

# PROPOSED CLASSIFICATION OF FIXED BRIDGE-WORK AND LAW GOVERNING ITS APPLICATION.\*

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By Alden J. Bush, D. D. S., Columbus, Ohio, Professor of Crown and Bridge-work, Orthodontia and Metallurgy, Dental Department Ohio State University.

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IN ATTEMPTING to classify fixed bridgework I have endeavored, **first**, to broaden the foundation upon which the substructure of our present conceptions thereof rests, and to establish more thoroughly our comprehension of the principles and their application which constitutes the very substructure of the foundation itself; **second**, to systematize and facilitate the teaching of fixed bridgework in accordance with the accepted principles of practice which govern their employment; and **third**, to propose a law that embodies the principles which modern practice has approved, a law which will furnish a conservative plan for guidance in the selection of abutments adequate for the support and retention of fixed bridgework, and one which will likewise, impose limitations to the unprincipled employment of those types of construction which are from the standpoint of principle, indefensible.

The terminology used in the classification is simply a correlation of terms selected from our nomenclature, that constant usage has rendered familiar, and which have been selected because they seem to be the most expressive of any terms available.

Most writers of dentistry, in referring to teeth of certain position in the arch, have used the terms anterior teeth and posterior teeth as best calculated to convey the idea of the association between object and position, likewise anterior and posterior have been used as the most expressive terms in referring to bridge replacements that supply a missing tooth, or group of teeth, in either of these locations.

Accordingly, then, fixed bridgework applied and confined within these limits may be divided into **anterior bridges** and **posterior bridges**.

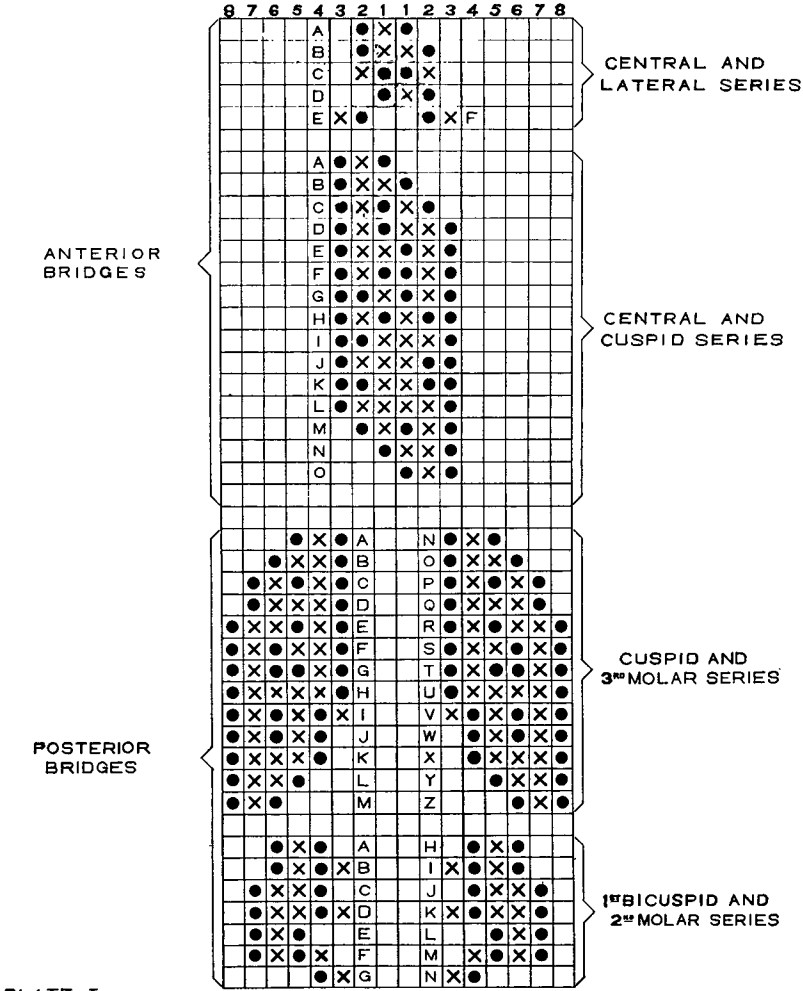
Plate I.—In referring to Plate I illustrating possible fixed bridge replacements, it will be observed that the bridges represented as applicable to the various positions arrange themselves into well defined groups that are characterized by the teeth chosen for abutments in connection with the tooth or teeth supplied. Accordingly, therefore, anterior bridges may be sub-divided into a **central** and **lateral series**, and a **central** and **cuspid series**; likewise, posterior bridges may be subdivided into a **cuspid** and **third molar series**, and a **first bicuspid** and **second molar series**.

