist's tool box or the like without difficulty, so that the device is easily portable.

From the foregoing description of certain embodiments of this invention, it should be evident to those skilled in the art that various changes and modifications might be made without departing from the spirit or scope of this invention as defined by the appended claims.

I claim:

1. In a tool holding fixture, in combination, a base, a member rotatably mounted on said base for horizontal rotation, a standard carried on said horizontally rotatable member extending at substantially a right angle to said base, an annular member rotatably mounted in said standard for vertical rotation with respect to the horizontally rotatable member, a second standard carried by said annular rotatable member and when vertically extended rotatably mounted for horizontal rotation with respect to said annular member, said second standard extending radially from the periphery of the annular member and having its axis of rotation always in the same plane as the axis of rotation of the first standard, and a tool holding member mounted for vertical rotation on said second standard when said second standard is vertically extended and having its axis of rotation intersecting the axis of rotation of the second standard.

2. In a tool holding fixture, in combination, a base, a member rotatably mounted on said base for horizontal rotation, a standard carried on said horizontally rotatable member extending at substantially a right angle to said base, an annular member rotatably mounted in said standard for vertical rotation with respect to the horizontally rotatable member, a second standard carried by said annular rotatable member and when vertically extended rotatably mounted for horizontal rotation with respect to said annular member, said second standard extending radially from the periphery of the annular member and having its axis of rotation always in the same plane as the axis of rotation of the first standard, and a tool holding member mounted for vertical rotation on said second standard when said second standard is vertically extended and having its axis of rotation intersecting the axis of rotation of the second standard, said first mentioned standard being centrally disposed with respect to said horizontally rotatable member.

3. In a tool holding fixture, in combination, a base, a member rotatably mounted on said base for horizontal rotation, a standard carried on said horizontally rotatable member extending at substantially a right angle to said base, an annular member rotatably mounted in said standard

for vertical rotation with respect to the horizontally rotatable member, a second standard carried by said annular rotatable member and when vertically extended rotatably mounted for horizontal rotation with respect to said annular member, said second standard extending radially from the periphery of the annular member and having its axis of rotation always in the same plane as the axis of rotation of the first standard, and a tool holding member mounted for vertical rotation on said second standard and having its axis of rotation intersecting the axis of rotation of the second standard, said tool holding member being mounted for vertical rotation on said second standard axially thereof when said second standard is vertically extended.

4. In a tool holding fixture, in combination, a base, a member rotatably mounted on said base for horizontal rotation, a standard carried on said horizontally rotatable member extending at



substantially a right angle to said base, an annular member rotatably mounted in said standard for vertical rotation with respect to the horizontally rotatable member, a second standard carried by said annular rotatable member and when vertically extended rotatably mounted for horizontal rotation with respect to said annular member, said second standard extending radially from the periphery of the annular member and having its axis of rotation always in the same plane as the axis of rotation of the first standard, and a tool holding member mounted for vertical rotation on said second standard when said second standard is vertically extended and having its axis of rotation intersecting the axis of rotation of the second standard, said second standard with said tool holding member being movable through 360 degrees.

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