

(21) Application No: 1200589.8

(22) Date of Filing: 13.01.2012

(71) Applicant(s):
Hippolite Onyejiaka Amadi
44 Dawes Avenue, Hornchurch, Essex, RM12 6AL,
United Kingdom

(72) Inventor(s):
Hippolite Onyejiaka Amadi

(74) Agent and/or Address for Service:
Hippolite Onyejiaka Amadi
44 Dawes Avenue, Hornchurch, Essex, RM12 6AL,
United Kingdom

(51) INT CL:
A61F 2/46 (2006.01) A61B 5/107 (2006.01)
A61B 19/00 (2006.01)

(56) Documents Cited:
WO 2007/004055 A1 US 20070191741 A1
US 20060149288 A1 US 20040193175 A1
Design right 4019723
Design right 4019724

(58) Field of Search:
INT CL A61B, A61F
Other: EPODOC, WPI

(54) Title of the Invention: **Glenohumeral joint (GHJ) protractors**
Abstract Title: **Glenohumeral joint protractors**

(57) The protractors are used to measure the circumferential location of points or regions relative to the anatomical neck of the humerus and the rim of the glenoid face of the scapula. The humerus component comprises a flat graduated ring 10 designed to pass through the hemispherical humeral head 4 to fit appropriately on the anatomical neck. The ring is divided into angled segments. The humeral component may also comprise a hemispherical cap 11 with finger grips 12. The glenoid component 8 is a pear shaped measuring piece. The rim is divided into angled segments. The glenoid component may additionally comprise a handle 9.