A single bridge of any one of the above

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CLASSIFICATION OF FIXED BRIDGES  
ACCORDING TO LOCATION  
ATTACHMENT AND TEETH SUPPLIED



Showing series classification of simple bridges according to location, attachment and teeth supplies. The incomplete bridges "E" and "F" of the central and lateral series, also "G" and "N" of the First Bicuspid and Second Molar Series, when joined form simple bridges "EG" and "FN" and are classified as anterior bridges and enumerated as belonging to the central and cuspid series—both, however, retain their identity when used to form other combinations and are so enumerated as illustrated in charts 3, 4, 7, 8, 9, 10, 12, 13 and 14. The incomplete bridge "C" of the central and lateral series is not classified as a simple bridge, but when joined bilaterally to the simple bridge of the posterior series it assists in the formation of complex bridges and is so enumerated as illustrated in charts 9 and 10. Likewise, incomplete bridges "I" and "V" of the Cuspid and Third Molar series and "B," "D," "F" and "J," "K," "M" of the First Bicuspid and Second Molar Series are not classified as simple bridges, but when joined unilaterally and bilaterally to the simple bridges of the anterior series they assist in the formation of compound and complex bridges and are so enumerated as illustrated in charts 3, 4, 7, 8, 9, 10, 11, 12, 13 and 14.

series may be said to form a **simple bridge**.

Any bridge that can be effected by connecting **unilaterally**, any one of the simple bridges forming either of the anterior series, with any one of the simple bridges forming either of the posterior series may be said to form a **compound bridge**.

bridges; third, according to attachment and teeth supplied, anterior bridges may be subdivided into a central and lateral series and a central and cuspid series, and posterior bridges may be subdivided into a cuspid and third molar series, and a first bicuspid and second molar series; and fourth, the simple bridges of the an-

<b>Classification of FIXED BRIDGEWORK</b>	<b>Simple Bridges</b>	<b>Anterior</b>	Central and Lateral Series Central and Cuspid Series
		<b>Posterior</b>	Cuspid and 3rd Molar Series 1st Bicuspid and 2nd Molar Series
	<b>Compound Bridges</b>	Central and Lateral Series joined to Right or Left	Cuspid and 3rd Molar Series 1st B. and 2nd M. Series
		Central and Cuspid Series joined to Right or Left	Cuspid and 3rd Molar Series 1st B. and 2nd M. Series
	<b>Complex Bridges</b>	Central and Lateral Series connecting	R. and L. Cuspid and 3rd M. Series R. and L. 1st B. and 2nd M. Series R. Cuspid and 3rd M. Series with L. 1st B. and 2nd M. Series. L. Cuspid and 3rd M. Series with R. 1st B. and 2nd M. Series.
		Central and Cuspid Series connecting	R. and L. Cuspid and 3rd M. Series R. and L. 1st B. and 2nd M. Series R. Cuspid and 3rd M. Series with L. 1st B. and 2nd M. Series L. Cuspid and 3rd M. Series with R. 1st B. and 2nd M. Series

Plate II

Showing diagram of general classification of fixed bridgework.

Any bridge that can be effected by connecting **bilaterally**, any one of the simple bridges forming either of the anterior series, with any one of the simple bridges forming either of the posterior series, may be said to form a **complex bridge**.

Plate II.—To recapitulate, first, fixed bridgework may be divided according to extension, into simple, compound and complex bridges; second, according to location, into anterior and posterior

series when joined unilaterally and bilaterally to the simple bridges of the posterior series form compound and complex bridges respectively. The adjectives upper and lower, right and left are used as prefixes and complete the terminology.

Plate I.—Again referring to Plate I it will be noticed that all simple bridges of comparatively straight alignment have at least one support or attachment at each end, and furthermore, that all the simple

bridges of the various series, in being joined or connected to form compound and complex bridges form extended bridges of curved alignment with one or more intervening supports or attachments.

