

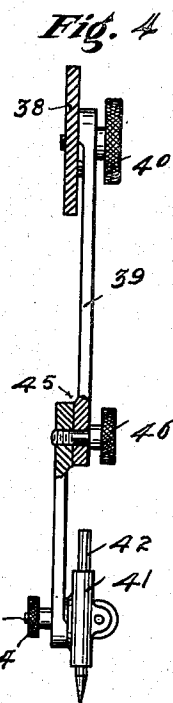
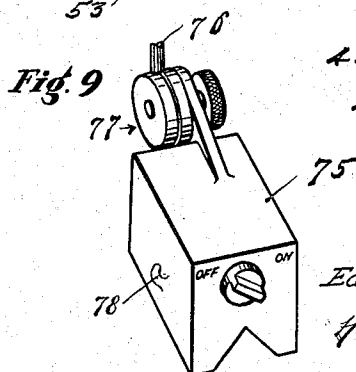
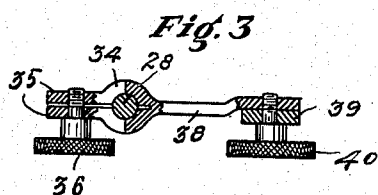
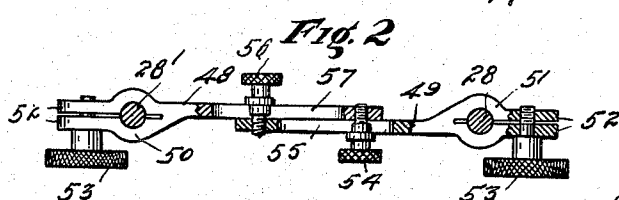
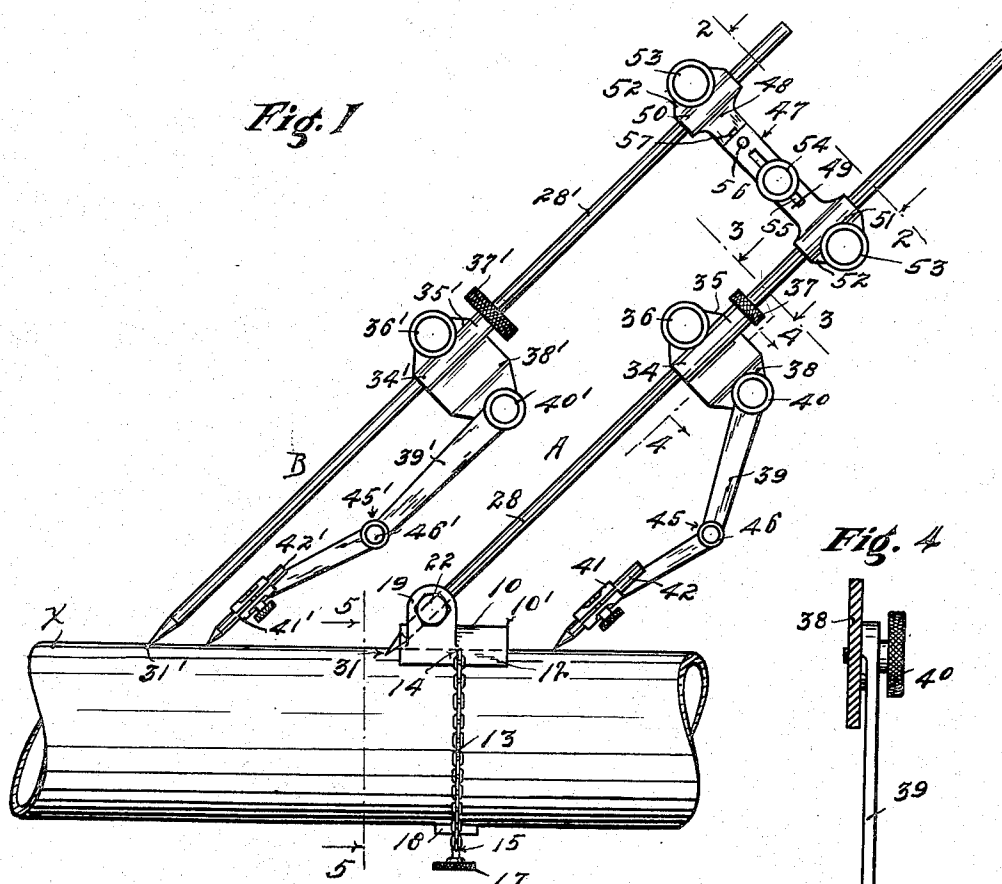
Nov. 24, 1953