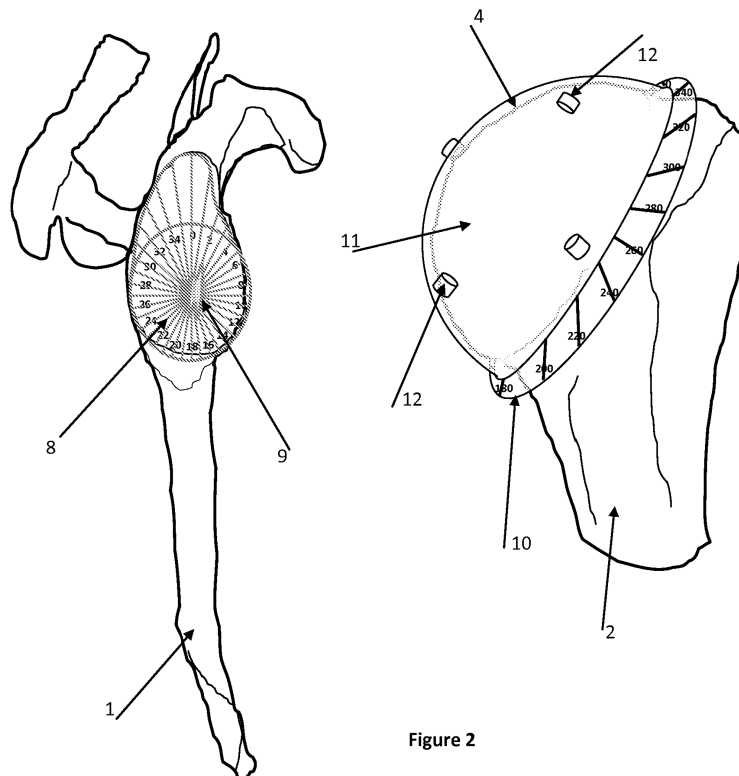


Figure 2

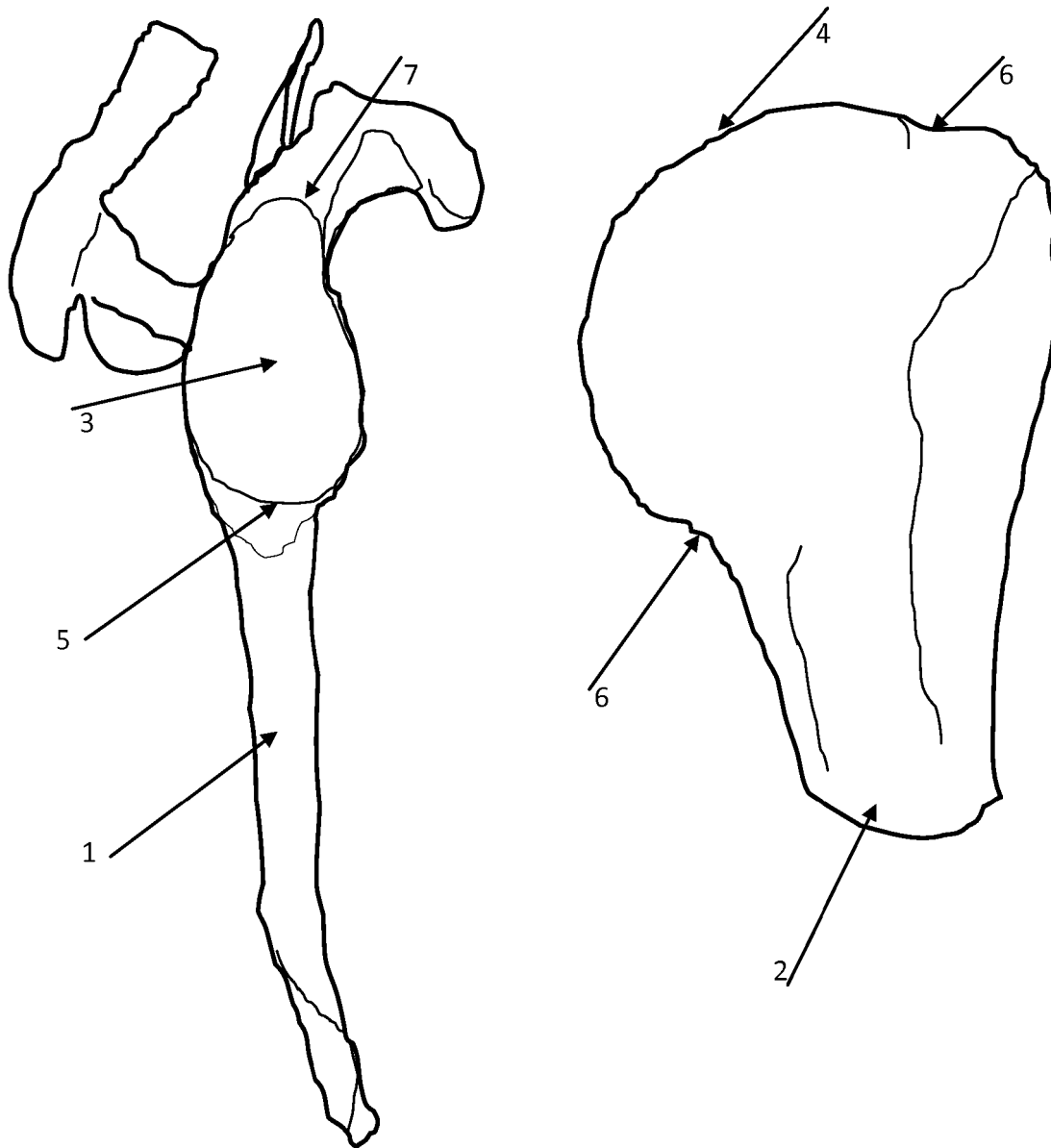


Figure 1

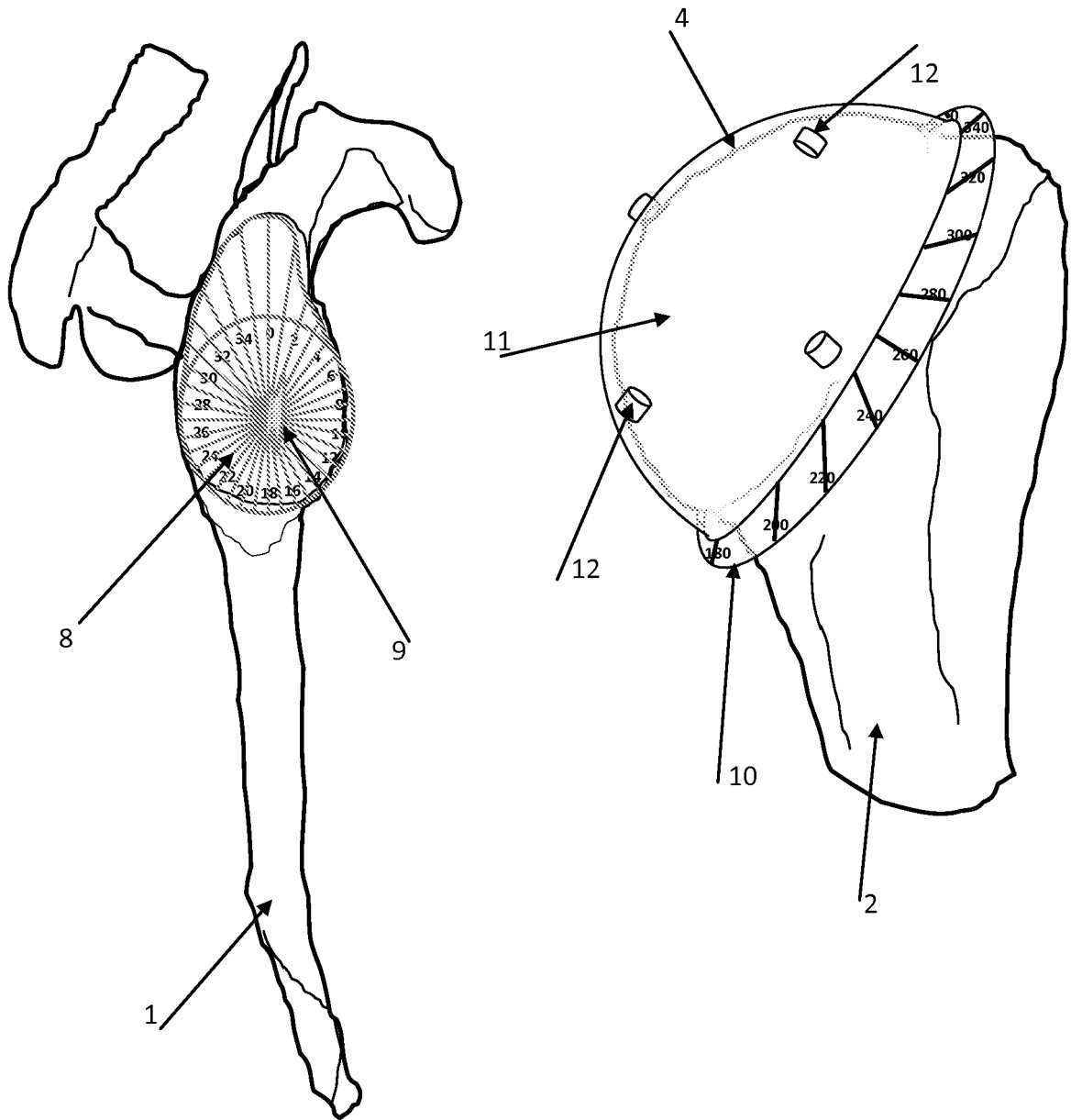