In view of this fact therefore, it seems fitting and much more in accord with the scientific phase of this class of work, that a general law be adopted that will furnish a safe plan for guidance and procedure in the application of the fixed bridgework in general, and which will serve the same purpose as the various rules that have been formulated from

at each end and are of comparatively straight alignment. Fig. 1.

A **compound fixed bridge** may be defined as an extended bridge effected by a simple anterior bridge joined **unilaterally** to a simple posterior bridge to supply two or more missing teeth from the anterior and posterior portions of the arch, attached to or supported by one or more abutments at each end and one or more additional attachments or supports from one or more intervening abutments and are of curved alignment. Fig. 2.

A **complex fixed bridge** may be defined as an extended bridge effected by con-

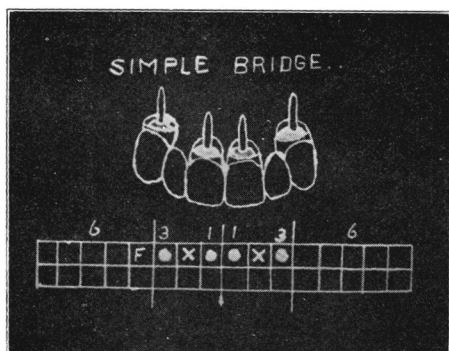


Fig. 1

time to time to cover a comparatively small number of cases, more or less typical, all of which are fundamentally based upon the same principles.

The law proposed is as follows. All fixed bridgework of straight alignment should be attached to, or supported by, one or more abutments at each end, and should receive additional attachment or support from one or more intervening abutments when of curved alignment.

In accordance to the classification and law proposed, the following definitions are derived.

A **simple fixed bridge** may be defined as a bridge used to replace one or more teeth missing from the anterior or posterior positions of the arch, attached to or supported by one or more abutments

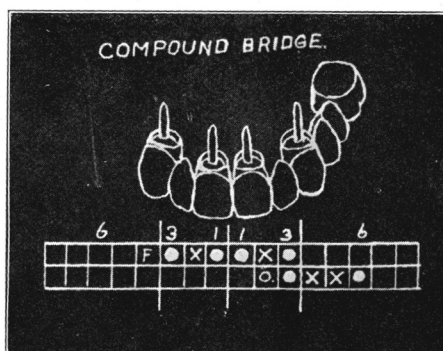


Fig. 2

necting a simple anterior bridge bilaterally with a simple posterior bridge to supply four or more missing teeth in the arch and are attached to or supported by one or more abutments at each end and one or more additional attachment or supports from one or more intervening abutments and are of curved alignment. Fig. 3.

In support of the proposed classification and in defense of the law which embodies the principles upon which the classification is largely based I wish to quote the following taken from a former paper.

"If the muscles of mastication are capable of exerting a stress of 275 pounds upon the first molars and if the supporting tissues of the first molars have been

capable of developing a structure which will safely bear such a strain, it must be concluded that the development of the muscle and the supporting tissues of the teeth are co-incident and in accordance with physiological laws.

"It is also true that this muscular power is normally intended to be exerted within physiological directions, and that the supporting tissues of the teeth are developed and physiologically designed to receive and support this strain only when this muscular stress is transmitted to them in a normal direction and according to physiological principles.

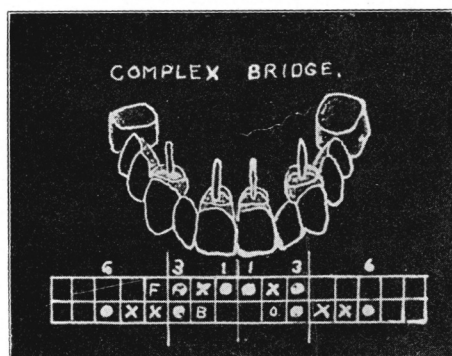


Fig. 3

"The wonderful power that the muscles of mastication are capable of exerting, and the wonderful plan upon which Nature has constructed the human teeth in order to utilize this energy in the mastication of food, and the wonderful design of the tissues which support the teeth while performing these functions, all seem to be in perfect accord with the marvelous schemes of Nature. Yet, it must be remembered that this muscular energy is intended to be exerted only within certain limitations, bound by the normal, and the design of the teeth render them efficacious in performing their functions only when muscular energy propels them normally, and that the tissues which support the teeth while performing their functions are capable of

