Innovation in Prosthodontics:

# A History of Articulators, Dentures, and Occlusion


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and Dr. Rodney Phoenix



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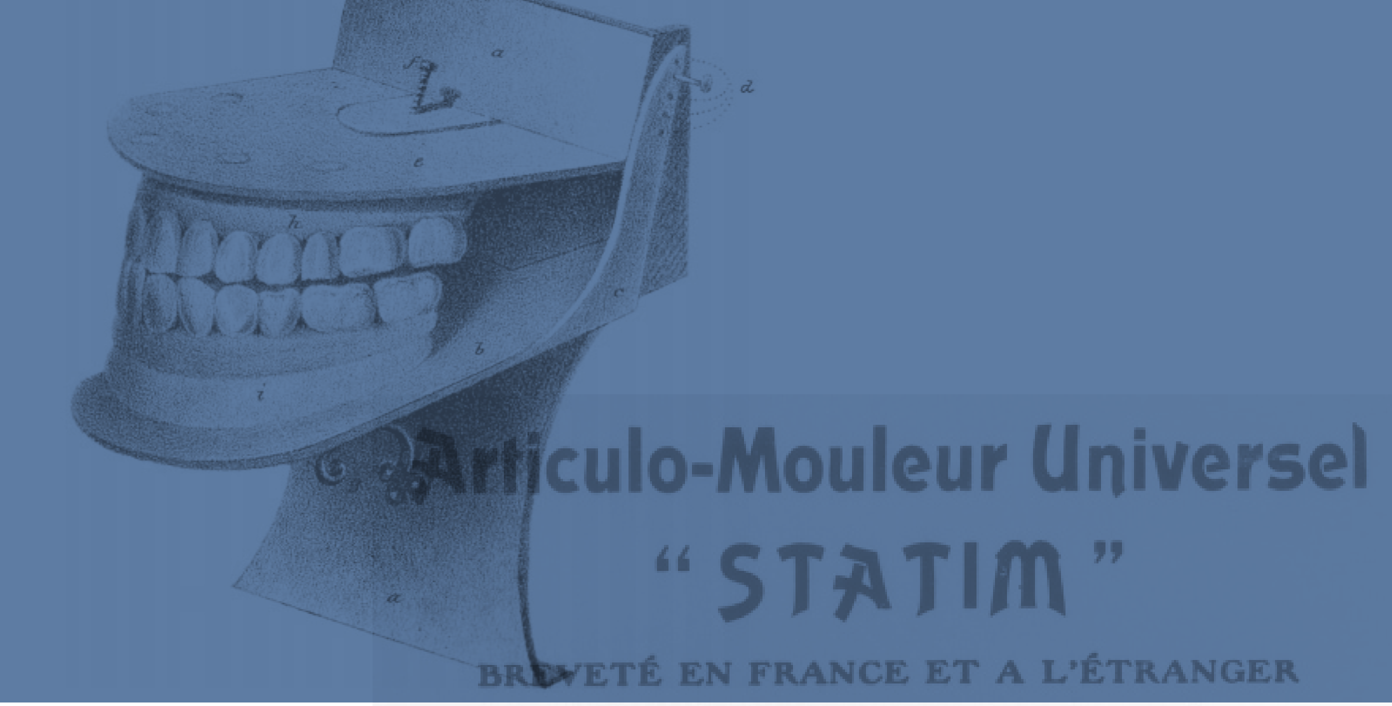
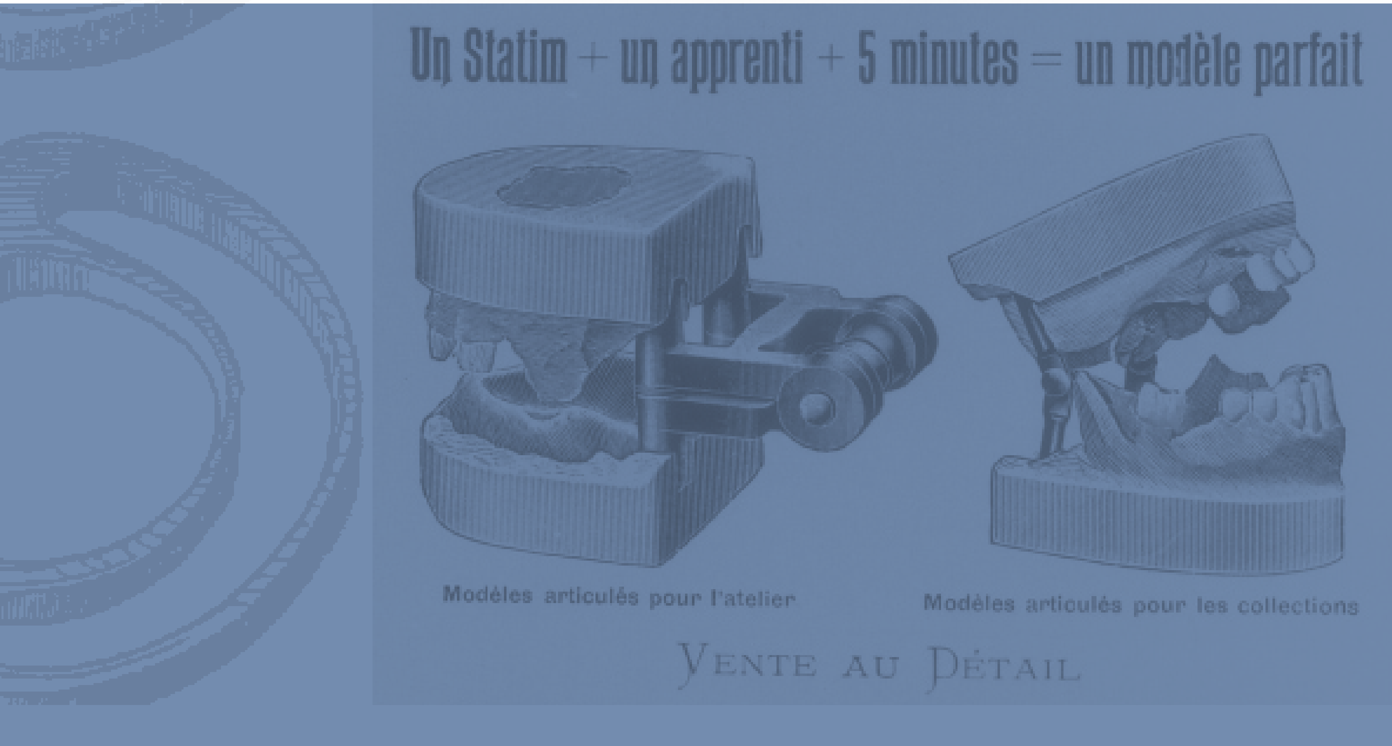
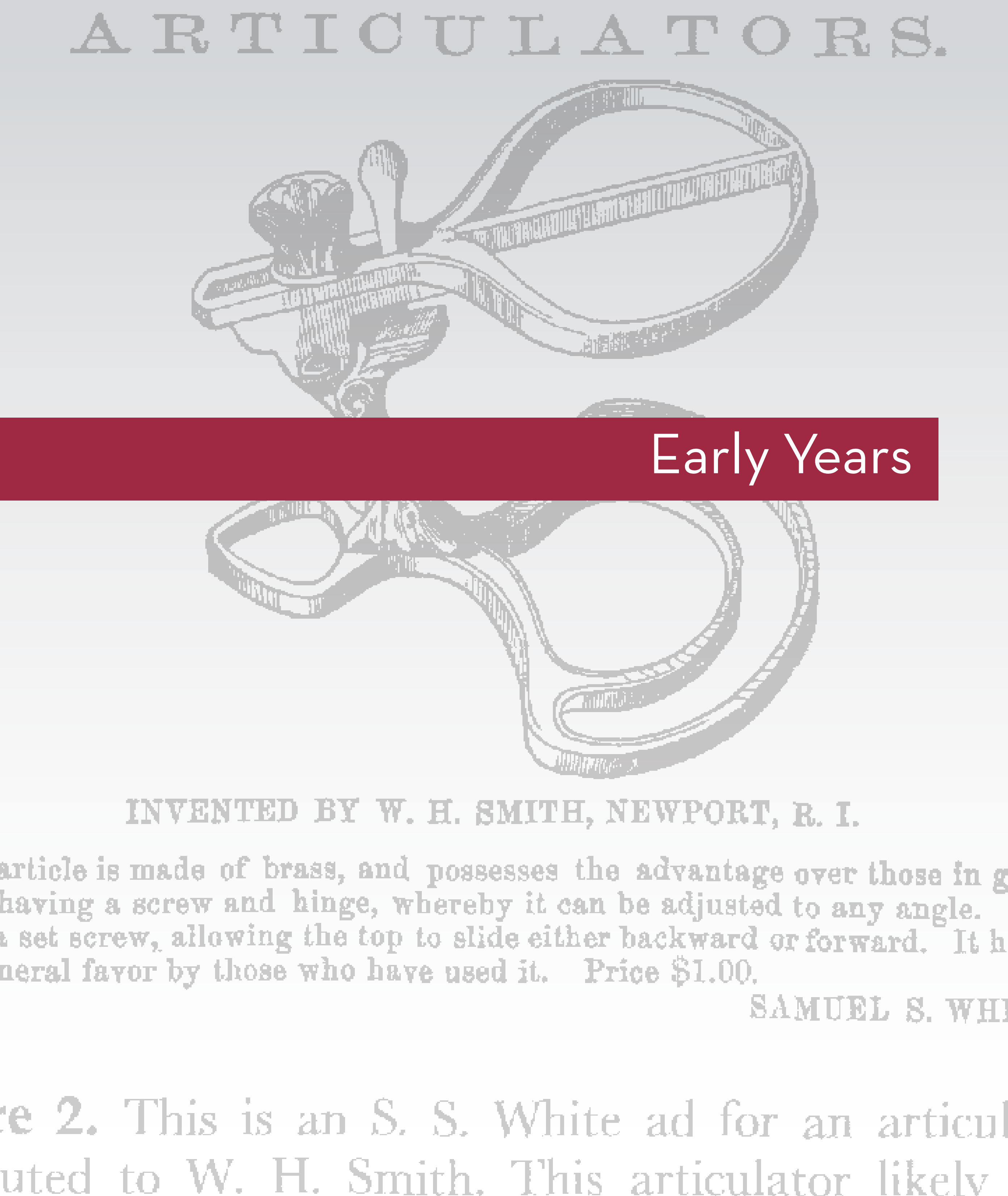