Figure 2

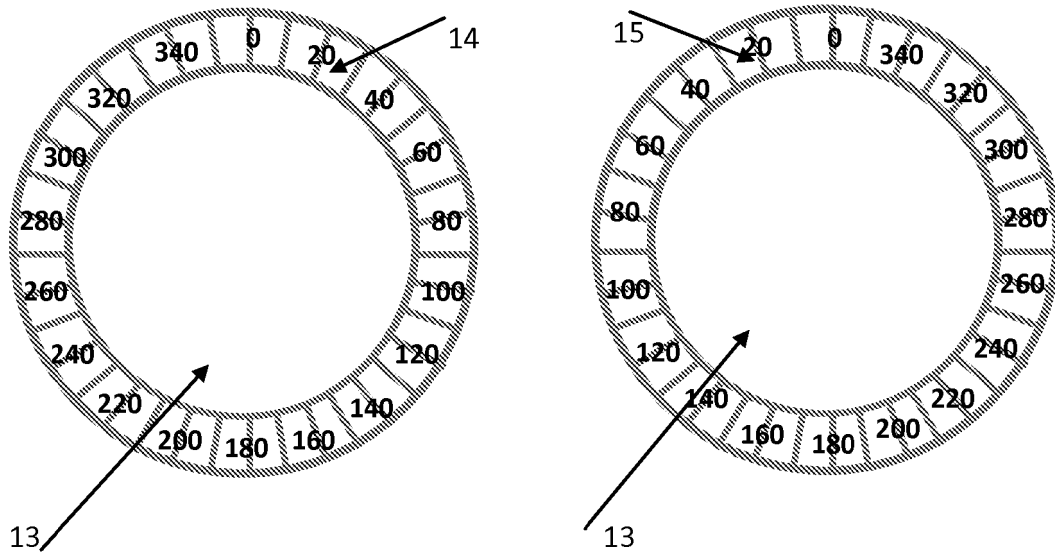


Figure 3

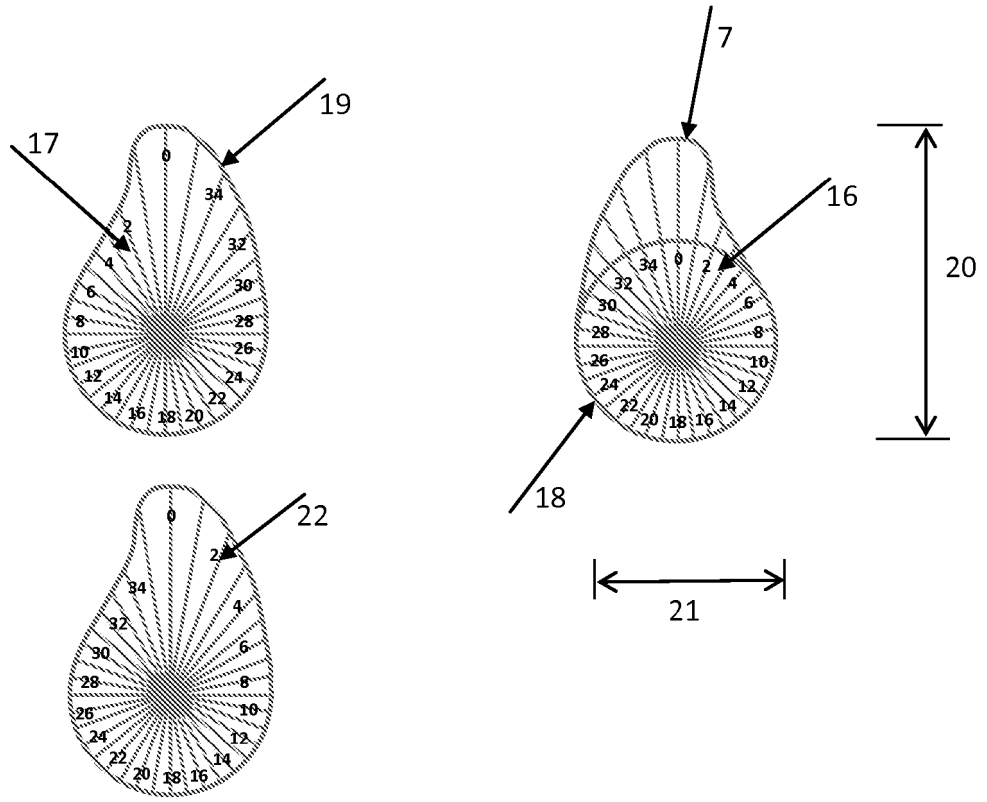


Figure 4

