

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
14 March 2002 (14.03.2002)

PCT

(10) International Publication Number
WO 02/21071 A2

(51) International Patent Classification⁷: G01B

(21) International Application Number: PCT/US01/27650

(22) International Filing Date:
7 September 2001 (07.09.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/657,032 7 September 2000 (07.09.2000) US

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(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.



WO 02/21071 A2

(54) Title: WELD GAUGE

(57) **Abstract:** An adjustable gauge (10) having special application to the measuring of the dimensions of a fillet weld. The gauge is accurate and easy to use. The gauge includes a first plate (24) and a second plate (26) wherein the plates are rotatably mounted about an axis of rotation and juxtaposed to one another. The gauge also includes a linear member (28) rotatably mounted on the same axis of rotation as the first and second plates juxtaposed to the second plate on a first face (42) opposite the first plate. The linear member is slidably mounted in relation to the first and second plates in order to extend so as to measure the dimension of a weld. The first plate is substantially rectangular in shape and terminates in an edge which traverses one corner thereof. The second plate is substantially circular in shape. A front face (34) of the first plate, which is adjacent to the second plate, has a recess (36) thereon sized to accommodate the second plate. The first plate, the second plate, and the linear member are rotatably mounted to one another with a spring biased mechanism (54, 56, 57, and 58) for increasing and decreasing the rotational resistance therebetween.

WELD GAUGE

5 This invention relates to an adjustable gauge, and more particularly to an adjustable gauge that has special application in measuring or checking the dimensions of a fillet weld and may also be used for making several other workpiece measurements.

10 Fillet welds are used when it is desired to join together two metal plates usually located at right angles relative to each other, but of course as one skilled in the art is aware, the plates to be joined may be placed at an angle of more or less than 90°. Heretofore, many of the gauges used to determine dimensions of these types of welds have not been accurate, and many separate gauges were required to check various sizes of welds. Some prior art fillet gauges also require that the fillet scale be disengaged from the main body and flipped over in order to measure the weld with an alternate dimensional scale. In U.S. Patent 2,389,842, pre-sized corner templates are used to gauge fillet welds. In U.S. Patent 3,597,848 a separate steel member must be utilized to read the gauge. Improvements have been made in the area of weld gauges, and gauges now exist that can perform multiple measurements. Examples are disclosed in U.S. Patent 4,485,558 and U.S. Patent 4,637,142.

20 However, the need continues for weld gauges of increased precision, versatility, and ease of use. Accordingly, it is an object of this invention to provide for a novel, adjustable gauge for measuring the dimensions of a fillet weld. It is also an object of the invention to provide a weld gauge that has multiple scales for obtaining precise measurements and that is easy to use and read.

25 Another object of this invention is to provide a fillet weld gauge which may be used to rapidly measure many different sizes of welds without the need to disengage the fillet scale and flip it over in order to use the alternate dimensional scales.

Another object of the invention is to provide for a fillet weld gauge which is readily adjustable and accurate.

30 Other objects of the invention will become apparent upon the reading of the following description.

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The objects of the invention have been accomplished by providing an adjustable gauge having special application to measuring dimensions of fillet welds. The gauge is accurate and easy to use. The gauge includes a first plate and a second plate wherein the plates are rotatably mounted about an axis of rotation and
5 juxtaposed to one another.

Also, an aspect of the invention is to include a linear member rotatably mounted on the same axis of rotation as the first and second plates and juxtaposed to the second plate on a first face opposite the first plate. The linear member is slidably mounted in relation to the first and second plates in order to extend for measuring the
10 throat dimension of a fillet weld.

Another feature of the invention is that the first plate is substantially rectangular in shape and terminates in an edge which traverses one corner thereof. The second plate is substantially circular in shape. The face of the first plate, which is adjacent to the second plate, has a recess therein sized to accommodate the second
15 plate.

Also, a feature of the invention is that the first plate, the second plate, and the linear member are rotatably mounted with a spring biased mechanism that can be used to vary the rotational resistance therebetween.