E. E. NORRIS
PROJECTION COMPASS

2,659,972

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2 Sheets-Sheet 1



Inventor-
Edward E. Norris
Harry W. Nelson
Attorney

Nov. 24, 1953

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2 Sheets-Sheet 2

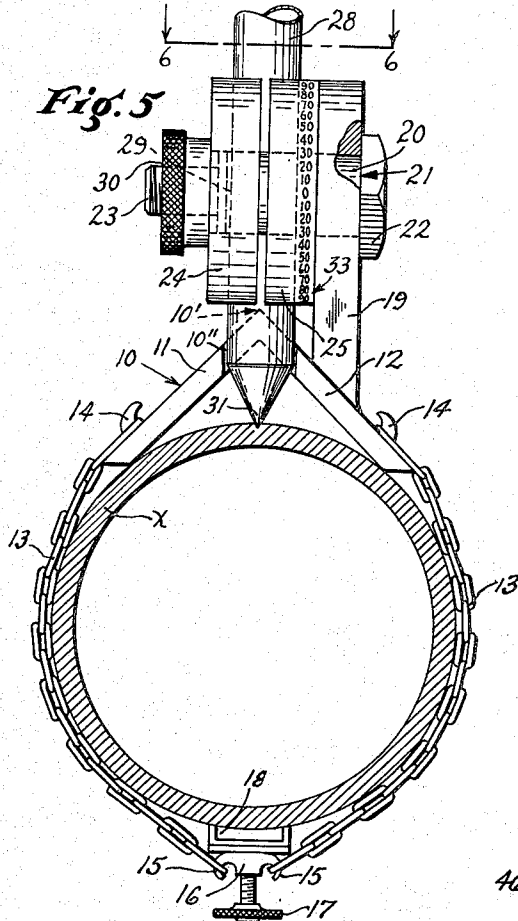


Fig. 6

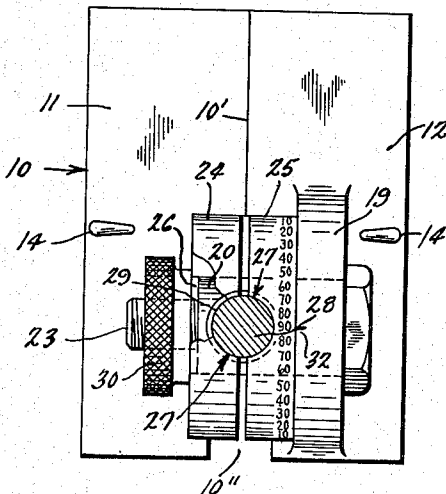


Fig. 8

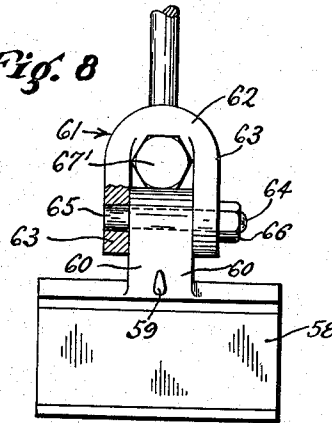
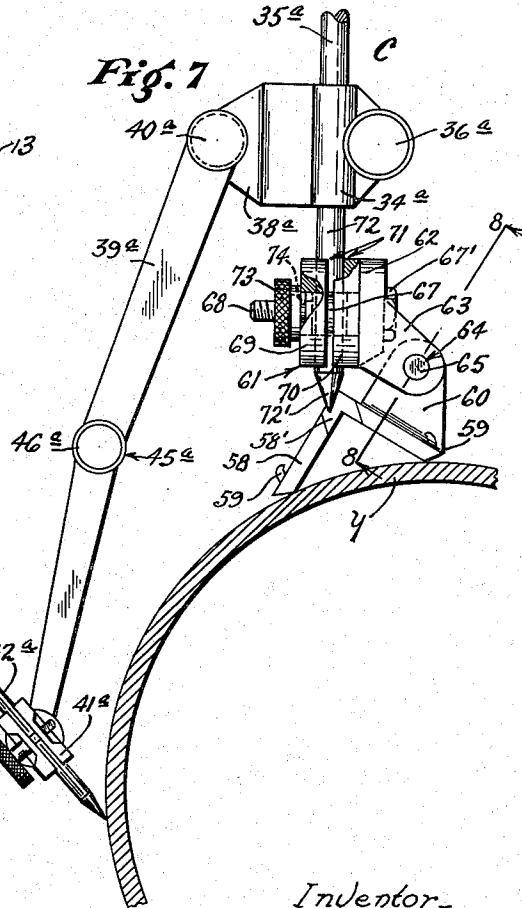


Fig. 7



Inventor-
Edward E. Norris
Harry W. Kueper
Attorney

UNITED STATES PATENT OFFICE

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PROJECTION COMPASS

Edward E. Norris, Minneapolis, Minn.

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2 Claims. (Cl. 33—21)

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My present invention relates to compasses and, more particularly, to a projection compass.

It is well known that layouts for welders or other artisans, in guiding them in making cuts, welding or other work, are usually made by means of templates which are a slow and exacting piece of work to prepare.

The object of this invention is to provide a projection compass for scribing a circle on any surface, particularly an oblique or cylindrical surface.

To the above end, the invention consists of the novel devices and combination of devices herein-after described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a side elevational view showing one form of the invention applied to a piece of work in the form of a pipe;

Figs. 2, 3 and 4 are detail views partly in elevation and partly in section taken on the lines 2—2, 3—3 and 4—4 of Fig. 1, on an enlarged scale;

Fig. 5 is a view partly in elevation and partly in section taken on the line 5—5 of Fig. 1, on an enlarged scale, the shaft being shown in a perpendicular position relative to the work;

Fig. 6 is a view principally in plan, with the shaft sectioned on the line 6—6 of Fig. 5;