# Part One:
# A History of Articulators



# Early Years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# The History of Articulators: A Perspective on the Early Years, Part I

*Edgar N. Starcke, DDS*

HOW MUCH do we really know about the origins of articulators? Before the 1840s, a time that coincided with the development of dentistry as a profession in the United States, Europe was our principal source of dental knowledge and practices. Investigating the infancy of American dentistry is itself a challenge. Anecdotal information, inadequate historical records, and little early scientific research have obscured much of what we know. It is not surprising that there are very few references to articulators in the early literature; however, since 1900, the distinction of "inventing the articulator" has been given to two prominent European dentists of the 18th and 19th centuries, Phillip Pfaff and Jean Baptiste Gariot.

In 1756, Phillip Pfaff, dentist to the court of Frederick the Great, King of Prussia, first described his method of making plaster casts. He described a way of making impressions with sealing wax, one half of the mouth at a time, removing the sections individually, and reassembling them outside of the mouth. He then poured plaster into the impression.[1] If natural teeth were present, Pfaff had the patient bite into the wax so that the relationship of the teeth could be considered.[2] For this reason, it has been assumed that he used a device to preserve the relationship of the casts. Some scholars therefore believe that he was the first to use a dental articulator.[3] Even though this would seem logical, it can only be considered conjecture, because Pfaff never mentioned such a device.

In 1805, Jean Baptiste Gariot described his method of making plaster casts and extending them posteriorly to provide an indexing mechanism for preserving the relationship of the casts.[4]

Gariot was indeed the first to describe a "plaster articulator" (see *sidebar**). It was a simple plaster indexing procedure, which came to be known as the "oiled board" articulator (Fig 1).[5] "Plaster articulators" were popular well into the 20th century, and through the years, many designs have been reported in the literature. An early variation on the Gariot design was called the "slab" articulator (Fig 2).[6]

Authors who described and used "plaster articulators" were Richardson, 1860,[7] Coles, 1876,[8] Peezo, 1916,[9] and Essig, 1937.[10] It is also noteworthy that three U.S. patents for "plaster articulators" were granted between 1857 and 1888:

- A. A. Blandy of Baltimore, MD. Patent #16,708, March, 1857
- G. F. Schaffer of New York, NY. Patent #99,698, February, 1870
- J. L. P. Leman of Middlesex, England. Patent #386,711, July, 1888

*Based on their function, "plaster articulators" would be appropriately classified as *Class I* articulators or as *Cast Relators*. The *Glossary of Prosthodontic Terms* (7th edition) defines a Class I articulator as "a simple holding instrument capable of accepting a single static registration." A Cast Relator is defined as a "mechanical device that orients opposing casts to each other without reference to anatomic landmarks."

The concern is not *how* a "plaster articulator" is classified, but whether it should be described as an *articulator* at all. The use of the terms "instrument" and "mechanical device" in the above definitions clearly indicates that there is a distinction between appliances designed specifically for mounting opposing casts and casts that are mounted by extending the plaster bases posteriorly for indexing.

I am not suggesting that the term "plaster articulator" be avoided or discarded, because it is familiar and is widely understood for what it represents. However, it should be recognized that "plaster articulator" is a misnomer, because it actually refers to a procedure or method for mounting casts with a plaster index, and not to an instrument, appliance, or a device, terms that are more descriptive of mechanical articulators.

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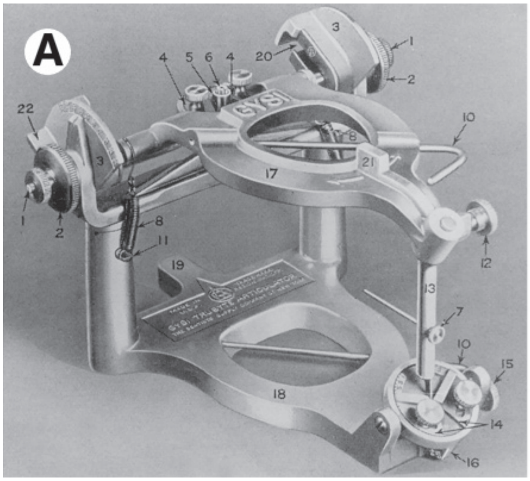


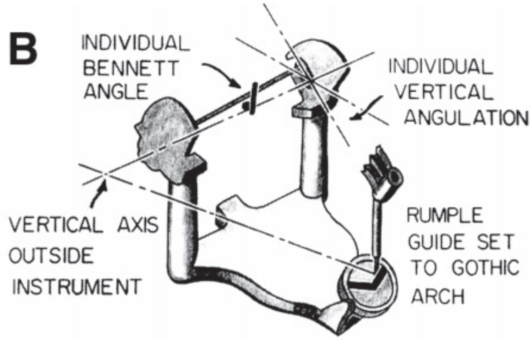




**Figure 1.** (*A*) The Gysi *Trubyte* Articulator, 1928. (Reprinted with permission from Dentsply, p 44.[27]) (*B*) The Gysi Trubyte Articulator, 1928. Schematic drawing illustrating the influence of the Rumple [sic] incisal guide on the position of the lateral rotation centers. (Reprinted with permission, p 881.[18])

## Other Gothic Arch Incisal Guide Control Articulators

The Gysi *Trubyte* was not the only articulator with a gothic arch incisal guiding system available to US dentists in 1928.