An additional aspect of the invention is that the second plate has a linear
20 groove in the first face which the linear member slides in to measure the dimensions of a fillet weld. A second linear groove is located in the first face of the second plate at an angle to the first groove for purposes of alternately sliding the linear member therein and measuring the dimensions of the weld using an alternate scale.

An additional feature of the invention is that the weld gauge is provided with a
25 third plate rotatably mounted to the first plate and juxtaposed against a back face of the first plate opposite the face to which the second plate is mounted.

A further feature of the invention is that the third plate is shaped substantially in the form of a pie section and rotatably mounted to the first plate in an area coinciding with the center of said pie.

30 Still another a feature of the invention is that the weld gauge has a detent mechanism for providing rotational stopping points of the second plate in relation to

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the first plate. In the embodiment shown, the detent mechanism includes rounded protrusions on either the first plate or the second plate and mating apertures in the other juxtaposed plate corresponding to the desired rotational stopping points.

The following is a brief description of the figures contained herein:

5

Figure 1 is an exploded view of the gauge.

Figure 2 is a top view of the gauge.

Figure 3 is a rear view of the gauge.

Figure 4 is a sectional view taken along the line of 4-4 of Figure 2.

Figure 5 is a perspective view of the gauge shown as measuring the throat of
10 fillet weld using the English or inch scale.

Figure 6 is a perspective view of the gauge shown measuring the throat of a
fillet weld using the theoretical scale.

Figure 7 is a perspective view of the gauge shown measuring the throat of a
fillet weld using the metric scale.

15

Now referring to the figures, a gauge 10 is shown in Figures 1 - 7 that is normally used to measure dimensions of a fillet weld 12, which joins two structural members 14, 16, positioned at right angles to one another. As shown in Figures 5, 6 and 7, weld 12 includes two legs 18, 20 and a throat 22.

20

Gauge 10 includes a plate body member 24, a circular plate member 26, a
linear member 28, and a generally pie shaped plate member 30, as is best shown in Figure 3. As seen in Figure 1, plate body member 24 is partly defined by edges 32, 33, 66, 67, and 68 and is generally rectangular in shape, but has one corner section severed therefrom in a miter cut fashion by edge 32. Plate body member 24 has a front face 34 having a generally circular recess 36 formed therein. Also located in
25 body member 24 is axis hole 38 and detent apertures 40. In the preferred embodiment, recess 36 extends to corner edge 32 and into a longitudinal edge 33 of body number 24 so that edge 33 severs the circular geometry of recess 36 in a cord like fashion, wherein said cord is defined by points 35 and 37 on the circumference of circular recess 36.

30

Circular plate member 26 has an axial hole 46 centrally located therein and a first face 42 having two linear grooves 44 and 45 thereon. Linear grooves 44 and 45

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are aligned along diameters of circular member 26 and intersect one another in a perpendicular manner thereby forming four radial groove portions 47a, 47b, 47c, and 47d. In the preferred embodiment, three separate scales of measurement are placed along radial groove portions 47a, 47b, and 47c. Along radial groove portion 47a, a
5 British or inches scale is marked. Along radial groove portion 47b a theoretical scale is provided; the theoretical scale being in inches along one side of groove portion 47b and in metric along the other edge of groove portion 47b. The theoretical scale provides a value of weld throat thickness 22, which includes an estimated value for weld penetration into structural members 14 and 16. The penetration increases the
10 effective strength and thickness of weld 12. A metric scale is laid out along radial groove portion 47c. In the preferred embodiment, there is no scale along radial groove portion 47d, but obviously any desired scale could be used along this radial groove portion. A bulbous protrusion 48 is located on a face 49 of circular plate 26 opposite face 42.

15 Linear member 28 has a pointed end 51, and a flat end 52 opposite pointed end 51, and a linear slot 50 extending therebetween. The linear slot 50 extends longitudinally coincident with linear member 28 and extends to a close proximity of flat end 52, and is more distal from the opposite pointed end 51.