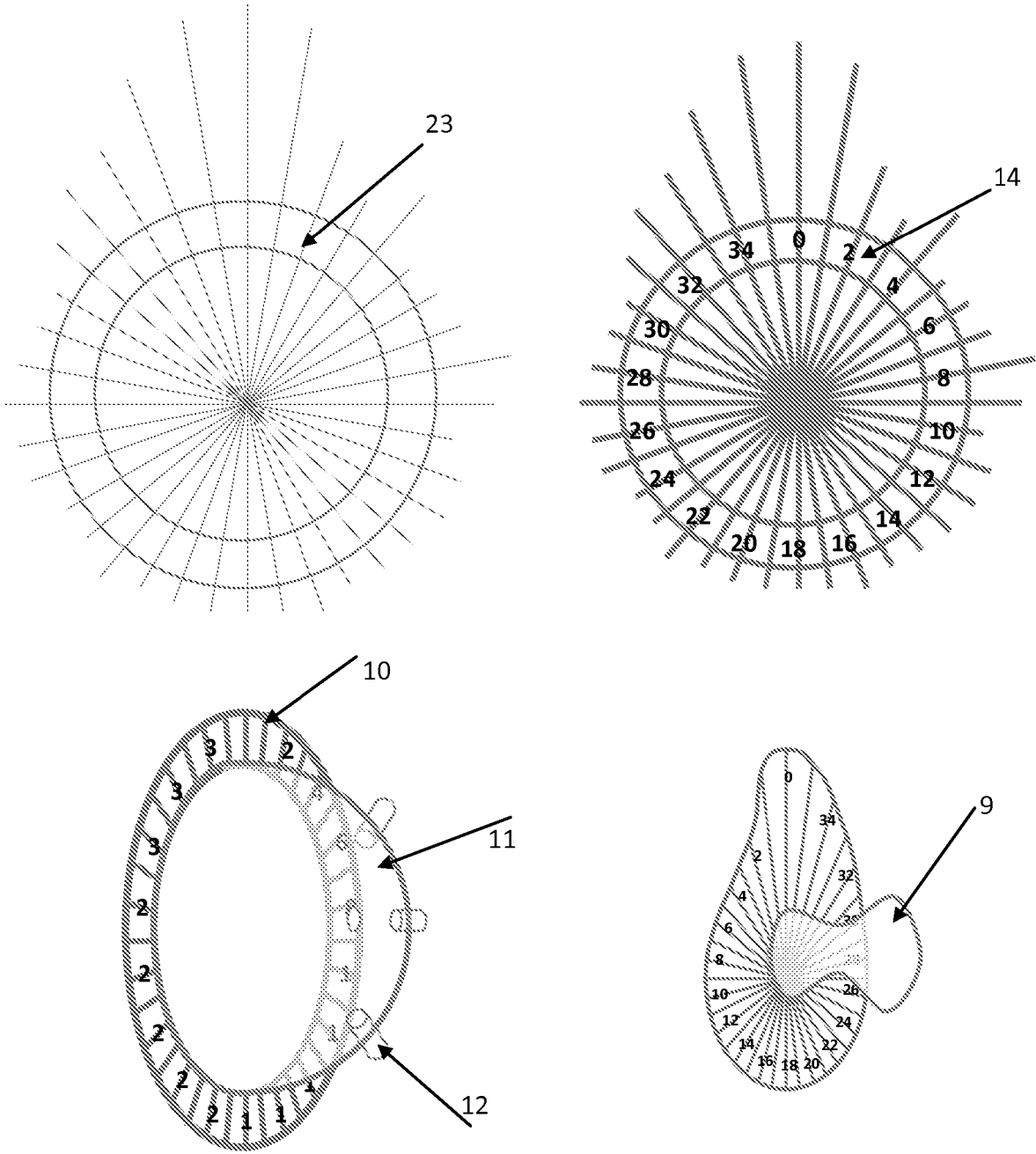


Figure 5

Title

GLENOHUMERAL JOINT (GHJ) PROTRACTORS

Background

This invention concerns a measuring device that assists to locate or describe points of interests relative to the bony articulation rims of the glenohumeral joint (GHJ).