In 1921, John W. Needles produced an articulator with this type of incisal guide as the primary control (Fig 6).[7] Needles developed a hybrid design that incorporated elements of Monson's "single rotation center" idea as well as the controlling incisal guide assembly. In addition, between 1922 and 1927, Needles and Milus M. House developed the *House-Needles* incisal guidance system for dental articulators (Fig 7).[8]

In 1922, Milus M. House was appointed director of the Deaner Institute for Dental Research in Kansas City, MO, described as the first foundation specifically devoted to dental research. He held that position for 5 years. John Needles was on the original 15-member research team and worked closely with House on several projects. One such project produced a new mandibular movement registration procedure now known as the "House-Needles Chew-in."[9]

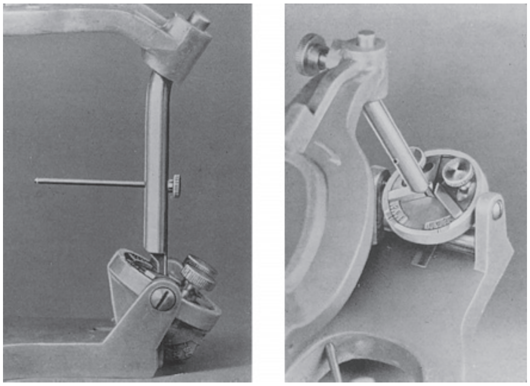


**Figure 2.** The Gysi *Trubyte* Articulator, 1928. The incisal guide assembly is also known as the "Rumpel guide." It is a controlling mechanism and Gysi's first adjustable incisal guide. (Reprinted with permission from Dentsply, p 61.[27])

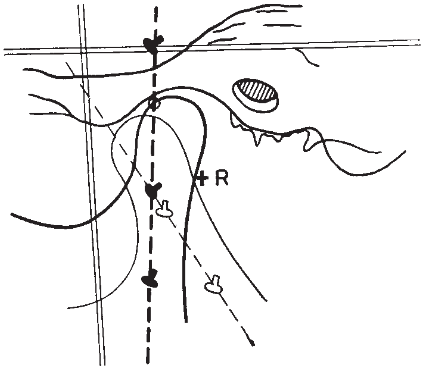



**Figure 3.** A composite drawing by Gysi of Breuer's illustrations showing the most logical position of the vertical "rotation point" to be at (R). (Reprinted from Gysi, p 66.[4])

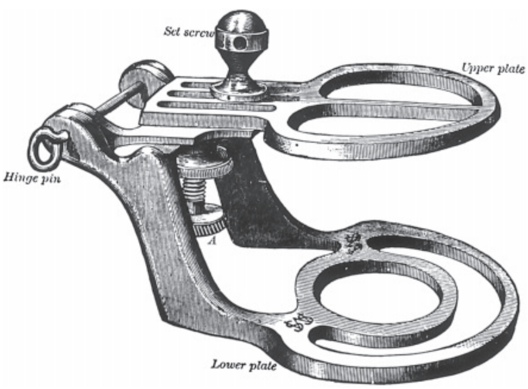



**Figure 5.** A planeline articulator produced by the SS White Co. It has an anterior-posterior tongue-in-groove mechanism for changing the position of the upper member. Articulators with this basic design were in very common use during the first half of the 20th century. Many of these had no markings and, as a result, their origins are not known. (Reprinted from Wilson.[7])

## Early Articulators Designed for Arbitrarily Correcting the Bite

Before a basic understanding of the nature of mandibular movement and before the advent of improved materials and techniques, dentists were plagued by the inherent problems associated with the necessity of using liberal amounts of a soft crude wax to make impressions and, at the same

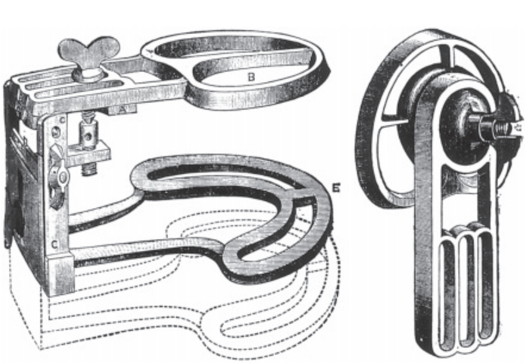



**Figure 6.** The *Hoffstadt* Articulator, 1871.[5] In this ad from the 1897 Morrison Brothers Catalogue, this instrument is referred to as the *Justi* Articulator. Louis Hoffstadt likely assigned the patent rights to the H.D. Justi Company. It featured a tongue-in-groove mechanism for both the horizontal and vertical adjustments. By the 1890s, an alternate upper arm with a ball and socket joint had been added (attributed to D.L. Overholser). (Reprinted from Morrison Brothers Catalogue.[8])

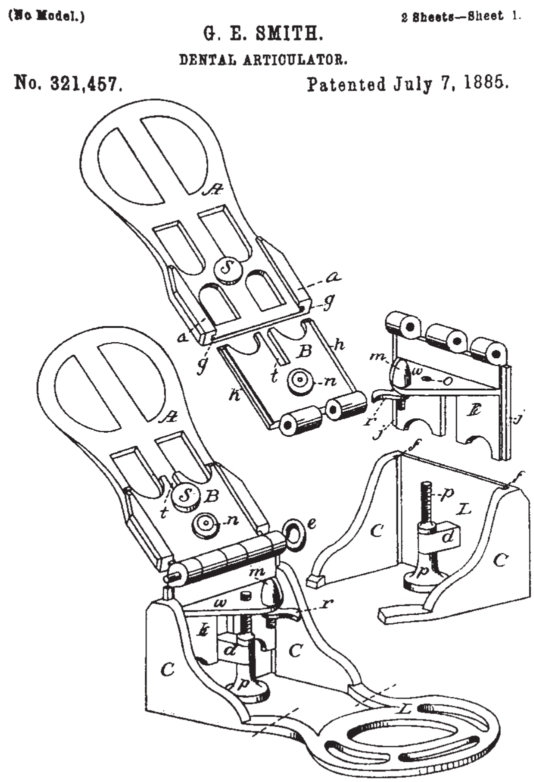
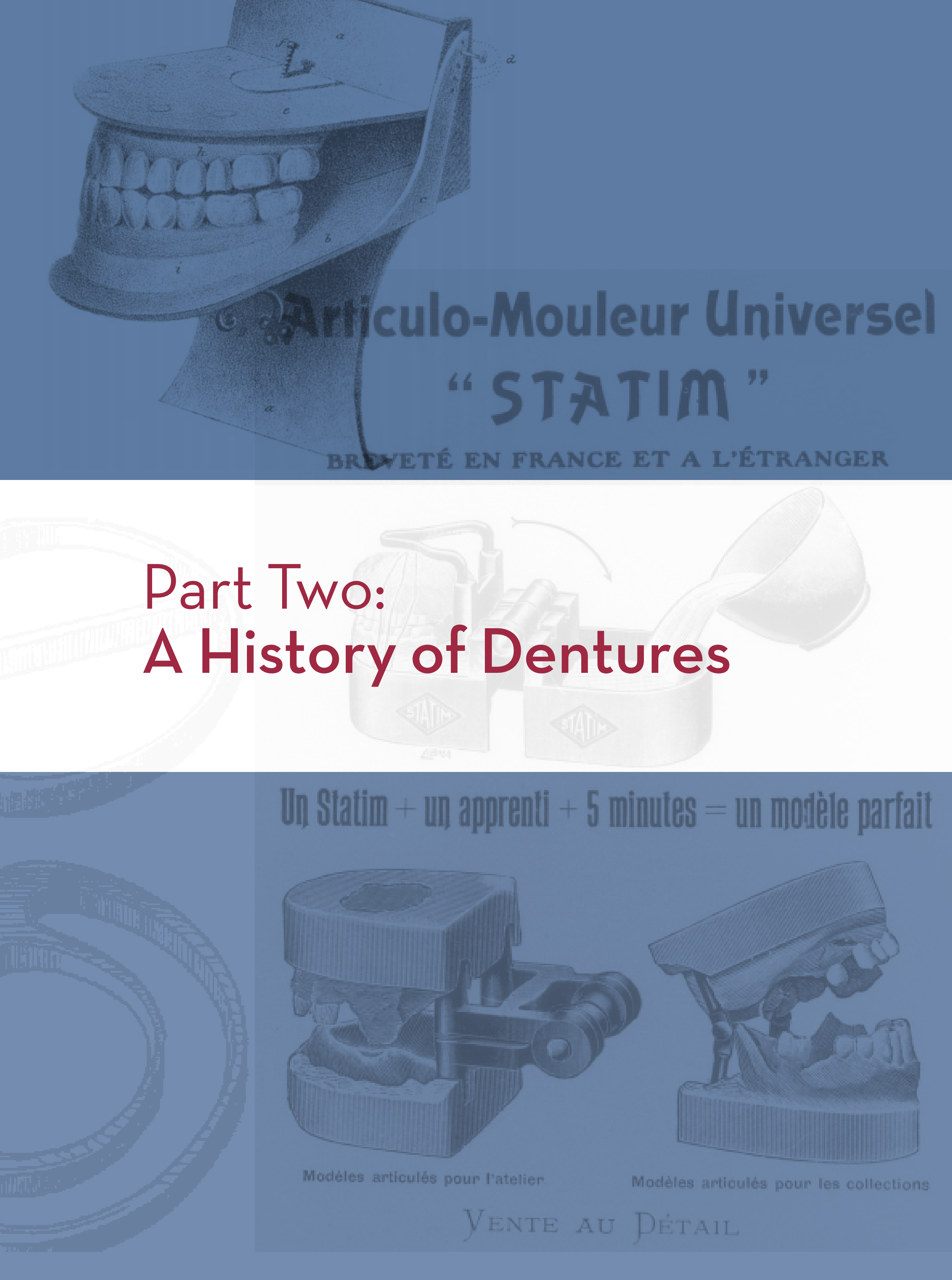