Pie shaped plate member 30 is defined by a sector line 74 and a partial sector
20 line 73, and includes a pointed section 77 jutting beyond partial sector line 73. An arcuate slot 53 terminates at sector line 74 thereby defining an arcuate portion 75 of plate 30, which is located between slot 53 and a circumferential edge 76. The arcuate portion 75 is uniform in width along the length of slot 53. A back face 25 of body member 24 has an arcuate scale 31 attached thereto with screws 64 and washers 65.

25 Having described the major parts of gauge 10, the assembly and parts for assembly will now be detailed. In the preferred embodiment, circular plate 26 is positioned within recess 36 such that second face 49 of circular plate 26 is juxtaposed body member 24. Linear member 28 is positioned within either linear groove 44 or linear groove 45 of circular plate 26 and can slide in and be alternated therebetween.
30 Body member 24, circular plate 26, and linear member 28 are rotatably held together with a knurled knob 54 having a threaded screw 55 attached thereto such that said

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threaded screw extends through linear slot 50 of linear member 28, axial hole 46 in circular plate 26, and axial hole 38 in body member 24 and is engagingly threaded into a circular nut 56 as is best shown in Figure 1. A nylon washer 57 is placed between knurled knob 54 and linear plate member 28. A coiled spring 58 is compressed between an extended head 59 of circular nut 56 and back face 25 of body member 24.

Pie shaped plate 30 is rotatably mounted at 60 and juxtaposed adjacent a rear face 25 of body member 24 such that circular nut 56 is positioned within slot 53 of plate 30 and remains in slot 53 as plate 30 is rotated. In the embodiment shown, rotational mount 60 includes a knurled knob 61 having a threaded screw (not shown) attached thereto that extends through an aperture (not shown) in plate 30 at point 60 and an aperture (not shown) in plate 24 also at point 60 which is engagingly threaded to a knurled nut 62. Other suitable rotational mounts such as a rivet may be used to join body member 24 and pie shaped plate 30.

Having described the parts and assembly of weld gauge 10, the operation will now be discussed. For measuring the throat 22 of fillet weld 12, circular plate 26 and linear member 28 are utilized. Circular plate 26 is rotated within recess 36 until the desired scale on radial segment 47a, 47b or 47c is aligned perpendicular to edge 32. Circular plate 26 is rotated by pushing the head 59 of circular nut 56 which causes coil spring 58 to become further compressed and thereby raise knob 54 slightly above linear member 28. This allows circular member 26 to freely rotate within recess 36. As the desired scale 47a, 47b, or 47c is aligned with edge 32, bulbous protrusion 48 will encounter the appropriate detent aperture 40. Circular nut 56 is then released and tension from coil spring 58 will firmly hold protrusion 48 within aperture 40 to lock the gauge 10 in the desired position.

Linear member 28 is rotated to the proper position within linear groove 44 or 45 by also pressing circular nut 56 against the face 25 of body member 24 so as to compress spring 58 and raise knob 54. As knob 54 is raised, linear member 28 can freely rotate. Linear member 28 is rotated such that pointed end 51 is aligned within or protruding radially outward from the corresponding radial segment 47a, 47b or 47c which is aligned perpendicular to edge 32.

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To measure the throat 22 of fillet weld 12, knob 54 is turned slightly to loosen threaded screw 55 within circular nut 56 thereby allowing linear member 28 to slide freely within the appropriate linear groove 44 or 45. Gauge 10 is then placed such that edge 66 of body member 24 firmly contacts structural member 16 and edge 67 of body member 24 is in firm contact with structural member 14 such that edge 32 faces fillet weld 12 (Figures 5-7). Linear member 28 is then extended toward fillet weld 12 until point 51 touches throat 22. Once point 51 contacts throat 22, knob 54 is tightened to prevent further movement of linear member 28. The dimension of throat 22 can then be read from the appropriate scale on radial segment 47a, 47b or 47c as indicated by the position of measuring line 70 on linear member 28. From the foregoing, it should be appreciated that the knurled knob 54 and nut 56 along with spring 58 have three separate functions. First they hold the linear member 28, the circular plate member 26, and body member 24 together as an assembly. Secondly, they allow the circular plate to be movable within the associated recess 36 between the detent positions, and finally, they allow the linear member 28 to be moved between the associated grooves 44, 45.

