

Articulators through the Years Revisited: From 1700 to 1900—Part I

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ABSTRACT

Many articles in the dental literature pertaining to articulators deal with the theory and development of articulating instruments, directions for use, explanations of deficiencies and methods recommended for overcoming them, detailed mechanical interpretations of the instruments, and various systems of classification. There have been a series of articulators that have been introduced if we glance at the past; the numbers are many and the dentist becomes confused as to which one to choose. This article which will be published in four parts, provides a pictorial history of the articulators in the collection.

Keywords: Articulators, Condylar guidance, Hinge, Mechanical, Plaster.

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INTRODUCTION

The first instrument designs were attempts to duplicate anatomic relationships or reproduce functional movements of the anatomy. More sophisticated articulating instruments evolved as more was learned about anatomy, mandibular movement, and mechanical principles. The objective was always the same: to produce or reproduce occlusal relationships extraorally. The story of the evolution of articulators should be told in several ways: the mechanical development should be documented; a historical account of each inventor and contributor should be recorded; and a pictorial record of each instrument should be preserved, so that a record would remain if the instruments themselves were to be lost or destroyed. Individual articles and several textbooks have sections devoted to one or several instruments. A number of teaching institutions and individuals own collections of instruments that constitute an unwritten

history just by their existence. It is important not to lose this legacy. However, such collections are more valuable to students, teachers, and historians alike when facts concerning the instruments are carefully recorded. This article which will be published in four parts, provides a pictorial history of the articulators in the collection.¹⁻⁷

ARTICULATORS FROM 1700 TO 1800¹

- Philip Pfaff—plaster articulator (1756)

ARTICULATORS FROM 1801 TO 1900⁸⁻¹⁶

- Barn Door Hinge articulator and adaptable Barn Door Hinge
- JB Gariot's first mechanical articulator (1805)
- Howarth plaster articulator (1830)
- Thomas W Evans—plain line articulator (1840)
- Cameron's articulator (1840)
- Daniel T Evens articulator (1840)
- Bonwill articulators (1858)
- ET Starr articulator (1868)
- Antes-Lewis articulator (1895–1900)
- Richmond Hayes articulator (1889)
- Gysi-E Muller articulator (1896-1899)
- William Earnest Walker—clinometer (1896)
- Gritman's articulator (1899)

The Plaster Articulator (Fig. 1A)

The plaster articulator is credited to Phillip Pfaff of Berlin in 1756, who was the dentist of Frederick the Great. It consisted of plaster extension on the distal portion of the maxillary and mandibular casts grooved to each other. This was commonly known as slab articulator.

The Barn Door Hinge and Adaptable Barn Door Hinge (Figs 1B and C)

The Barn Door Hinge consisted of heavy duty hinge bending each arm 90° to form L shaped upper and lower members. Though not credited to any one individual, it has been in use for many years. The adaptable Barn Door hinge is capable of opening and closing only in a hinge movement. It has an anterior vertical stop, which is usually a carriage or machine bolt. Provided that the instrument is well manufactured and not flexible, lateral movement is held to a minimum. The

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adaptable barn door hinge is also known as the Dayton Dunbar Campbell instrument.

JB Gariot's First Mechanical Articulator (1805) (Fig. 1D)

In 1805, JB Gariot described first mechanical hinge articulator. It consist of a simple hinge, with a set screw in the posterior against a metal plate, to serve as a vertical stop.

Howarth Plaster Articulator (1830) (Fig. 1E)

In 1830, Howarth and Ladmore, produced a most common method for relating casts with the help of plaster index (also called as plaster articulators). It consisted of two nested metal boxes which were held in position and the hinge movement was controlled with elastics. The casts were secured in place, with twins or elastics.

Thomas W Evans Articulator-Plane Line Articulator (1840) (Fig. 1F)

It is one of the earliest mechanical hinge articulators. Important feature was that vertical dimension could be preserved or altered as required.

James Cameron's Articulator (1840) (Fig. 2A)