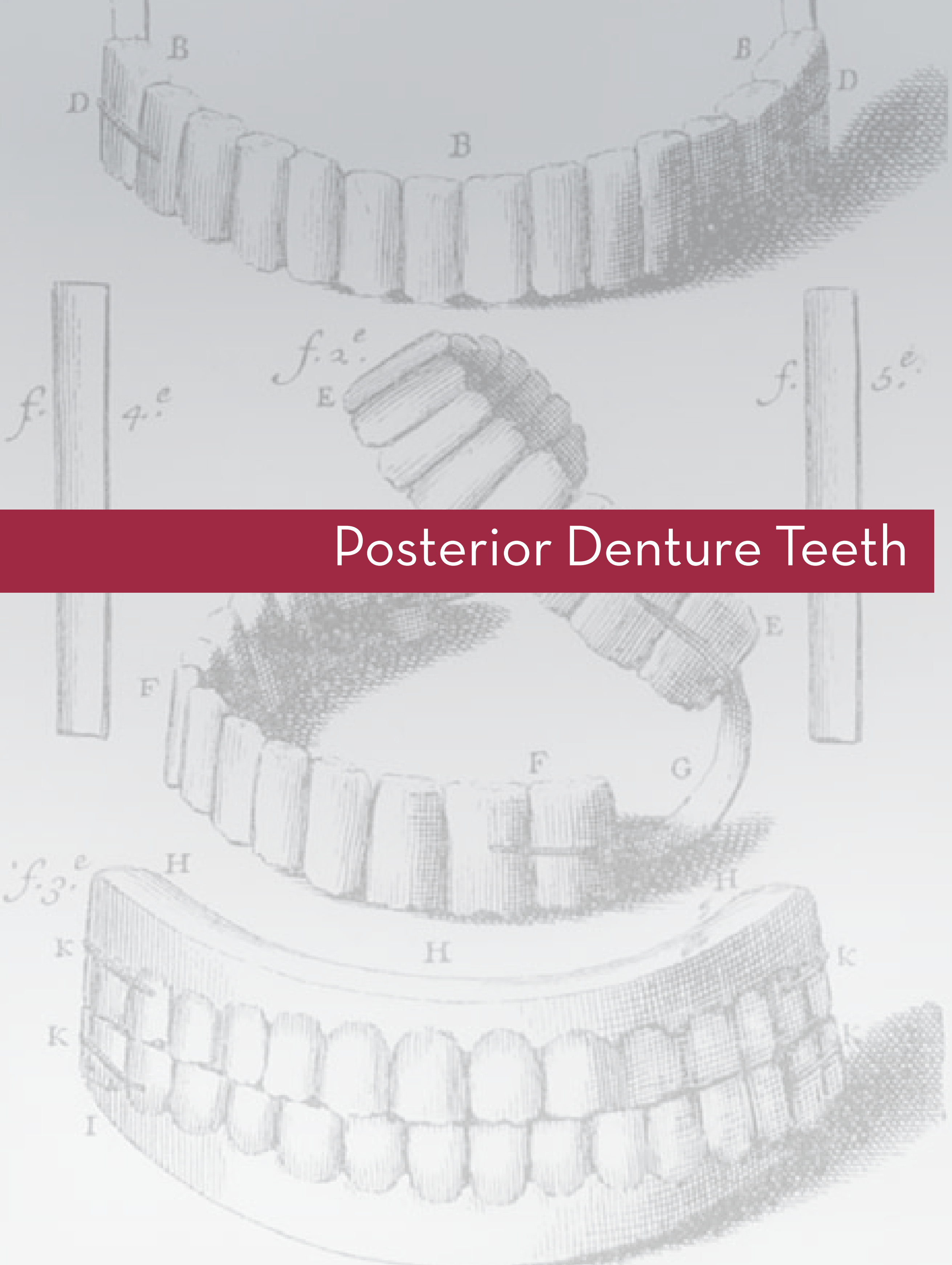

**Figure 7.** The *G.E. Smith* Articulator, 1885. The *Smith* was quite intricate for an articulator that did not perform many functions. (Reprinted from Smith.[15])

time, record the bite. Commonly known as a "mush bite," making a correct centric relation record with this procedure was usually just plain luck. Some early inventors, concerned with the extent of this problem, however, must have believed that the most practical solution would be found not by improving clinical techniques but by using an articulator with special adjustment capabilities. As a result, these inventors turned their attention to modifying the designs of commonly used simple hinge articulators with a variety of features that could be used as part of laboratory procedure to correct the bite or a missed centric on the instrument.

US patent records show that these improvements appeared on the first articulator granted a US patent. In 1840, James Cameron of Philadelphia, PA produced his unique "pole stand" design (Fig 11). This articulator had features that allowed both the upper and lower members to be arbitrarily adjusted.[1] Sixty-four years later, in 1904, Frank L.

# Part Two:
# A History of Dentures






# Posterior Denture Teeth

## Topics of Interest

# The History and Development of Posterior Denture Teeth—Introduction, Part I

*Robert L. Engelmeier, DMD, MS*

THE purpose of this series of articles is to lead the reader on an intriguing journey through the historic events that led to the development and evolution of artificial teeth. The artistry and innovative genius that have been invested in this endeavor have weaved an interesting story. As this story unfolds, these articles concentrate specifically on the history of commercially available, posterior denture teeth and the philosophies of occlusion that promoted their use. The reason for this focus is that it was only after the commercial availability of individual artificial teeth and the discovery of a reliable denture base material that prosthetic dentistry could truly progress and be available to more than just a privileged few.

No attempt is made in these articles to take sides in the passionate debates that have raged over the past century between the different philosophical schools of denture occlusion. These articles simply attempt to present the evolution of the various occlusal philosophies along with the sometimes curious denture teeth that they inspired. And, where appropriate, they profile the inventive individuals who developed those teeth along with the companies that manufactured them. In addition, an attempt is made to present these historical profiles in the context of their period (i.e.) the level of technology, materials development, and advancement in articulator design.

Before the early twentieth century, the occlusal anatomy of posterior denture teeth was an arbitrary creation (whether "anatomic" or "nonanatomic"). It was not designed to follow any occlusal philosophy or theory of mandibular movement. These posterior denture teeth could not be set in harmony (or to balance) with any particular determinants of occlusion. This introductory paper is an historical review of the pioneering period of denture and artificial tooth development through the early nineteenth century.