Pie shaped plate 30 can be used to measure weld undercut, weld reinforcement, fillet leg length, angle of preparation, and misalignment; however, these uses of plate 30 are known and therefore will not be described in great detail. The basic operation of plate 30 involves rotating it about point 60 so that point 77 comes in contact with the element to be measured. When contact is obtained, the desired dimension can be read by the alignment of lines 71 and 72 on plate 30 with the scale 31. Line 71 aligns with a British or inch scale and line 72 aligns with a metric scale.

It should also be appreciated that this invention may be carried out using only one plate member or base portion, which may have at least one groove located in the plate, and a linear member for sliding on the base portion to measure the throat of a fillet weld. For example, the base portion could be shaped substantially in an octagon shape such that two edges of the octagon would be held in firm contact with the structural members joined by the fillet weld and the groove would be located such that it terminates perpendicular to an edge of the octagon between the edges contacting the structural members. The linear member would be mounted to be

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slidable and/or rotated with the base portion as described above or using other methods which are well known in the art. It should also be appreciated that the invention could be carried without grooves in the base portion so that the linear member slides directly on a face of the base. There may also be raised guides on the
5 base portion to guide the sliding movement of the linear member. Furthermore, the base portion may contain two or more grooves.

Those skilled in the art will appreciate that the conception, upon which this disclosure is based, may be readily used as a basis for designing other structures, methods, and systems for carrying out several purposes of the present invention.
10 Further, the abstract is neither an attempt to define the invention of the application which is measured by the claims, neither is it intended to limit the scope of the invention in any way.

The preferred embodiment herein described is not intended to be an exhaustive or to limit the invention to the precise forms enclosed. They are chosen
15 and described to best explain the principals of the invention in its application and practical use to thereby enable others skilled in the art to utilize the invention.

CLAIMS

1. A gauge (10) for checking weld dimensions comprising first (24) and second (26) plates which are rotatably mounted about an axis of rotation and juxtaposed one another, and being further characterized by a linear member (28) rotatably mounted on the same axis of rotation as the first and second plates, and juxtaposed the second plate on a first face (42) of the second plate opposite the first plate, the linear member further being slidably mounted in relation to the first and second plates in order to extend to and measure a weld dimension.
2. The gauge as set forth in Claim 1 wherein the first plate is substantially rectangular in shape and terminates in an edge (32) which traverses one corner thereof.
3. The gauge as set forth in Claim 1 or 2 wherein the second plate is substantially circular in shape.
4. The gauge as set forth in any one of Claims 1-3 including a front face (34) on the first plate juxtaposed a second face (49) of the second plate and wherein the front face has a recess (36) thereon sized to accommodate the second plate.
5. The gauge as set forth in any one of Claims 1-4 wherein the second plate has a linear groove (44) on the first face juxtaposed the linear member and sized to accommodate the linear member for sliding therein.
6. The gauge as set forth in any one of Claims 1-5 wherein the first plate, the second plate, and the linear member are rotatably mounted together with a spring biased mechanism (54, 56, 57, 58) for increasing and decreasing the rotational resistance therebetween.
7. The gauge as set forth in Claim 5 further comprising a second linear groove (45) on the first face of the second plate, the second groove set at an angle to the first groove and sized for purposes of sliding the linear member therein and measuring the dimensions of the weld using an alternate scale.
8. The gauge as set forth in any one of Claims 1-7 further comprising a third plate (30) rotatably mounted to the first plate and juxtaposed against a rear face (25) of the first plate opposite the front face (34).

9. The gauge as set forth in Claim 8 wherein the third plate is shaped substantially in the form of a pie section and rotatably mounted to the first plate in an area coinciding with the center of the pie.

