

## ***Dental articulators***

**Definition:** It is a mechanical instrument that represents the temporomandibular joints and jaw members, to which maxillary and mandibular casts may be attached to simulate some or all-mandibular movements.

### **Functions:**

1. It allows most of the prosthetic work to be done in the absence of the patient.
2. Maintain jaw relation record during setting-up of teeth.
3. Denture remounting after processing for correction of occlusion.

### **Requirements of an articulator:**

1. It should not be bulky or heavy.
2. It should be made of non-corrosive and rigid materials.
3. It should open and close in a hinge movement.
4. The moving parts should move freely without any friction.
5. There should be adequate space between the upper and lower members.
6. It should provide a positive anterior vertical stop (incisal pin).
7. It should accept face-bow transfer record.
8. It should hold the casts in the correct horizontal relationship.
9. It should hold the casts in the correct vertical relationship.
10. The casts should be easily removed and re-attached.

### **Types of articulators:**



1. Non adjustable condylar path articulators.
  - a. Simple hinge articulators (Class I).
  - b. Fixed condylar path or mean value articulators (Class II).
2. Adjustable condylar path articulators.
  - a. Semi-adjustable condylar path articulators (Class III).
  - b. Fully- adjustable condylar path articulators (Class IV).

These adjustable types of articulators differs from the fixed condylar path articulators in that it has adjustable condylar and incisal guidance. They can be adjusted so that the movements of the jaw members of articulator closely resemble all movements of the mandible for each individual patient.

### **Simple hinge articulators (Class I):**

#### Design:

It consists of an upper and lower members held apart at a certain distance by a screw which acts at the back. The screw can increase or decrease the distance between the two members, and permits only a hinge like movement.



#### Possible movements:

This type of articulators gives only opening and closing movements (hinge movement only).

### Records required:

1. Vertical dimension of occlusion.
2. Centric relation records.

### Disadvantages:

These articulators do not represent the temporomandibular joint and the dynamic mandibular movements.

## **Mean Value or Fixed Condylar Path Articulators (Class II):**

### Design:

The two members of these articulators are joined together by two joints that represent the TMJ. On the fixed condylar path articulators, the upper members are movable (the condyle) and the lower members are stationary (fixed). The horizontal condylar path is fixed at certain angle that ranges from 30-40° (allow protrusive movement on articulator and it fixed) which is the average of the most patients. The incisal guide table is also fixed at a certain angle from horizontal.



### Possible movements:

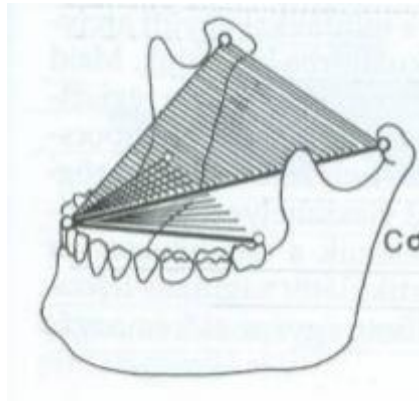
1. Opening and closing.
2. Protrusive movement at a fixed condylar path angle.

### Records required:

1. Vertical dimension of occlusion.
2. Centric relation record.
3. Face-bow record:

In some designs of these articulators, the upper cast can be mounted by a face bow transfer.

When the mean value articulator does not accept face-bow record, the mounting is made according to Bonwill triangle.



Bonwill found that in mandible the inter-condyle distance as well as the distance from each condyle to the contact point of the lower central incisors was 4 inches (equilateral triangle).

### Disadvantages:

1. Most of these articulators do not accept face-bow record.
2. Protrusive movement restricted to a fixed angle and it is successful in patients whose condylar angle approximates that of the articulator (30-40°).
3. No lateral movements.

## Semi Adjustable Condylar Path Articulators (Class III):

### Design:

In these articulators the horizontal condylar path is adjusted by a making protrusive record obtained from the patient (do eccentric protrusive jaw relation record).

The lateral condylar path inclination (allow lateral movement on articulator) is adjusted according to the

Hanau's formula:

$$L = H / 8 + 12$$

L = the lateral condylar path.

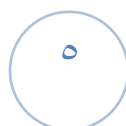
H = the horizontal condylar path.

Types of semi adjustable articulators are non-arcon, while others are arcon.

A. The term **Arcon** (articulator + condyle) is commonly used to indicate an instrument that has its condyles on the lower member and the condylar guides (fossa assemblies) on the upper member.



B. The **Non arcon** commonly used to indicate an instrument that has its condyles on the upper member the condylar guides (fossa assemblies) attached to the lower member.





### Possible movements:

1. Opening and closing.
2. Protrusive movement according to the horizontal condylar path angle determined from the patient (By taking protrusive record from the patient).
3. Lateral movement to the angle estimated from the Hanau's formula.
4. Some types have Bennett movement (immediate side shift).

### Records required:

1. Face bow record to mount the upper cast.
2. Vertical dimension and centric relation to mount the lower cast.
3. Protrusive record to adjust the horizontal condylar path inclination of the articulator.