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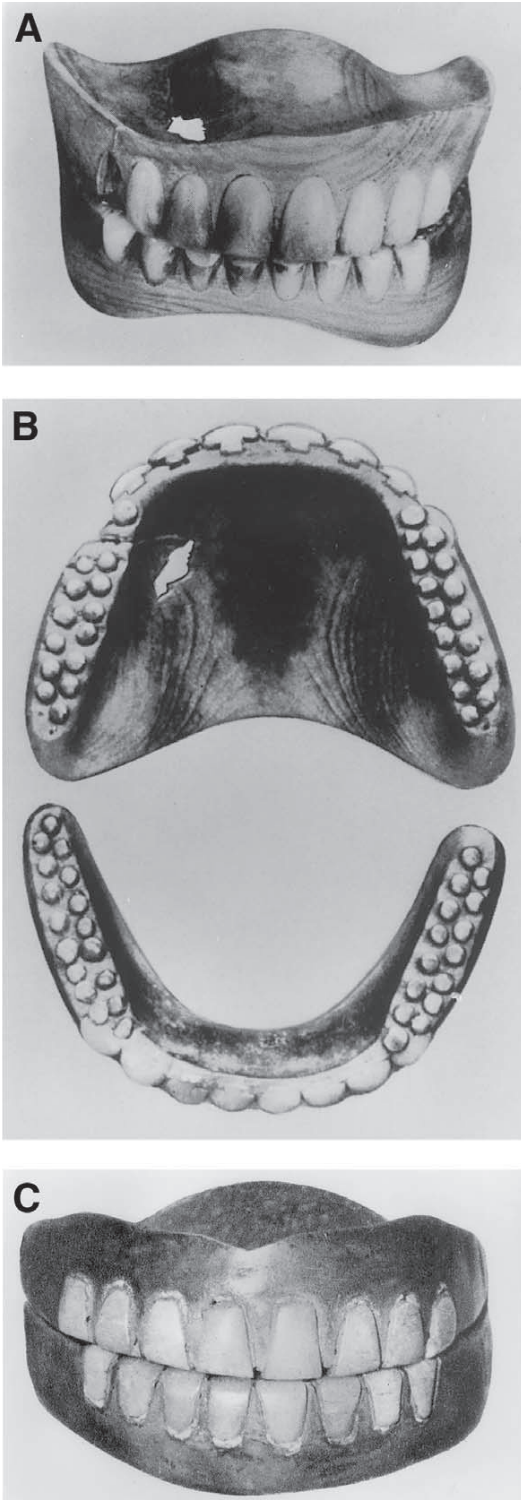
## Ornamental Replacement of Missing Teeth

There is archaeological evidence from many cultures of attempts to replace missing teeth.[1-4] Early replacements were fashioned from whatever materials were available (e.g.) bone, ivory, wood, pebbles, or human and animal teeth. The substitutes were ligated or splinted to adjacent natural teeth.[1-6] Because this series of articles is concerned with complete denture occlusion, this journey begins with the earliest known attempts to restore a complete arch with artificial replacements for the teeth.

The earliest examples of complete dentures used in the Far East come from early sixteenth-century Japan. These unique restorations were carved from a solid piece of a sweet-smelling wood, such as apricot, cherry, or boxwood. Remarkably, these primitive dentures were actually retained by atmospheric pressure.[1,2] To date, some 120 of these dentures have been found. Many of these restorations had integral teeth carved from the same block of wood as the base. Some had teeth fashioned from ivory or bone, whereas others had human teeth attached. There are even examples with copper and iron nails driven into the posterior base to enhance chewing efficiency (Fig 1). Wooden dentures of this type were made in Japan from around 1500 until the mid-nineteenth century.[1,2]

The hinged ox-bone complete dentures illustrated in Figure 2 *A* were excavated in Switzerland and date from around 1500.[4,7] Restorations of this type were ornamental only and were never intended for mastication. They usually dropped out of the mouth if the wearer spoke too rapidly. The German medical historian Gernot Rath[4] postulated that if sets of maxillary and mandibular complete dentures were ever made by the Romans, they most




likely would have resembled those shown in Figure 2. After the collapse of the Roman Empire, dental skill and knowledge rapidly deteriorated as Europe sank into the Dark Ages. The dentures exhibited in Figure 2 could actually represent the reemergence of a much earlier "lost" design.

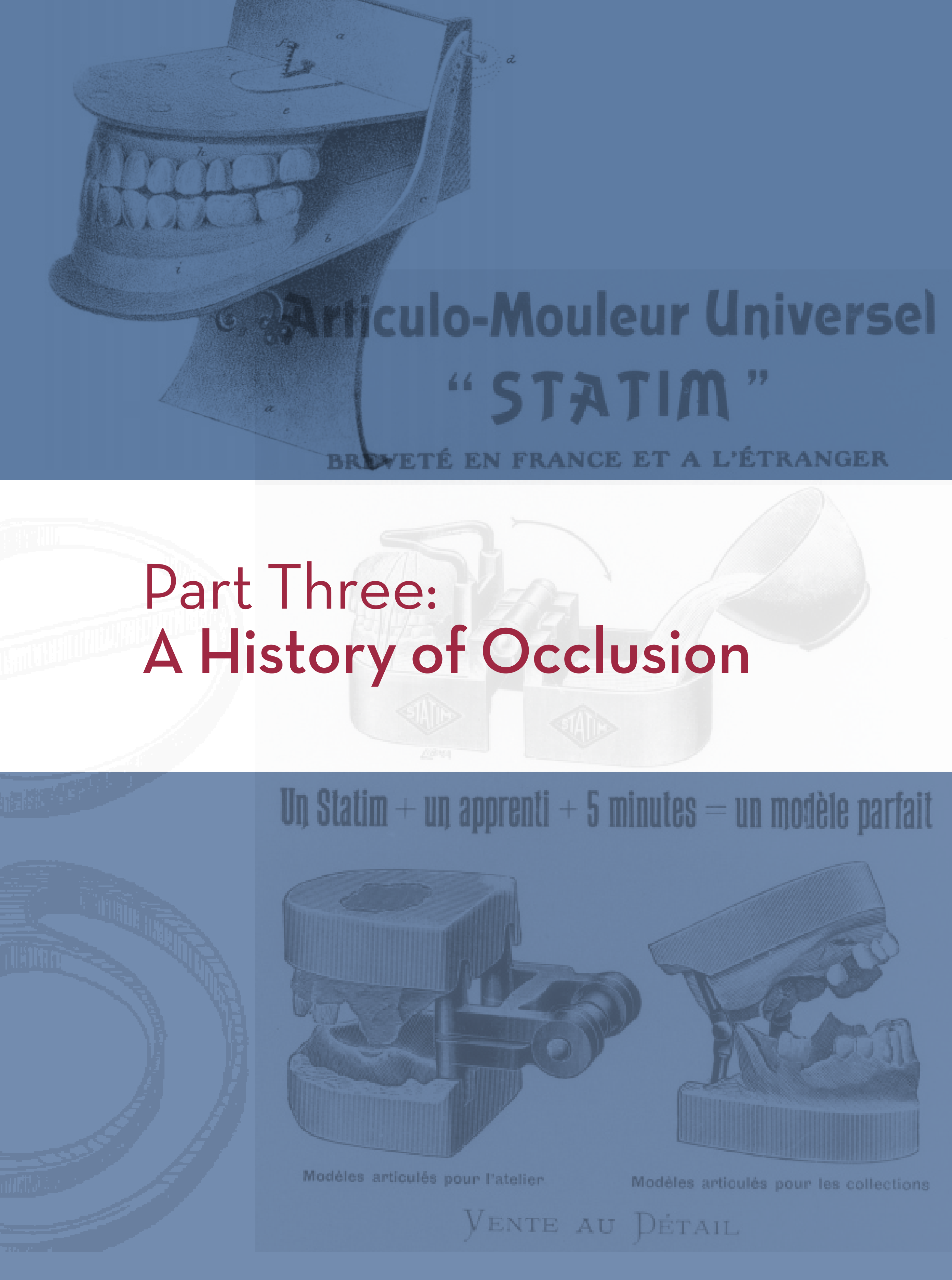
## Early Milestones in Denture Tooth Development

In his epochal text,[8] the celebrated French dentist Pierre Fauchard (Fig 3 *A*) described what is generally considered the first example of effectively retained maxillary and mandibular complete dentures. His innovative dentures (Fig 3*B*) consisted of carved bone or ivory teeth (or human natural teeth) attached to an enameled metal base. Flat steel springs were attached to both dentures, as illustrated, to adequately retain them.