Anatomical cadaveric works, surgical planning and surgical procedures often require the description and identification of points of interest such as places of construction, spots of defects and anatomical structures requiring further investigation. Presently such identifications are done by 'eye-balling' estimations based on the practitioner's experience. This does not efficiently produce reliable descriptions to achieve accurate intra- and inter-subject repetition and re-identification.

Statement of invention

The present invention is therefore presenting two complimentary components of measurement Protractors concomitant to the shapes of the articulating portions of the two GHJ bones, namely the Humerus and the Scapula, with appropriately fitting handles to assist easy positioning and adjustment of the protractors during usage.

Advantages: These are used to measure the circumferential location of points or regions relative to (a) the rim of the anatomical neck for the Humerus for the 'humeral-component' and (b) the rim of the glenoid face of the Scapula for the 'glenoid-component'. These can be used to describe location of bone defects or attachment of soft tissues on the Joint's bones thereby aiding disease diagnosis and the planning of repair interventions. These can also be used intra-operatively to aid in the absolute location of desired points of bony constructions during surgery. These can be applied for anatomical shape studies and other related

anatomical investigations of the articulating bones and soft tissues. The two compliment protractors are made in different sizes to accommodate the wide variety of anatomical sizes of human GHJ bones as defined in the literature; all sizes having the same or slightly different aspect ratios in width and height. This hence makes it possible to apply in wide range of cases, specimens and patients.

Introduction of drawings

Further description of this invention is described following labelling of the accompanying drawings:

- Figure 1 shows the articulating GHJ bones namely, the scapula and humerus
- Figure 2 shows the scapula and humerus with their respective invented protractor in place
- Figure 3 shows the graduated base of the Humeral-component
- Figure 4 shows the graduation versions of the Glenoid-component
- Figure 5 shows the construction steps and protractor handles

Detailed description

The two constituent bones of the glenohumeral joint, scapula 1 and humerus 2, anatomically articulate with their glenoid 3 and humeral-head 4, respectively. The glenoid-component 8 and humeral-component 10 of the devised protractors are made to conform to the anatomical shapes of their respective structures of measurement.

(i) Basic Shape

(a) Humeral Component: A flat graduated hollow ring 10, designed to pass through the hemispherical humeral head 4 to fit appropriately on the anatomical neck 6. Appropriate size selection during usage for individual patient is subject to the user. However by standards, the choice is based on the 'hollow dimension' 13 that could comfortably pass through the humeral head cartilage surface to sit on the anatomical neck 6 but not too wobbly to independently move during measurement. The flat rim of the ring is divided into thirty-six equal segments 14 unto which a graduation of '0°-to-360°' is affixed. The direction of increasing graduation could be clockwise 14 or anti-clockwise 15, being suitable for anterior-wise measurement on the left and right shoulders respectively.

(b) Glenoid Component: This measuring piece is cut in the basic pear-shape of the glenoid 3. Approximate size to use during application is chosen based on the closest dimension to the specimen's or patient's actual glenoid height 20 and width 21 to enable a read-out without much eye-balling estimation. The rim of the object is divided into thirty-six unequal segments. The broader bottom end of the pear shape is a circular segment 18 of which thirty-six equal divisions are outwardly projected to provide the main thirty-six object segments round the rim of the protractor 19. A '0°-to-360°' coordinate system is graduated round the rim following the thirty-six segments. The origin or '0°' mark could be made to be positioned at any prominent anatomical reference landmark with the rest of the graduation proceeding either clockwise 22 or anticlockwise 17. This would be based on the specifications by intending

users. However, the default design is such that graduation proceeds in the anatomical anterior direction with the '0°' mark located superiorly at the position of the supraglenoid tubercle 7. Graduation could also be made internally round a conforming inscribed circle 16 at the lower half of the protractor (Figure 4).