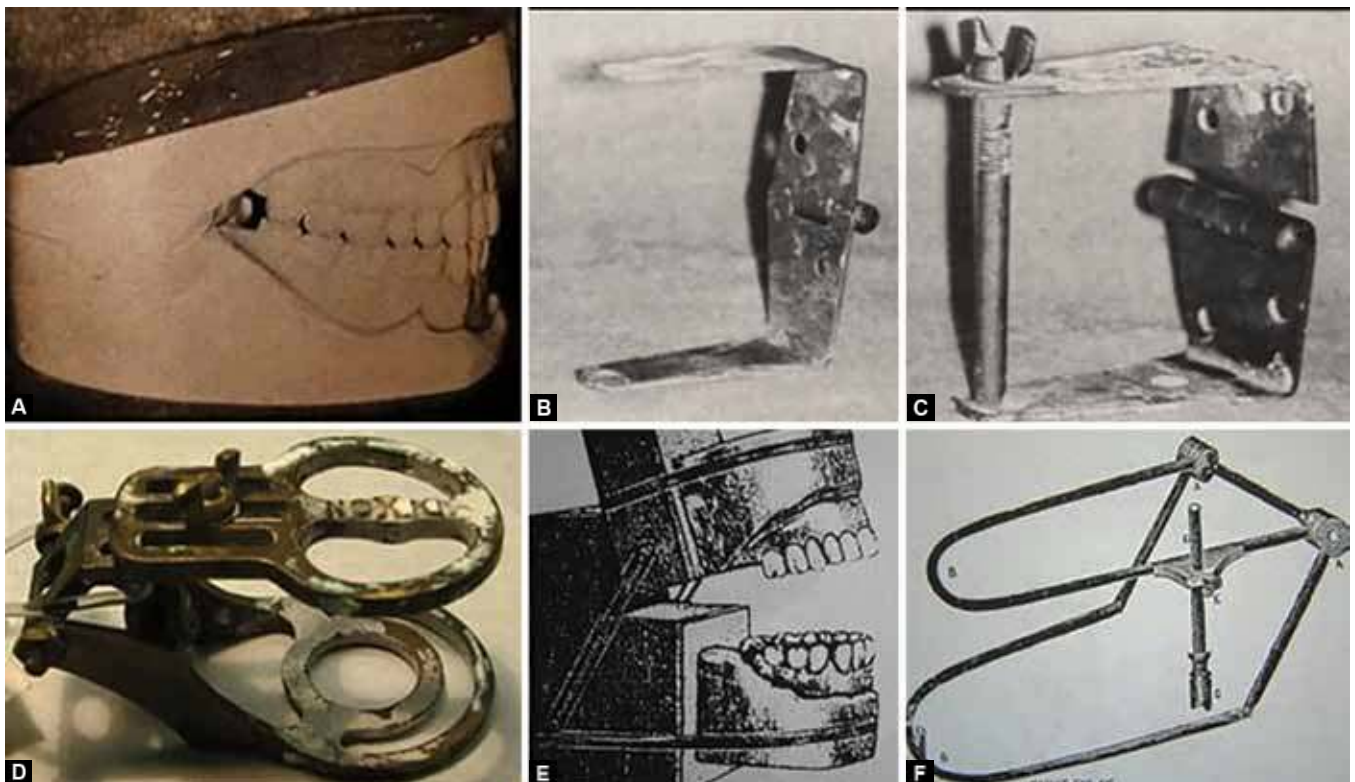
There was provision for vertical dimension and anterior-posterior relation. Mandibular member of the articulator moved while upper member was fixed.

Daniel T Evens Articulator (1840)