Fig. 7 is a front elevational view of another form of the invention;

Fig. 8 is a side elevational view of the parts shown in Fig. 7, with a portion thereof broken away and sectioned on the line 8—8 of Fig. 7; and

Fig. 9 is a perspective view of a different form of base.

Referring first to the invention shown in Figs. 1 to 6, inclusive, which includes, as shown in Fig. 1, a primary instrument A and a secondary instrument B. These two instruments are substantially identical, the one with the other, except the mounting thereof. Either one of these instruments may be used for scribing a circle on a piece of work. The mounting of the instrument A limits the smallness of a circle that can be scribed. The instrument B is used for scribing circles smaller than can be scribed by the instrument A.

The instrument A will first be described in detail and includes a base 10 in the form of an angle bar, the flanges 11 and 12 of which are turned downwardly with their longitudinal edge portions resting on a piece of work. This piece of work, as shown, is a pipe *x* and the base 10

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extends longitudinally thereof with its apex 10' parallel to the axis of said pipe.

The base 10 is rigidly and detachably secured to the pipe *x* by a pair of chains 13 that extend around said pipe on opposite sides thereof. The uppermost links of the chains 13 are held by hooks 14 on the flanges 11 and 12 at the longitudinal centers thereof. The lowermost links of the chains 13 are held by a pair of opposite hooks 15 on a nut-acting member 16 having threaded engagement with a hand screw 17. This hand screw 17, at its outer end, is swivelled on a channel block 18, the flanges of which bear on the under side of the pipe *x*, as a base of resistance, see Fig. 5. Obviously, by tightening the hand screw 17, the chains 13 will be drawn tightly around the pipe *x* and rigidly hold the base 10 thereon.