10. The gauge set forth in any one of Claims 1-9 further comprising a detent mechanism (40, 48) for providing rotational stopping points of the second plate in relation to the first plate.

11. The gauge as set forth in Claim 10, wherein the detent mechanism comprises rounded protrusions (48) on either the first plate or second plate and mating apertures (40) on the other juxtaposed plate corresponding to the desired rotational stopping points.

12. The gauge as set forth in Claim 7, wherein the first and second grooves are cruciform in shape.

13. The gauge as set forth in Claim 12, wherein the first and second plates include a detent mechanism for indexing the position of the first and second plates relative to one another.

14. The gauge as set forth in Claim 13, wherein the indexed positions coincide with alignment of the first and second linear grooves in a perpendicular orientation to an edge of the first plate.

15. A gauge (10) for checking throat dimensions of a fillet weld comprising a base portion (26) and a linear slide member (28) characterized in that said linear slide member is rotatably mounted to said base portion and linearly slidable along said base portion to measure the throat of a fillet weld.

16. The gauge as set forth in Claim 15, further comprising at least two grooves (44, 45) in a first face of the base portion for sliding the linear member therein.

17. The gauge as set forth in Claim 16, wherein the grooves are located in a cruciform manner in the first face of the base portion and terminate at edges of the base portion.

18. The gauge as set forth in either Claim 16 or 17, wherein the linear member has a linear slot (50) to facilitate sliding in the grooves.

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19. The gauge as set forth in any of Claims 15-18, further comprising a first plate (24) rotatably mounted to the base portion on a second face (49) opposite the linear member.

20. The gauge as set forth in Claim 19, wherein said first plate includes a recess (30) sized to accommodate said base portion so that the base portion may rotate therein.

21. A gauge (10) for checking weld dimensions comprising first (24) and second (26) plates which are rotatably mounted about an axis of rotation and juxtaposed one another, and being further characterized by a third member (28) rotatably mounted to the first and second plates.