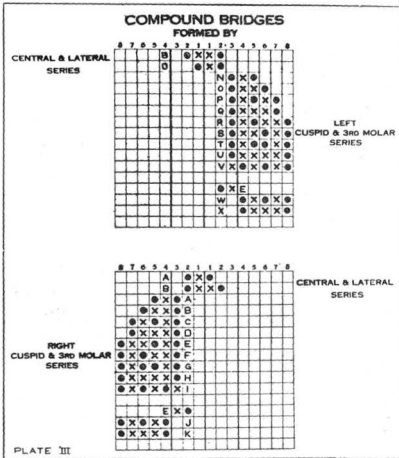
yielding normal support only when the muscular stress of mastication is normally directed.

"Therefore, it would not be in accordance with physiological laws to expect a first molar which, if normally capable of withstanding a stress of 275 pounds, and the supporting tissues normally capable of resisting the stress, to physiologically resist this stress if the direction of the stress be perverted, and the supporting tissues compelled to receive the stress contrary to the direction that they are normally designed to receive it.

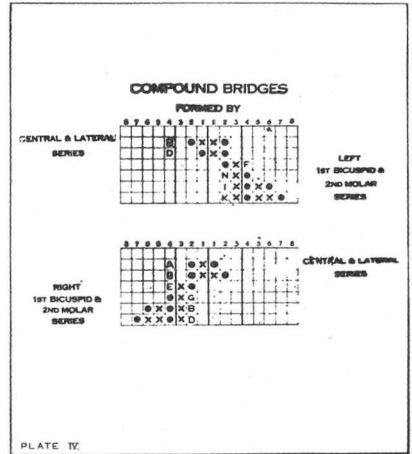
"Hence, it seems obvious that if fixed bridgework be constructed with occlusal and incisal masticating surfaces after Nature's plan and in accordance with physiological law governing normal articulation and occlusion, and if the stress as received by the abutments is normally directed, that such bridgework may be successfully attached to the roots of teeth without inviting pathological manifestations."

But, on the other hand, if fixed bridgework be constructed without due regard for these principles, and the occlusal or incisal surface be so made, as to abnormally direct the resultant force to the abutment teeth, OR THE EMPLOYMENT OF ABUTMENTS BE SUCH AS TO SUBJECT THEM TO STRESS PERVERTED THROUGH LEVERAGE, then will the supporting tissues surrounding the root fail to render support, just in proportion as the stress is perverted and the supporting tissues are obliged to offer resistance in a direction which they were never intended to furnish.

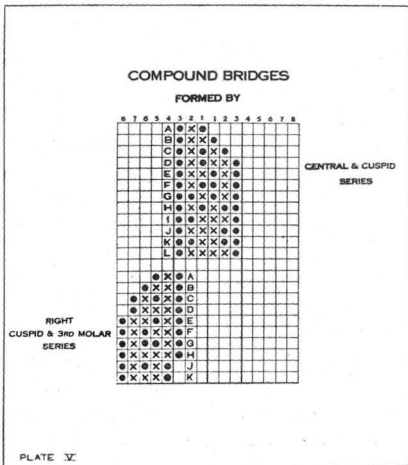
Unquestionably, there are many fixed bridges outside the scope of this proposed law and classification which are apparently giving good service, and which, by reason of this apparent service, and their continued employment, have thus, seemingly, been sanctioned as good practice: nevertheless, the soundness of the principles underlying the proposed law cannot be questioned, neither can it be denied that these same bridges in ques-



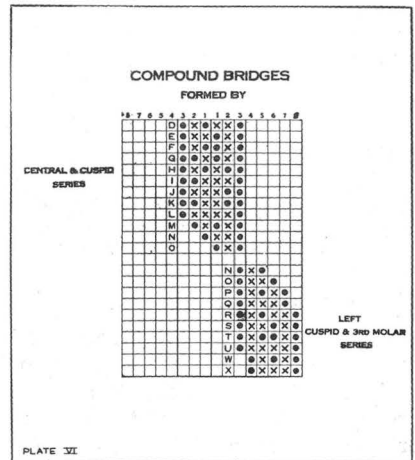
Showing compound bridges formed by central and lateral series joined unilaterally to Left Cuspid and Third Molar Series, also Central and Lateral Series joined unilaterally to Right Cuspid and Third Molar Series.