Integral with the flange 12 is an upstanding bearing 19, the sides of which are flat and extend parallel to the apex 10'. A pivot bolt 20, of large diameter, extends through a transverse hole 21 in the bearing 19 and over the base 10 with its axis perpendicular to a plane passing through the apex 10' and bisecting the angle between the flanges 11 and 12. This bolt 20 has a large head 22 that impinges the outer side of the bearing 19, and the outer end portion of said bolt is of reduced diameter and screw-threaded to afford a stud 23.

A pair of clamping discs 24 and 25 have axial holes 26 through which the bolt 20 extends. It is important to note that the outer end of the bolt 20 terminates short of the outer side of the clamping disc 24, see Fig. 6. The clamping disc 25 impinges the bearing 19 as a base of resistance. In the opposing faces of the clamping discs 24 and 25 is a pair of half seats 27 that are semi-circular in cross-section.

A long round shaft 28 in the half seats 27 is held in different endwise adjustments by the clamping discs 24 and 25. This shaft 28 extends through a transverse hole 29 in the bolt 20 and a notch 10' in the front end portion of the base 10. A knurled nut 30 on the stud 23 impinges the outer side of the clamping disc 24 and clamps the discs 24 and 25 onto the shaft 28 and disc 25 onto the bearing 19 and frictionally hold the same from turning. The depth of the half seats 27 is such that the two discs 24 and 25 do not meet when clamped onto the shaft 28, see Fig. 6. The discs 24 and 25 hold the shaft 28 with its axis in the same plane as the apex 10'. It is important to note that the diameter of the hole 29 is somewhat larger than the diameter of the

shaft 28 to permit the knurled nut 30 to move the discs 24 and 25 axially on the bolt 20 and clamp the disc 25 onto the bearing 19 and to clamp the discs 24 and 25 onto the shaft 28 without interference from said shaft.

The lower end portion of the shaft 28 is tapered to a point 31 at the axis thereof.

Prior to mounting the instrument A on the pipe x, a hole will be punched in said pipe at a predetermined point which will be the center of a circle to be scribed on said pipe by the instrument A. When mounting the instrument A on the pipe x, the knurled nut 30 is loosened to permit axial adjustment of the shaft 28 relative to the base 10 and its point 31 placed in the center hole punched in the pipe x. The base 10 is next adjusted on the pipe x to bring the shaft 28 into its correct angular position relative to the apex 10' of the base 10. When the base 10 is properly adjusted on the pipe x, the hand screw 17 is operated to clamp the base 10 onto the pipe x and the knurled nut 30 operated to clamp the discs 24 and 25 onto the shaft 28 and hold the same where adjusted relative to the base 10. During this adjustment, the shaft 28 is held with its point 31 in the punched center hole. It may be here stated that the bottom edge portions of the flanges 11 and 12 will be machined to a true plane, said plane being perpendicular to axis of shaft 28 when the assembly is adjusted and tightened to a position where the 90° mark on disc 25 aligns with pilot mark 32.

On the top of the bearing 19 is a pilot mark 32 and on the periphery of the disc 25 is a circumferential scale of degrees 33 reading in opposite direction from zero to 90 degrees. When 90 degrees is in registration with the pilot mark 32, the shaft 28 is perpendicular to the apex 10'. From 90 degrees, the scale 33 reads in opposite directions to a second zero which is diametrically opposite the first zero.

A sleeve 34 on the shaft 28 is normally free to float axially and turn about the axis of said shaft. This sleeve 34 is longitudinally slit and provided with a pair of outstanding ears 35 between which said slit extends. A knurled thumb screw 36 connects the two ears 35 and is operable to draw the same together and frictionally clamp the sleeve 34 onto the shaft 28. Integral with the upper end of the sleeve 34 is a knurled knob 37 by which the sleeve 34 may be moved on the shaft 28. Formed with the sleeve 34, diametrically opposite the ears 35, is a radial extension 38.