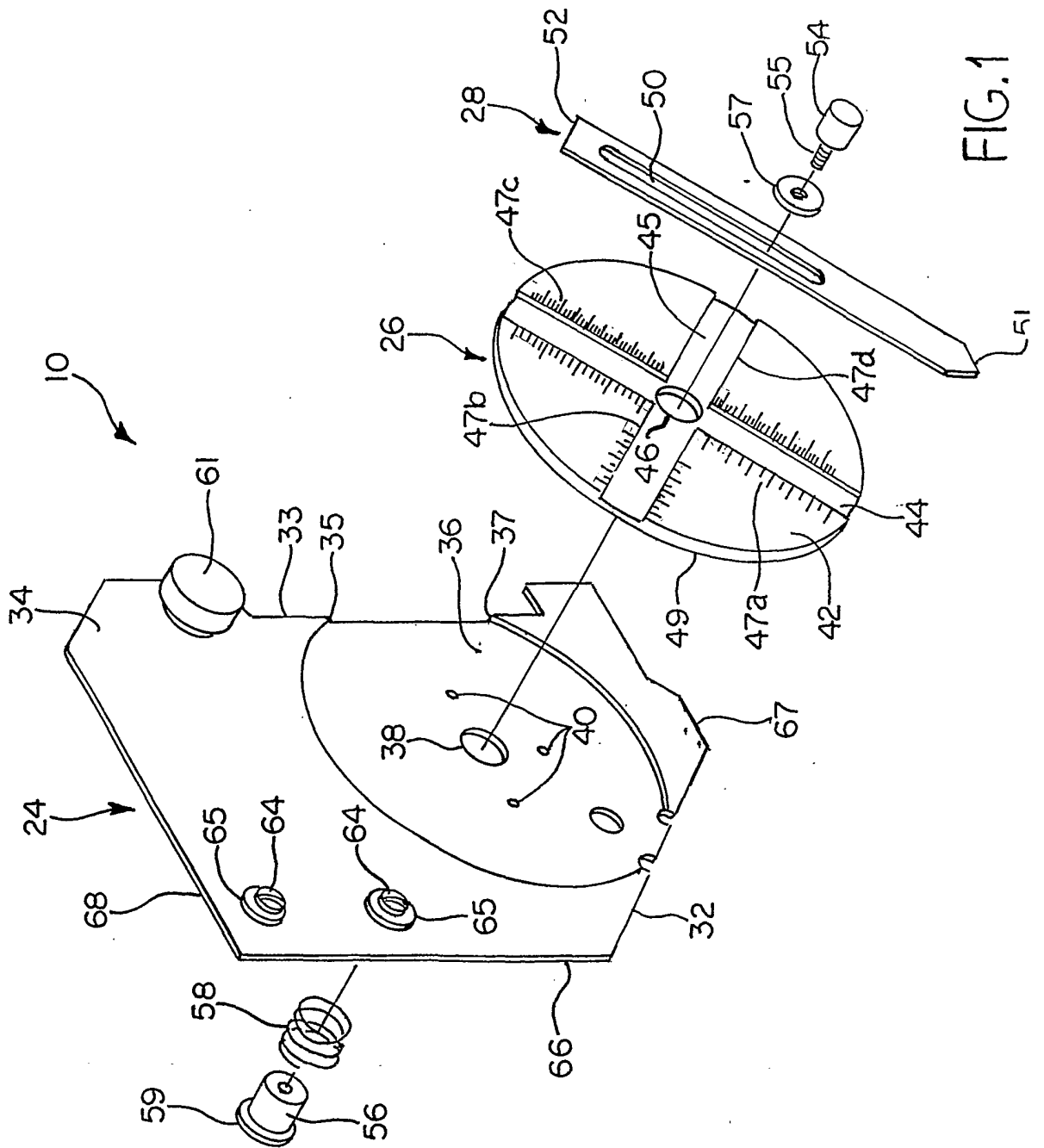


FIG.1

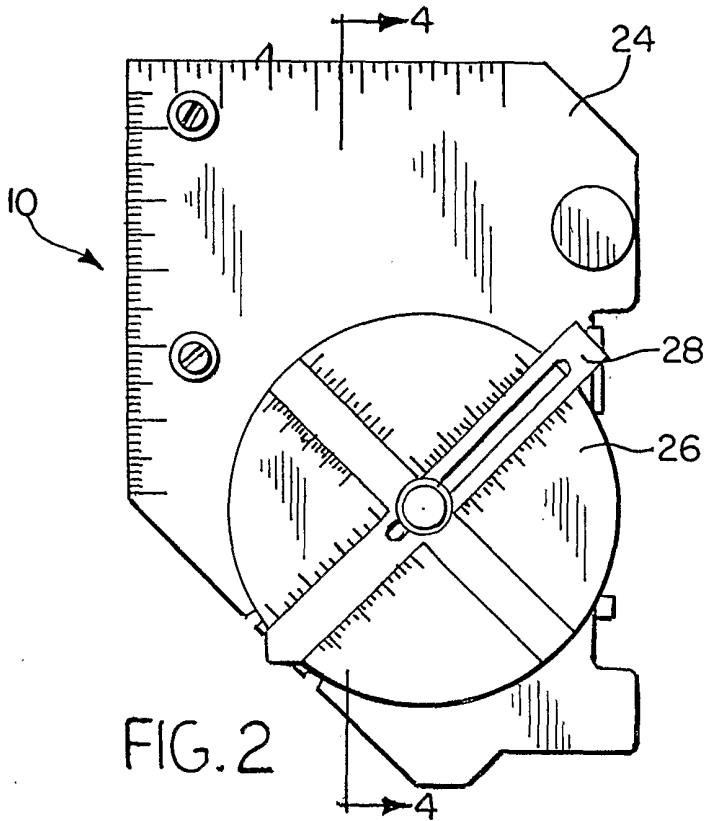


FIG. 2

