

**Inventors:**

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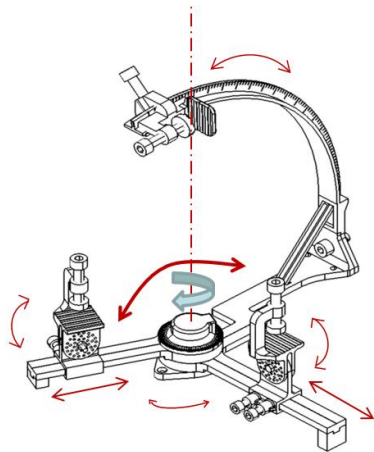
1) Patent title: **Multi-Dimensional Clamping Fixture**

2) Patent no. and Date of certificate issued: **364820 & 16/04/2021**

**3) Brief descriptions of product/solution:**

The present invention relates to an improved clamping device which can be used to hold two or three work pieces providing eleven degrees of freedom independently along each of the three radial vertical planes which maintains multiple angle relationship. These work pieces can be easily aligned at any angle with precision. One of the three vertical planes is detachable which provides even more freedom to easily mount and remove the device and work pieces if necessary. A uniform hexagonal socket is provided in the head of all the drive bolts which facilitates easy removal of work pieces using an Allen key.

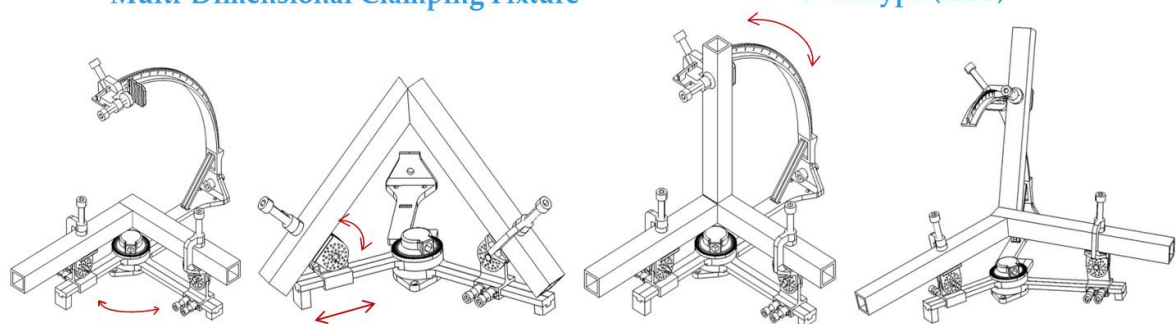
**4) A graphic image to represent the product/ solution:**



**Multi-Dimensional Clamping Fixture**



**Prototype (ABS)**

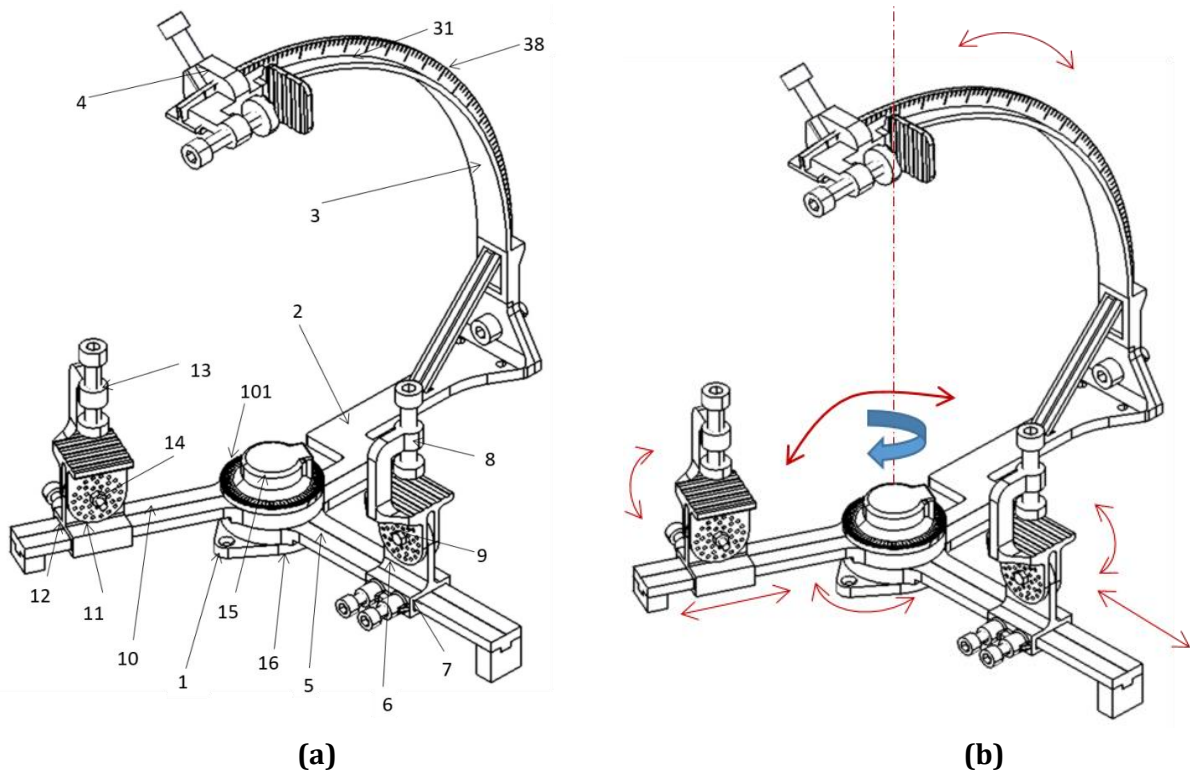


**Isometric views of the fixture while holding two / three work pieces in varied orientations**

**5) Abstract of the product/patent with descriptions and images:**

The clamping fixture is a device to hold two or three work pieces simultaneously maintaining required angular precision. The slider (11, 6) and the clamp units (13, 8, 4) along with the relative motion of the three arms (10, 5, 2) allow the mounted work pieces to attain an N-dimensional degrees of freedom for their alignment. An additional

detachable segment (3) provided in the device gives more freedom to easily mount and remove the device and work pieces as necessary. Angular scales (101, 38) are provided on the central circular hood (15) and on the detachable arced segment (31) to precisely measure the angles for the mounting of the work pieces. The structure of the clamping fixture gives enough space to perform welding operation from multiple directions. A uniform hexagonal socket is provided in the head of all the drive bolts which facilitates easy removal of work pieces using an Allen key. **The multi-dimensional portable clamping fixture can be used to easily hold work pieces required for assembly during welding operations in desired multiple orientations.** This device may bring a radical change in the design of clamping fixtures required in various industries like automobile, aerospace, ship building, manufacturing, etc. while increasing the accuracy of work and performance.



**Figure 1: Multi-Dimensional Clamping Fixture showing (a) multiple elements indicated with numbers (b) multiple orientation of various elements**

In contrast to the previous disclosures, the present invention provides a novel multi-dimensional clamping fixture provided with three arms to mount individual work pieces along any three axes lying on three vertical planes meeting at a central pole of the device with angular positions ranging from  $0^{\circ}$  to  $360^{\circ}$ . All the three arms are detachable so that any of the combinations can easily be attached or detached as per the necessity. Scale provided on the central circular hood and on the detachable arced segment makes easy to measure the angles among the mounted work pieces. **The proposed multi-dimensional portable clamping fixture will drastically reduce the human labor, time and will increase the accuracy of work and efficiency when used in operations of assembly especially for welding in various industries like automobile, aerospace, manufacturing, etc.**