(ii) Handle

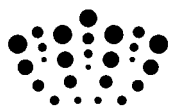
- (a) Humeral Component: This is a hemispherical 'cap' 11 with a fitting diameter relative to the hollow portion 13 of the humeral protractor object. This is fitted and assembled into the object to form one piece or made to be detachable. Outward projections are constructed on the surface of the cap to form 'finger traps' 12 to aid rotation adjustments of the protractor when aligning this to its anatomical reference point during application.
- (b) Glenoid Component: This is an additional outwardly projecting material 9 affixed at the internal central area for use as handle. Handle is designed for a comfortable grip when aligning protractor with its anatomical reference on the specimen. By default, this is designed to be similar but not limited to the figure '8' shape of a 'rubber-stamp' handle. This could be assembled by gluing to form one piece with protractor or be made a detachable unit.

MATERIAL: The manufacturing material should, by default, be transparent in the form of glassy, transparent plastic, Perspex or other materials for versions meant for cadaveric, clinical and surgical planning jobs that may be performed at room temperatures. Versions for use during intra-operative procedures are manufactured with tempered materials that can withstand the high pressure of the autoclave during sterilization.

CONSTRUCTION: The segmental divisions of the circles used in the creation of the protractor graduations is achieved by basic mathematical geographic construction techniques 23 or with any available software package that can aid the division of a circle into any given number of equal segments. This is followed by the imprinting of the graduations 14 as appropriate, the trimming of the outer rim 10 and 19, the carving out of the inner humeral-component hole and finally the affixation of the handles.

Claims

- 1 Two complimenting components of measurement Protractors concomitant to the shape of the articulating portions of the two GHJ bones, namely the Humerus and the Scapula, with appropriately fitting handles to assist easy positioning of the protractors during usage.
- 2 Protractors as in claim 1, in which components are manufactured with a 'see-through' material.
- 3 Production material according to claim 2, in which the intra-operative version could be on tempered and autoclave-able material for sterilisation.
- 4 Production material according to claim 2, in which the pre-operative surgical planning and intra-operative versions could also be a numerical computer version that could be superimposed on a digital image of the GHJ bone for measurements off digital medical images.
- 5 Numerical version according to claim 4, in which this is integrated into any existing image guidance and navigation software for surgical interventions and anatomical studies.
- 6 Protractors as in claim 1, in which the handles may be permanently fixed or detachable.
- 7 Protractor handles as in claim 6, in which the humeral component incorporates 'finger-traps' for ease of rotation during usage; and the glenoid component incorporates shapes for firm gripping with the fingers.



Application No: GB1200589.8

Examiner: Dr Matthew Parker

Claims searched: 1-7

Date of search: 17 April 2012

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	WO2007/004055 A1 (LAFOSSE)
A	-	US2004/193175 A1 (DEPUY)
A	-	US2006/149288 A1 (HOWMEDICA)
A	-	US2007/191741 A1 (UNIV TAIPEI)

Categories:

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

--

Worldwide search of patent documents classified in the following areas of the IPC

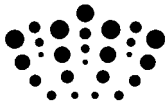
A61B; A61F

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
A61F	0002/46	01/01/2006
A61B	0005/107	01/01/2006
A61B	0019/00	01/01/2006



Application No: GB1200589.8

Examiner: Dr Matthew Parker

Claims searched: 1-7

Date of search: 17 April 2012

Patents Act 1977
Amended Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-7	Design right 4019723 (DR HIPPOLITE AMADI)
X	1-7	Design right 4019724 (DR HIPPOLITE AMADI)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

--

Worldwide search of patent documents classified in the following areas of the IPC

--

The following online and other databases have been used in the preparation of this search report

--

International Classification:

Subclass	Subgroup	Valid From
A61F	0002/46	01/01/2006
A61B	0005/107	01/01/2006
A61B	0019/00	01/01/2006