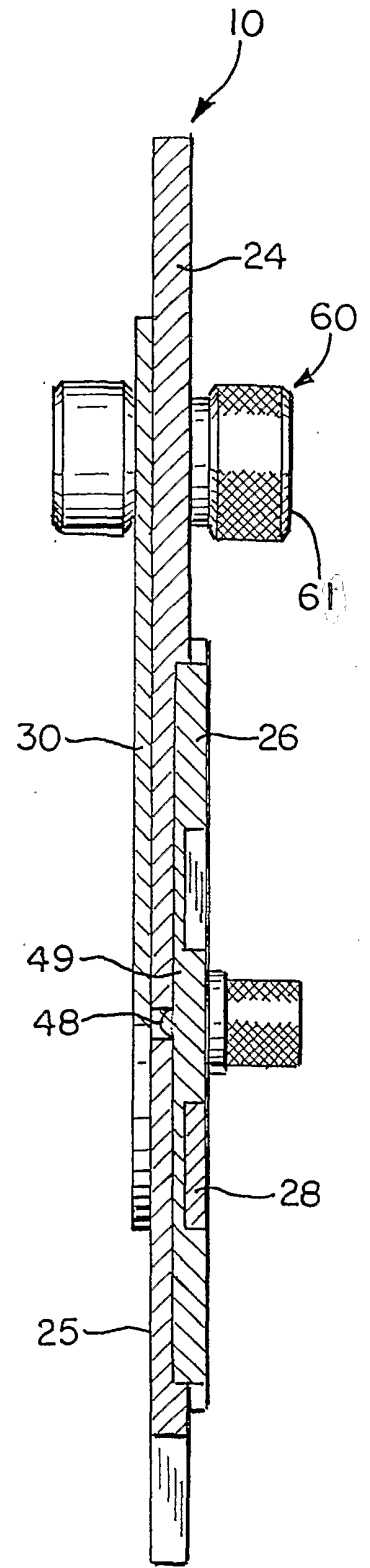


FIG. 4

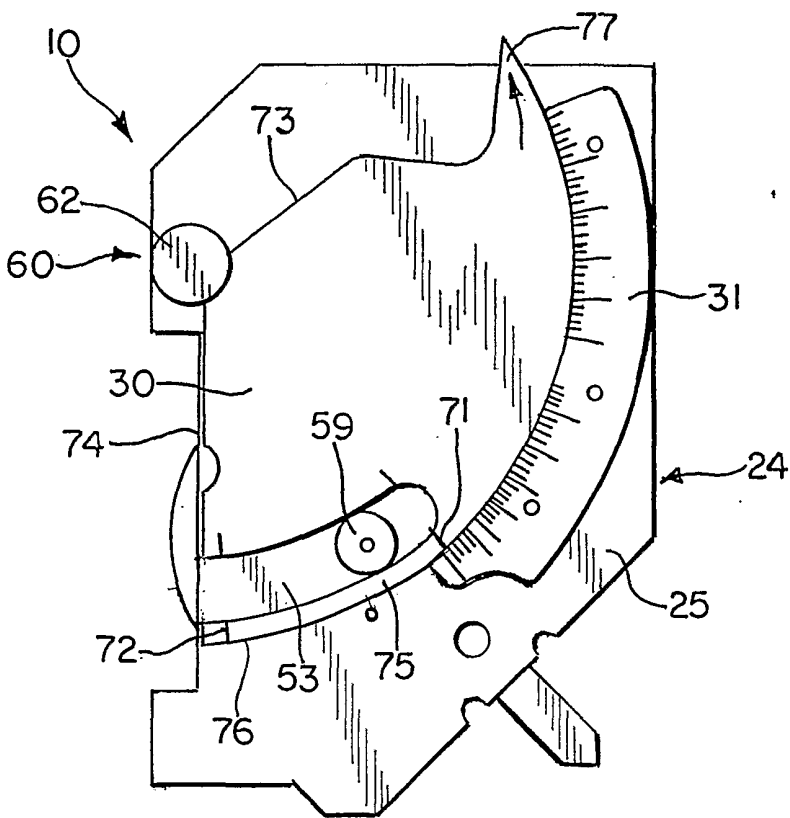


FIG. 3