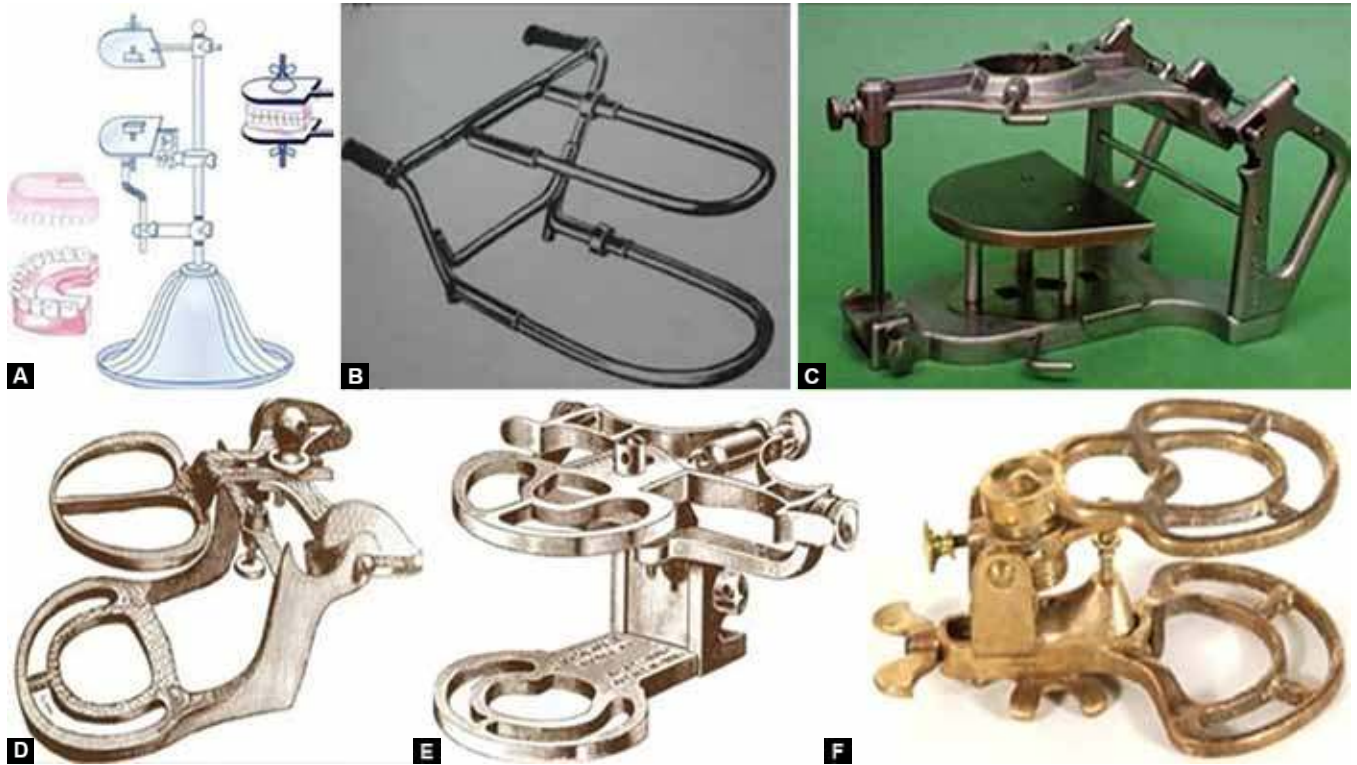
It was called as 'Dentist's Guide'. It was the second articulator to be patented and represents advancement in the understanding of mandibular movement by Daniel T Evens. For the first time, there is a mention of provision for protrusive and lateral movements. Evens also followed the misconception of Cameron that, for an articulator to accurately imitate human jaw movements, only the lower member should move. He also was the first to record the vertical stop feature in his patent application. Evens articulator in its original form was probably never marketed, it was unsuccessful because it was inconvenient and difficult to use. Kern introduced few modifications and marketed it in 1844.

The Bonwill Articulator (1858) (Figs 2B and C)

In 1858, Bonwill, a mathematician developed the first articulator based on his theory of occlusion or the theory of equilateral triangle with a serious effort to imitate the movements of the mandible in eccentric positions. It was a mean value articulator. It has a fixed inter condylar distance of 10 cms and fixed distance between each condyle and lower central incisor point of 10 cms. The Bonwill's theory of occlusion—teeth move in relation to each other as guided by the condylar control and the incisal point.



Figs 1A to F: (A) The plaster articulator, (B) the Barn Door Hinge, (C) adaptable Barn Door Hinge, (D) JB Gariot's first mechanical articulator, (E) Howarth plaster articulator and (F) Thomas W Evans articulator



Figs 2A to F: (A) James Cameron's articulator, (B and C) the Bonwill articulator, (D) ET Starr articulator, (E) Antes-Lewis articulator and (F) Richmond Hayes articulator

ET Starr Articulator (1868) (Fig. 2D)

One of the fixed condylar guide instruments. The lower plate is held in position by elastic bands.

Antes-Lewis Articulator (1895–1900) (Fig. 2E)

This was actually the product of a joint venture and it included the design features of two instruments. The upper plate is held in position by the encased central spring at the end of the 'yoke'.

Richmond Hayes Articulator (1889) (Fig. 2F)

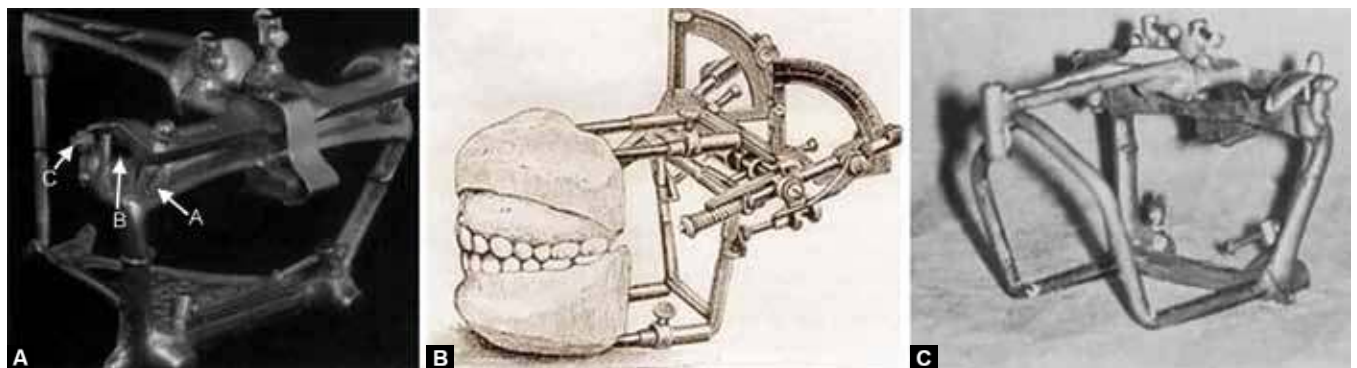
First to incorporate a fixed descending condylar path. It was more innovative in condylar design and probably reflected Hayes concept of condylar movement more accurately.