Early eighteenth-century Europe experienced a high point in Western civilization and culture. Although quacks, frauds, and charlatans still abounded, dentistry was at last emerging as a recognized profession. Despite of the fact that this period was a time of scientific discovery, the fledgling profession of dentistry was woefully lacking good instruments and reliable materials; there were no articulators. It was not until 1756 that Phillip Pfaff of Berlin first described a wax sectional impression technique to generate plaster casts of a patient's mouth.[9,10] Before the development of the dental cast, denture bases had to be crudely shaped or roughed out to approximate the anatomy of a patient's ridges. This was accomplished by careful measurement of the mouth with dividers and compasses. Final shaping was done by means of painstaking fitting to the mouth with a colored disclosing medium and meticulous, precision carving of the base material. This was a time when competent clinicians kept their knowledge secret. Consequently, good training was rare. Finally, it was a time when only the wealthy could afford state-of-the-art dental treatment. The French aris-

**Figure 1.** (*A* and *B*) A typical example of a Japanese wooden denture from the early sixteenth century. The base was carved from a single piece of wood, and the anterior teeth were fashioned from flint. Iron or copper nails were commonly driven into the posterior bases to enhance chewing efficiency. Examples of these dentures exist where the teeth and sometimes the base have been painted black to indicate that the wearer was a married woman. (*C*) An all-wooden Japanese denture, circa 1700.

# Part Three:
# A History of Occlusion



# Denture Teeth with Metal Occlusals–Part 1

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**Keywords**
Denture tooth designs; denture tooth history; metal occlusals; non-anatomic denture occlusion.

## Abstract

Non-anatomic denture teeth made their debut in the early 1920s. Within a decade, the paradigm shift from anatomic to non-anatomic denture occlusion had been well established. The next evolutionary step in non-anatomic denture tooth development emerged with Dr. Wharton's 1938 design for his metal "chewers." The intention of denture teeth with metal occlusal inserts was increased chewing efficiency and wear resistance. Illustrated here in Part 1 are some of the most interesting metal occlusal designs from the early to mid-20th century. Though most were never manufactured or only had short production runs, a few enjoyed significant popularity and are still in production.

Victor H. Sears believed control of occlusal forces, for the purpose of alveolar ridge preservation, to be the primary objective of non-anatomic denture occlusion. He considered chewing efficiency to be a secondary consideration.[1-3] Nevertheless, chewing efficiency has had a huge impact on non-anatomic tooth designs for nearly a century.

One very interesting chapter in the story of artificial tooth development has been the integration of metal inserts into occlusal surfaces to increase chewing efficiency and resist wear. Metal occlusals for non-anatomic denture teeth made their debut in the late 1930s. A surprising number of these fascinating designs have appeared over the past 80 years. A few have survived to the present day, while most have faded into oblivion. A search of the dental literature and U.S. Patent Database has revealed more than 30 non-anatomic tooth designs having metal incorporated into their occlusal anatomy. The most significant of those designs are reviewed in this 2-part article.

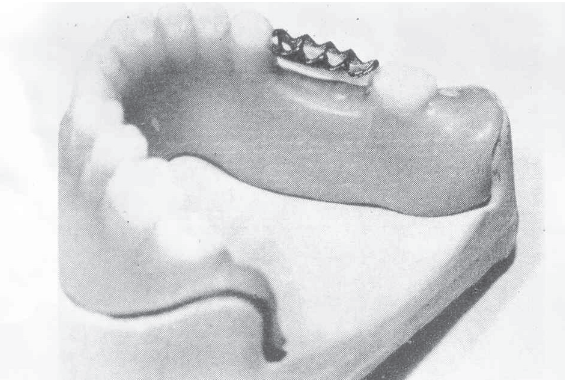
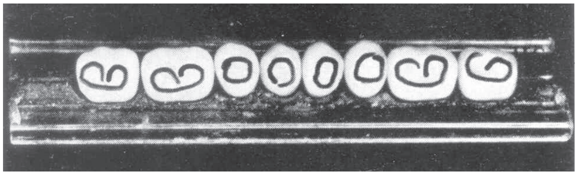


**Figure 1:** Dr. Charles Wharton's 1938 design for his metal Chewers was intended to increase masticatory efficiency. These apparently were the first non-anatomic, metal occlusal denture teeth. They were produced by Austenal Laboratories.

## Early metal occlusal designs

The earliest example of a metal occlusal intended to increase chewing efficiency was Dr. Charles Wharton's 1938 design for his metal Chewers.[3] They had corrugated metal ridges bisected by a single, central ridge and a narrowed occlusal table. The primary design objectives were efficient cutting, unrestricted gliding in all directions, and ready escape of masticated food via a space created under them in the denture base. The all-metal Chewers were exclusively set in the mandibular arch and were meant to occlude against maxillary flat, porcelain teeth (Fig 1).[3] The Chewers were produced and marketed by Austenal Laboratories.

Dr. John T. Vincent developed maxillary posterior denture teeth containing stainless steel or gold inserts, which were set against mandibular, porcelain French's Posterior Teeth. Though he never published any articles concerning his design, Dr. Vincent did explain his purpose and use of his Metal Inserts very well in a personal communication with Victor Sears.[3] In that conversation he claimed to have been first to develop an occlusion from such a combination of materials. He was also the first to appreciate the fact that thin, metal ridges efficiently cut through the bolus but did not chip easily like porcelain ridges. Vincent's teeth were not flat. They possessed enough buccal and lingual rise to be set to balance. The metal inserts were eliminated from the maxillary second molars to allow the mandibular porcelain molars to quickly "chew-in" their maxillary acrylic counterparts. This enabled them to balance with the incisal guidance during eccentric movements. Excessive wear and loss of occlusal vertical dimension (OVD) was prevented by the metal inserts occluding against the remaining mandibular porcelain teeth. Dr. Vincent's theory was that this



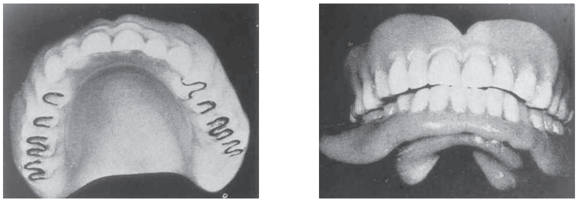


**Figure 2A:** (top) Dr. John T. Vincent developed his metal inserts in 1942. These maxillary acrylic teeth had strips of gold solder set into prepared recesses. They were set against mandibular porcelain French's Posterior Teeth.

**Figure 2B:** (bottom) Dr. Vincent's block of 4 maxillary posterior teeth had no blade in the second molar, allowing wear of this tooth and resulting maintenance of protrusive balance.

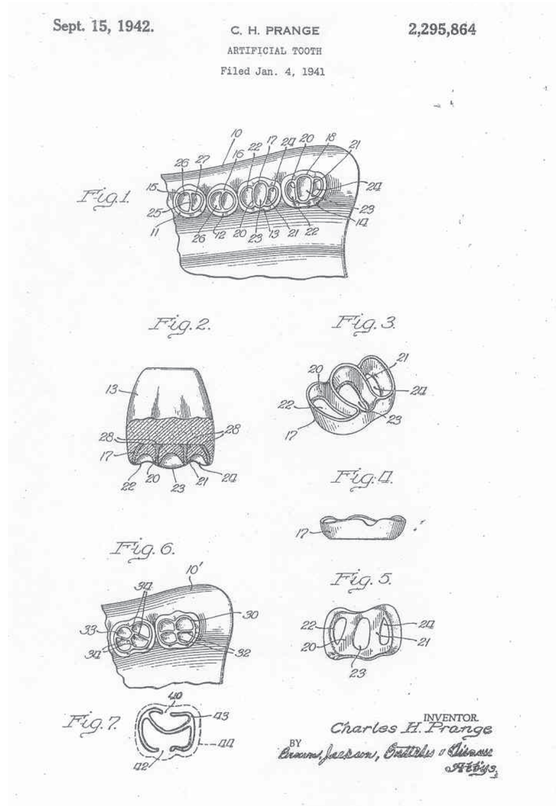


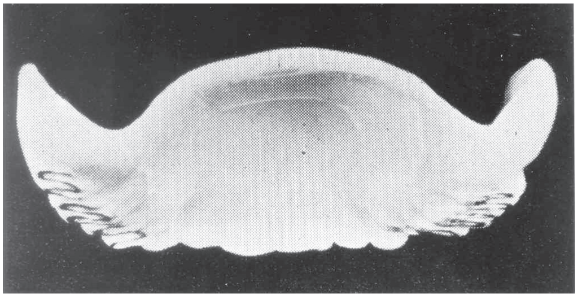

**Figure 3**: (right) Dr. Charles H. Prange of Short Hills, NJ patented his artificial teeth with ribbon-like metal inserts in 1942.