A depending arm 39 is pivotally attached, at its upper end, to the extension 38 by a knurled thumb screw 40 and is normally frictionally clamped thereon by said screw. A friction holder 41 for a pencil 42, to scribe a circle on the pipe x, is pivotally attached to the lower end portion of the arm 39 by a screw stud 43 and an applied knurled thumb nut 44. Normally, the holder 41 is frictionally clamped on the arm 39 where positioned. In the arm 39 is an intermediate joint 45 having a pivot in the form of a knurled thumb screw 46 that frictionally holds the joint from pivotal movement.

By turning the sleeve 34 by means of the knob 37, the pencil 42 will scribe a circular line on the pipe x and at the same time the sleeve 34 will float on the shaft 28 and thus always keep the pencil in contact with the pipe x.

Referring now in detail to the instrument B, wherein the parts thereof that correspond to like parts throughout the several views in Figs.

1, 3 and 4 are given the same reference numeral followed by a prime. The shaft 28' is rigidly secured to the shaft 28, in parallel arrangement by a spanner 47, comprising an outer section 48 and an inner section 49. On the outer end of the section 48 is a sleeve 50 and on the outer end of the section 49 is a sleeve 51. These two sleeves 50 and 51 are identical with the sleeve 34 and the ears and knurled thumb screw are designated by the numerals 52 and 53, respectively. The sleeves 50 and 51 are applied to the upper end portions of the shafts 28 and 28' and are normally clamped thereon. The spanner sections 48 and 49 are in overlapped arrangement and connected, for endwise adjustment, to vary the distance between the two shafts 28 and 28' by a knurled thumb screw 54 that extends through a longitudinal slot 55 in the spanner section 49 and has threaded engagement with the section 48. For holding the two spanner sections 48 and 49 for straight line movement and aligned, a second knurled screw 56 extends through a longitudinal slot 57 in the section 48 and has threaded engagement with the section 49, see Fig. 2.

When the instrument A is to be used to scribe a circle on the pipe x, the arm 39' of the instrument B may be turned on the opposite side of the shaft 28' from that shown, or the instrument B removed by detaching the spanner 47 from the shaft 28. If desired, one compass may be dispensed with and the other mounted on either shaft 28 or 28'.

Referring now to the instrument C shown in Figs. 7 and 8, which has a base 58 similar to the base 10 and has on its flanges hooks 59 to which a clamping device similar to the one shown for instrument A may be attached to secure the base 58 on a pipe y. Integral with the right-hand flange of the base 58 is an upstanding bearing 60.

A clamp 61 is applied to the bearing 60 and includes an annular member 62 having a pair of lugs 63 between which the bearing 60 extends. These lugs 63 are pivotally attached to the bearing 60 by a bolt 64 that extends through aligned holes in the bearing 60 and the lugs 63. The bolt 64 has an enlarged annular head 65 loose in the hole in the left-hand lug 63, as viewed in Fig. 8, impinges the bearing 60 and holds the same frictionally clamped against the right-hand lug 63. A nut 66 has threaded engagement with the outer end portion of the bolt 64 and impinges the outer side of the right-hand lug 63 as a base of resistance.

A bolt 67 projects through a hole in the clamp member 61 at the axis thereof and has a head 67' that impinges the outer side of said clamp member. On the outer end of the bolt 67 is a screw-threaded stud 68 of reduced diameter. The clamp 61 further includes a pair of discs 69 and 70 turnably mounted on the bolt 67 and have in their opposing faces half seats 71. A shaft 72 is mounted in half seats 71 at its lower end portion and has a pointed lower end 72'. A knurled thumb nut 73 applied to the screw stud 68 impinges the outer disc 69 and holds the discs 69 and 70 clamped onto the shaft 72 and with the disc 70 frictionally clamped onto the clamp member 62. The shaft 72 extends loosely through a transverse hole 74 in the bolt 67 of a diameter larger than the diameter of the shaft 72.

A sleeve is mounted on the shaft 72 to float axially thereon and to turn about the axis of said shaft. This sleeve carries an arm having a pencil

holder which is identical with like parts in Figs. 1, 3 and 4 and are given the same reference numerals followed by the letter *a*. The shaft 72 in the instrument C is capable of being tilted laterally in addition to its swinging movement.