Gysi E Muller Articulator (1896–1899) (Fig. 3A)

Gysi worked with Muller to construct an articulator that exactly imitated the form of the condyle and glenoid fossa. This was his first articulator. It is an average value instrument with the exception of lateral rotation center controls.

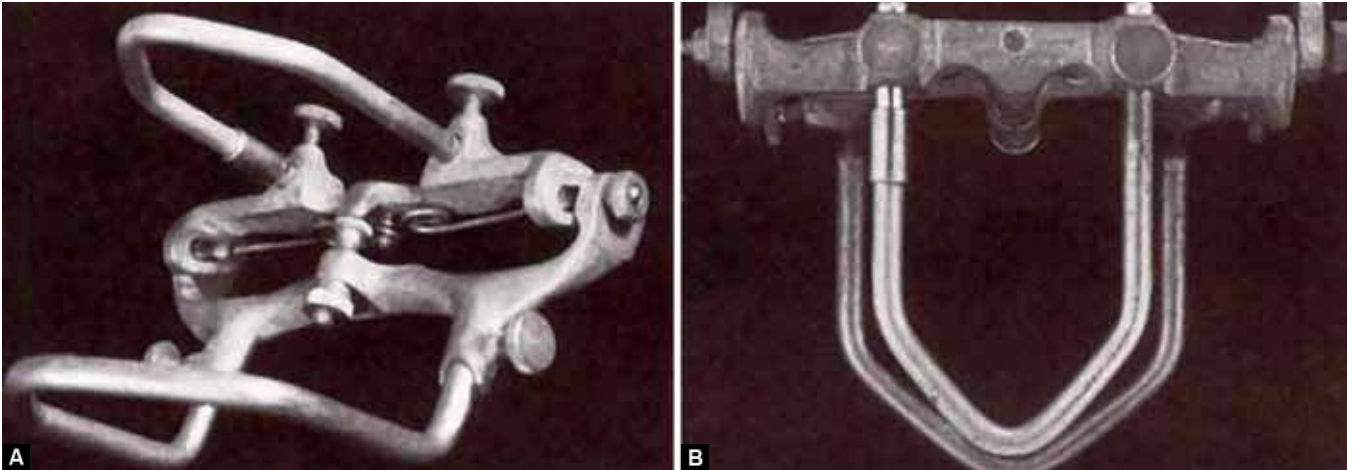
William Earnest Walker-Clinometer (1896) (Fig. 3B)

WE Walker in 1896 said that dentures, which balanced on Bonwill's articulator, did not balance in the mouth and pointed the absence of condylar inclination as the dictating factor. He devised the 'clinometer' which had provision for gothic arch tracings. Later every investigator tried to reproduce the individual movements of the patient mandible. They said that the condylar path varied from person to person and even in the same person, it differs.



Figs 3A to C: (A) Gysi E Muller articulator, (B) William Earnest Walker clinometer and (C) the Bixby attachment





Figs 4A and B: Gritman's articulator

The Bixby Attachment (1894) (Fig. 3C)

The Bixby attachment was designed by CE Bixby in 1894. A modified attachment replaces the lower member on a Gysi Simplex instrument. It was intended to regulate the anteroposterior position of a cast in the articulator. The Bixby attachment provided no means of establishing the horizontal plane but was considered a forerunner of the facebow.

Gritman's Articulator (1899) (Figs 4A and B)

This articulator was patented and introduced with the Snow facebow by George B Snow and AD Gritman. The Gritman articulator featured descending condylar paths of 15°, an average determined by measurements taken from a large number of patients. The condylar paths also included a slight Balkwill Bennett angle to represent the average oblique descent of the condyle. A heavy horizontal spring kept the upper member in position. There was a posterior vertical stop feature.

There are four parts to be discussed. Part II of this article, to be published in a later issue of the journal and, will be devoted to a discussion of articulators introduced from 1901 to 1950.

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