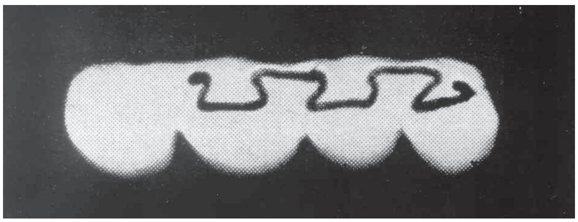
minimized trauma to the ridges and aided in reestablishing the original horizontal and vertical overlap during reline/rebase procedures. One final benefit of this combination of materials was the minimizing of occlusal sounds. Vincent developed his Metal Inserts in 1942. He apparently produced them for his exclusive use and never marketed them. According to his communications with Sears, he used these teeth in his private practice for more than a decade (Fig 2A, B).[3,4]

Dr. Charles H. Prange of Short Hills, NJ, patented a very effective metal insert for acrylic denture teeth in 1942. He sought to take advantage of the ability of acrylic teeth to produce lighter, stronger dentures, while the metal inserts improved bolus penetration and resisted abrasion. To avoid esthetic and weight disadvantages often associated with metal occlusals, he designed ribbon-like, chrome-cobalt inserts for his artificial teeth. These teeth efficiently cut through the bolus, resisted abrasion, and were easy to fabricate, set, and adjust (Fig 3).[5] They displayed very little metal and had excellent sluice-ways. This versatile design could be used in individual teeth or over a quadrant block of teeth. To further enhance the sluice-ways, the ribbons could be interrupted rather than closed as illustrated. No evidence was found indicating Dr. Prange's teeth were ever marketed as designed, but his patent was assigned to the Dental Research Corporation of Chicago. Eventually, Howmedica, Inc. (a division of Dental Laboratory Products, Inc.) manufactured and marketed Dr. Irving R. Hardy's Cutter Bar Teeth under Dr. Prange's 1942 patent.

The 1940s were very dynamic and fruitful developmental years for denture teeth with metal inserts. Many unpatented prototypes were produced by clinicians for exclusive use in their private practices. In addition, considerable collaboration seems to have gone on between many of those pioneer designers.

One of the more prolific designers of that period was Dr. C. H. Blanchard of Los Angeles,[4] whose Cross Bladed Porcelain Teeth were profiled in a previous article. He believed that dentulous patients shredded food by 3 actions: shearing by incisors, punching holes with sharp cusps, and slicing by cusps through sulci (in harmony with mandibular movement). He held that all of these actions could also be accomplished by edentulous individuals. His artificial tooth designs were not flat. His teeth had minimal cusp height and were set on a compensating curve to allow for balanced occlusion (Fig 4A).[4] Dr. Blanchard advocated materials that allowed wear to compensate for shifts in the denture bases following ridge resorption. He preferred 18-8 stainless steel, hard gold solders, and clasp alloys over the much harder chrome-cobalt and bronze alloys. In 1941, he suggested a stainless steel blade design (Fig 4B)[4] to Dr. John T. Vincent, who by 1942 had developed his own block posteriors containing metal blades. By 1943, Blanchard modified his maxillary bladed teeth by fabricating them from acrylic and imbedding metal cutting blades. He continued to oppose these teeth with his original mandibular Porcelain Cross Bladed Teeth.[4] Dr. Blanchard experimented with many designs for metal inserts as well as modifications of commercially available teeth as: Dr. French's Posteriors and Austenal's 'O' mold (Fig 4C).[4] He insisted it was essential for blades to occlude with opposing blades throughout all mandibular excursions.[4] In his 1951 article, he credited Dr. Frank Melton Butler of Seattle for having fabricated a large number of dentures containing metal blades by 1946. He also mentioned Dr. Prange's patent[5] and Dr. Irving Hardy's Cutter Bar design of 1947.[4] However, all of Dr. Blancard's designs and those of





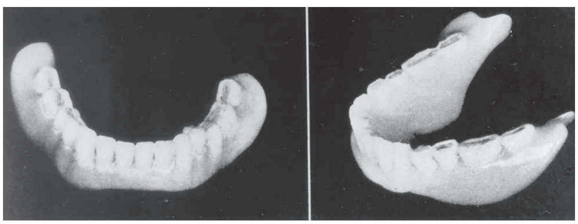


**Figure 4A:** (top) Dr. C. H. Blanchard's teeth were designed with minimal cusp height and were set on a compensating curve to assure balance.

**Figure 4B:** (center) This design was suggested by C. H. Blanchard to John T. Vincent in 1941. Dr. Blanchard favored hard gold and 18-8 stainless steel alloys over the harder chrome cobalt alloys, which had much greater wear resistance.

**Figure 4C:** (bottom) Dr. Blanchard modified many commercially available teeth, such as these 'O' mold Austenal Posteriors, by reshaping and incorporating occlusal metal blades.

his collaborators seem to have been prototypes. No mention could be found concerning manufacturing or marketing of any of these teeth.

Dr. George A. Weichert of St. Albans, NY, was granted a patent in 1945 for his Cutting Cusp for Dentures metal occlusal design.[6] He claimed that these teeth could cut all types of food with equal effectiveness at a 50% reduction in applied force. These teeth were designed to be set in the mandibular denture opposite slightly concave maxillary posterior teeth. The Cutting Cusp occlusals were convex mesiodistally and could effectively be set in a balanced lingualized or linear occlusion, though those 2 concepts had not been clearly defined as early as 1945. Dr. Weichert preferred hard metal, like the chrome cobalt alloys for his blades. His design had excellent sluice-ways. One-third of his patent was assigned to Emmerson P. Jennings of New York City; however, no record of commercial availability of these teeth has been found (Fig 5A).[6]

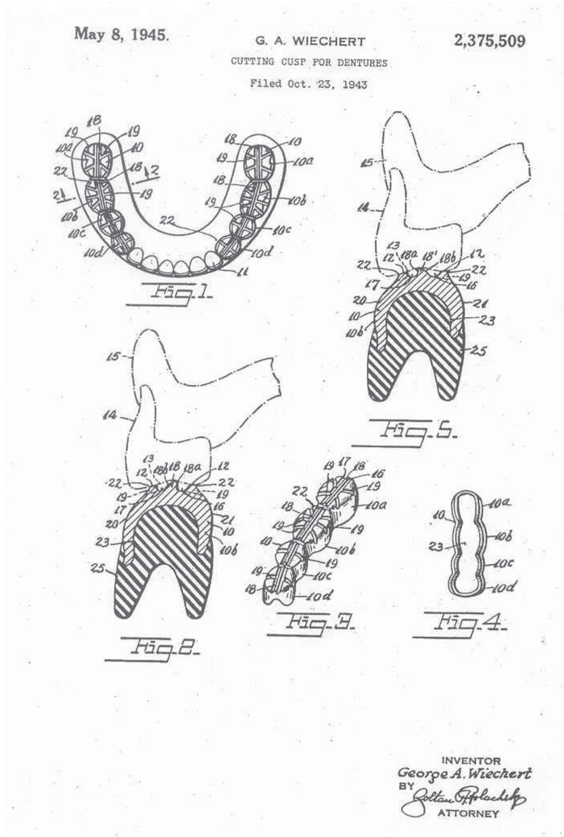



**Figure 5A:** George A. Weichert received a patent in 1945 for his cutting cusp for dentures metal occlusal design. They had sharp, chisel-like blades and excellent sluice-ways.

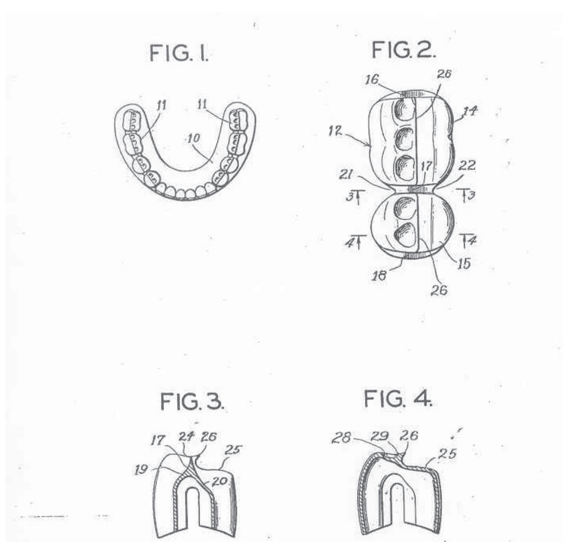



**Figure 5B**: Dr. Weichert patented this artificial denture design in 1950. It consisted of a metal base and metal teeth with cutting blades.