### Disadvantages:

1. The lateral condylar path angle is determined from the Hanau's formula.
2. Most of these articulators have no Bennett movement.

### **Fully adjustable articulators (Class IV):**

They differ from the semi-adjustable articulators in that the lateral condylar path inclinations is adjusted by a making lateral record obtained from the patient (do eccentric lateral jaw relation record) not from the Hanau's formula.



### Possible movements:

The same of the semi-adjustable articulators. In addition to Bennett movement.

### Records required:

- a. Face bow record to mount the upper cast.
- b. Vertical dimension and centric relation to mount the lower cast.
- c. Protrusive record to adjust the horizontal condylar path inclination.
- d. Right lateral record to adjust the left lateral condylar path inclination.
- e. Left lateral record to adjust the right lateral condylar path inclination.

### Disadvantages:

Multiple records are required with the possibility of errors. The semi-adjustable articulators are usually enough for complete denture construction.

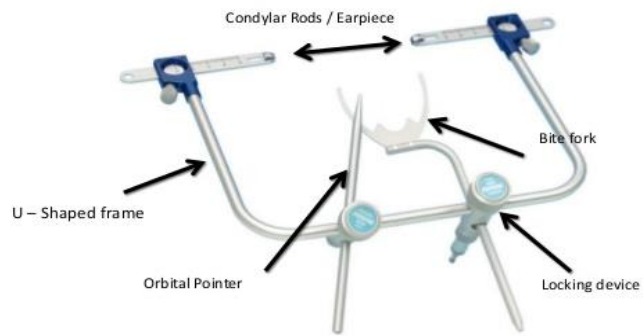
### **FACE-BOW:**

The face-bow is a caliper-like device that is used to record the relationship of the maxilla to the temporomandibular joints or the opening axis of the jaws and to orient the casts in this same relationship to the opening axis of the articulators (orientation relation).



## The face-bow consists of:

1. U- shaped frame.
2. The condyle rods.
3. The fork.



## Types of face-bow:

1. Kinematic (Face type)
2. Arbitrary:
  - a. Face type
  - B. Earpiece type

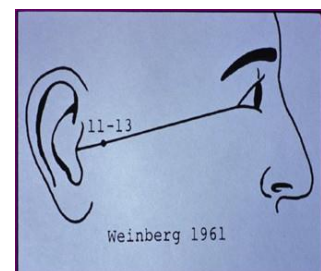
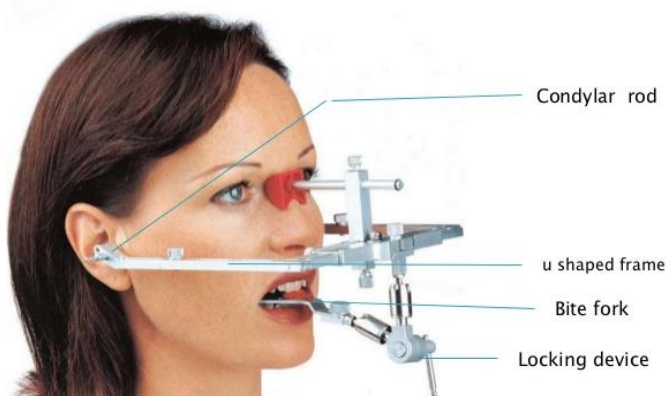
## The kinematic (mandibular, hinge axis locator) face-bow:

It is used to locate the kinematic (true or terminal) transverse hinge axis. Transverse hinge axis: is an imaginary line around which the mandible may rotate during opening and closing for about 2mm.

## The arbitrary face-bow:

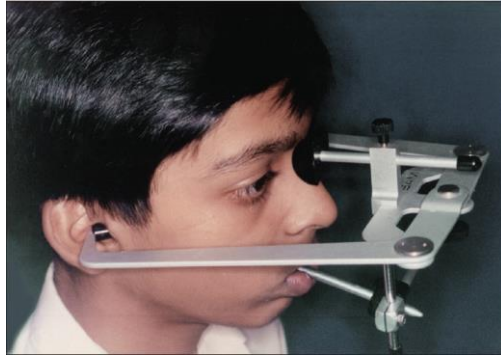
It is used to record the position of the upper jaw in relation to the arbitrary hinge axis and transferring the relation to an articulator.

- The face type is oriented to the kinematic or arbitrary hinge axis. The arbitrary axis is positioned on a line extending from the outer canthus of the eye to the middle of the tragus of the ear and approximately 13mm in front of the external auditory meatus.





- The ear face-bow oriented to the arbitrary axis by fitting into the external auditory meatus.



Important of the face-bow:

1. Mounting of the maxillary cast without a face- bow transfer can introduce errors in the occlusion of the finished denture.
2. Minor changes in the occlusal vertical dimension on the articulator without having to make new maxillomandibular records.
3. It is helpful in supporting maxillary cast while it is being mounted on the articulator.