The tilting feature of instrument C is designed to accomplish what is known in the pipe trades as "eccentric branch layouts." To mount instrument C on pipe *y* to scribe a circle thereon, first clamp base 58 temporarily onto said pipe by means of a clamping device, similar to the one shown in instrument A attached to the hooks 59. By use of knurled nut 73 and clamping disks, set shaft at 90 degrees, or approximately so, with axis of pipe *y*. Rotate scriber assembly around shaft 72 until scriber point is directed on the opposite side of shaft 72 to that of bolt 64. Set scriber point to radius of smaller or branch pipe. Loosen nut 66 and tilt shaft 72 toward bolt 64 and at the same time, with scriber point still in the same above mentioned position of rotation, slide scriber assembly along shaft 72 until said scriber point touches surface of pipe *y*. Keep tilting shaft 72 and at the same time keep point of scriber in contact with surface of pipe *y* by moving scriber assembly axially along shaft 72 until said scriber point reaches a point of tangency with circumference of pipe *y*. Tighten nut 66 firmly. Loosen knurled nut 73 and swing shaft 72 to desired angle and at the same time move shaft 72 axially toward pipe *y* until point 72' is almost touching surface of said pipe. Tighten knurled nut 73 again. The instrument is now ready to use as far as tilting and swing angle adjustments are concerned. On surface of pipe *y*, locate the point through which axis of branch pipe will pass. Loosen base 58 from pipe *y* and move said base along surface of said pipe until point 72' coincides with above mentioned located point. Tighten base 58 to pipe in this location and instrument is now ready to scribe circle on pipe *y*. It might be stated here that eccentric branch layouts can also be made with the combination of instrument A and B in Figure 1. With spanner free on shaft 28 and by using shaft 28 as a center and the spanner assembly as a radius, the shaft 28' may be swung to either side as far as desired and spanner clamped to shaft 28. Then shaft 28' can be reset axially until its pointed end 31' touches surface of pipe again. Base 10 is loosened from pipe *x* and moved along surface of said pipe until point 31' coincides with prelocated point on surface of pipe *x*, said prelocated point to be that through which axis of branch pipe will pass. Base 10 is then tightened against surface of pipe *x*. Instrument C can also be substituted for instrument A in Fig. 1.

In Fig. 9 is shown a magnetic base 75 for attaching instruments of the class described to a piece of work. A fragment of the shaft 76 is at-

tached to the base 75 by a clamp 77. On each side of the base 75 is a hook 78, only one of which is shown, for attaching a pair of chains of a clamping device, as shown in Fig. 5, in case the base 75 is applied to a piece of work of non-magnetic material.

From the foregoing, it must be evident that the invention herein disclosed is capable of a large range of modification within the spirit of the invention herein disclosed and claimed.

What I claim is:

1. In an instrument of the class described, a base in the form of an angle bar having on one of its flanges a bearing, a member pivoted to the bearing to turn about an axis parallel to the apex of the base, a clamp pivoted to said member to turn about an axis that extends transversely of the base, said base having a notch in one end portion at its apex, a shaft held by the clamp for endwise adjustment and for swinging movement with the clamp into and out of the notch in the plane of the apex of the base, said member permitting swinging movement of the shaft with the clamp transversely of the base to project the shaft through the notch, and a member adjustably mounted on the shaft.

2. In an instrument of the class described, a base in the form of an angle bar having a bearing fixed to one of its flanges, a member pivoted to the bearing to turn about an axis parallel to the apex of the base, a pair of jaws, adjustable means connecting the jaws and pivotally attaching the same to said member to turn about an axis extending transversely of the base, said base having a notch in one end portion at its apex, a shaft held by the jaws to be turned thereby into and out of said notch, said adjustable means being operable to clamp the jaws onto the shaft and also clamp one of the jaws onto said member, and a scriber carried by the shaft.

EDWARD E. NORRIS.

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