**Figure 2:** Dentsply's 10° Functional Teeth (courtesy Dr. Robert Engelmeier's collection).


**Figure 3:** Dentsply's 10° Anatoline Teeth introduced in the early 1980s (courtesy Dr. Robert Engelmeier's collection).

1951: M.M. DeVan's Bio-Teeth were offered in porcelain. The entire Dentsply Artificial Tooth line was available in vacuum-fired porcelain and their new Duetron acrylic resin.

1953: Ernest L. Pilkington and Joseph F. Turner's 30° Pilkington-Turner Teeth were made available in vacuum-fired porcelain. Sears considered these teeth to be non-anatomic due to their geometric appearance. They were offered in Biotone plastic in 1955, as were all other Dentsply molds.

1954: 0° Rational Teeth were introduced in porcelain. They were offered in Biotone acrylic in 1956. These teeth were dropped from Dentsply's line in the mid 1980s when they were replaced by Monoline Teeth, which were clearly a revision of the original Rational Tooth design.

1958: 10° Functional Teeth were offered in vacuum-fired porcelain, as were the 33° Trubyte Teeth. Functional Teeth were dropped from Dentsply's line in the mid 1980s when they were replaced by the new 10° Anatoline Teeth (Fig 2).

1962: 33° Trubyte Teeth were offered in Biotone blended acrylic. 10° Functional Teeth were added to the Biotone line in 1965.

1966: Quadrant blocks of 0° Rational Teeth were offered in Biotone blended acrylic.

1971: 20° Bioform plastic teeth underwent an occlusal design modification.

1978: Dentsply offered 33° Trubyte and 0° Rational Teeth in their new economic New Hue plastic.

1981: Dentsply offered their Solarex line in a new economic porcelain. They also offered their 20° posteriors in their latest "IPN" (interpenetrating polymer network) cross-linked polymer.

1982: 10° Anatoline (Fig 3) and 0°Monoline Teeth were redesigned 10° Functional and 0° Rational Teeth, respectively. They were marketed in the new IPN cross-linked polymer. 33° Trubyte teeth in 1985 and 30° Pilkington-Turner Teeth in 1989 were also offered in IPN acrylic.

1989: Dentsply introduced the new 22° Biostabil line of semi-anatomic teeth in IPN cross-linked polymer (Fig 4).

1992 Dentsply offered their "SLM" line of cross-linked polymer teeth (sustained life material). The line included 33° Trubyte, 30° Pilking-Turner, 22° Biostabil, 20° Posteriors, 10° Anatoline, and 0° Monoline teeth.

1995: Portrait IPN cross-linked acrylic was introduced in the 20° Posterior and 10° Anatoline molds.

1996: The Portrait IPN line was expanded to include the 33° Trubyte Teeth and a revised carving of the 20° Posteriors.

1998: The Portrait line was further expanded to include 0° Monoline Teeth and the totally new 40° Euroline Teeth (Fig 5).

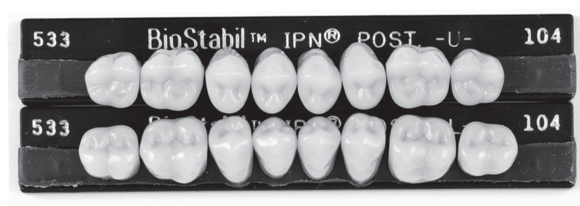



**Figure 4:** Dentsply's 22° Biostabil Teeth introduced in 1989 (courtesy Dr. Robert Engelmeier's collection).


**Figure 5:** Dentsply 40° Euroline Teeth introduced in 1998 (courtesy of Dr. Robert Engelmeier).

Early 21st century Dentsply mold guides included: 0° Portrait Posteriors, 0°Monoline Posteriors, 10°Anatoline Posteriors, 20° Posteriors, 22° Biostabil, 30° Pilkington-Turner, 33° Posteriors, and finally 40° Euroline Posteriors. All came in 3 distinct lines with their own distinct shade guides: Bioblend IPN, Bioform IPN, and Portrait IPN. Though Dentsply did not develop molds specifically for a lingualized occlusion, they made a number of recommendations mixing molds of their maxillary and mandibular teeth to create a "lingualized occlusion." These recommendations were discussed in the Lingualized Occlusion chapter of this series. By 2005 they carded 2 combinations of portrait teeth specifically labeled "Lingualized Occlusion." One was 10° Anatoline Maxillary Teeth versus 0° Monoline Mandibular Teeth. The other was their 33° Maxillary Posteriors versus 22° Biostabil Mandibular Teeth. Currently Dentsply/Sirona offers the following lines of posterior denture teeth in short, medium and long arch lengths:

**Portrait IPN:** $0^0$,$10^0$,$20^0$,$22^0$,$33^0$,$40^0$

**Bioform IPN:** $0^0$,$10^0$,$20^0$,$30^0$,$33^0$

**TruExpression Veriform:** $0^0$,$10^0$,$20^0$,$33^0$,$40^0$

**Two lines of Ultra Value teeth:** Classic synthetic resin and New Hue Economy: $0^0$, $33^0$ [1,2,3]

## Myerson Tooth Corporation

1917: The Ideal Tooth Corporation was founded in Boston by Dr. Simon Myerson. It was soon thereafter moved to Cambridge, MA. Dr. Myerson's first products were improved porcelain artificial teeth and facings. The original posterior tooth line was anatomic in form.

1929: Dr. Myerson designed the first truly flat nonanatomic denture teeth. His "True Kusp" teeth were available in porcelain and, for many years set the benchmark for flat nonanatomic teeth.

1936: True Kusp teeth were manufactured in England by the Dental Manufacturing Company.

1937: The Ideal Tooth Corporation developed the first multi-fired porcelain for denture teeth. They offered their entire line in the new True-Blend porcelain.

1947: The Ideal Tooth Corporation name was changed to the Myerson Tooth Corporation.

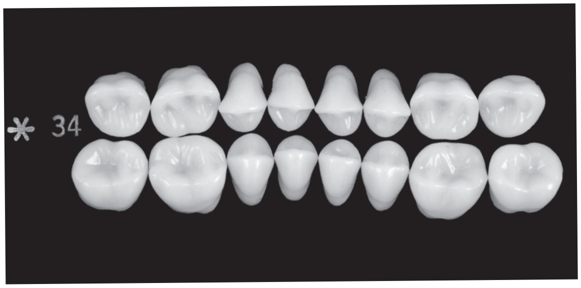



**Figure 6:** Myerson's 30˚ anatomic teeth were available in porcelain and acrylic. They added 4 new molds to their line in 1960 when they purchased the Kenson line One of these was an additional anatomic mold. Myerson redesigned their anatomic mold in the early 1990s (courtesy Dr. Robert Engelmeier's collection).

1948: The Myerson Tooth Corporation developed the first cross-linked copolymer material for denture tooth fabrication. They offered their entire tooth line in both the new Dura-Blend resin as well as their True-Blend porcelain. Also during the 1940s, Myerson introduced their new FLX (free lateral excursion) semi-anatomic molds.

1951: "True Kusp" teeth were redesigned as "Shear-Kusp" teeth and were offered in both True-Blend porcelain and Dura-Blend resin.

1952: Dr. Myerson worked with Dr. Victor Sears to design the Myerson-Sears flat nonanatomic teeth, which were available in both Dura-Blend resin and True-Blend multi-fired porcelain.

1955: Dura-Blend characterized teeth were introduced. Myerson also improved their multi-fired porcelain technique for enhanced esthetics.

1960: The Myerson Tooth Corporation acquired the Kenson Tooth Corporation. The Kenson Tooth line was offered in a new "balanced" cross-linked polymer. This line contributed 4 additional molds to Myerson's artificial tooth inventory: 0˚ (distinctly different from the Myerson-Sears design. These 0˚ teeth were also available as a quadrant block.), F-10 posteriors (a 10˚ semi-anatomic mold), 20˚ posteriors, and 30˚ (anatomic) posteriors (Fig 6).

1970s: Myerson offered their very esthetic "Special Teeth" in a natural fluorescence porcelain.