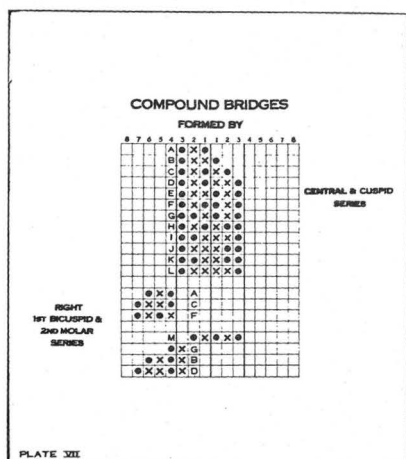
Showing compound bridges formed by Central and Lateral Series joined unilaterally with Left First Bicuspid and Second Molar Series, also Central and Lateral Series joined unilaterally to Right First Bicuspid and Second Molar Series.



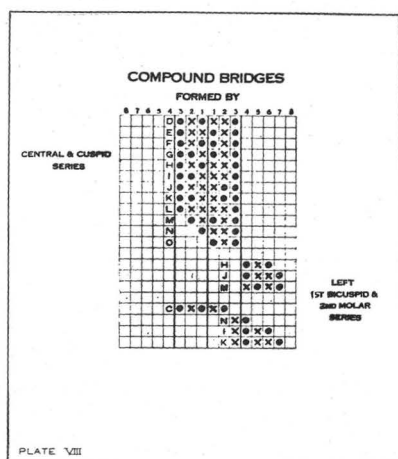
Showing compound bridges formed by Central and Cuspid series joined unilaterally to right Cuspid and Third Molar Series.



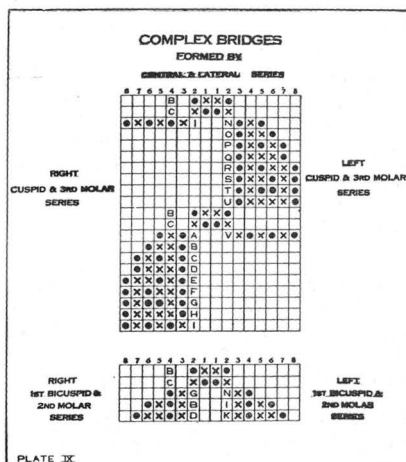
Showing compound bridges formed by Central and Cuspid Series joined unilaterally to left Cuspid and Third Molar Series.



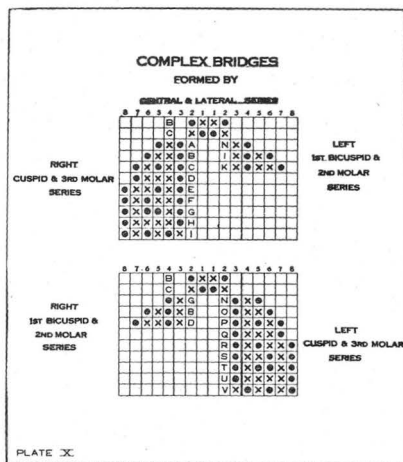
Showing compound bridges formed by Central and Cuspid Series joined unilaterally to Right First Bicuspid and Second Molar Series.



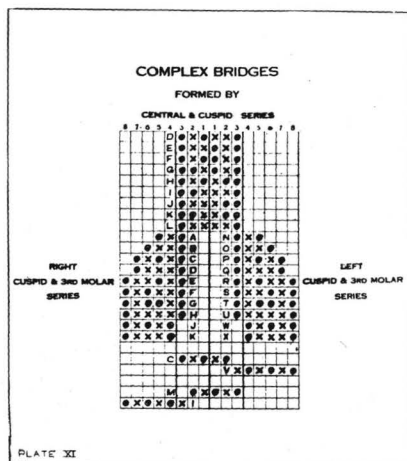
Showing compound bridges formed by Central and Cuspid Series joined unilaterally to Left First Bicuspid and Second Molar Series.



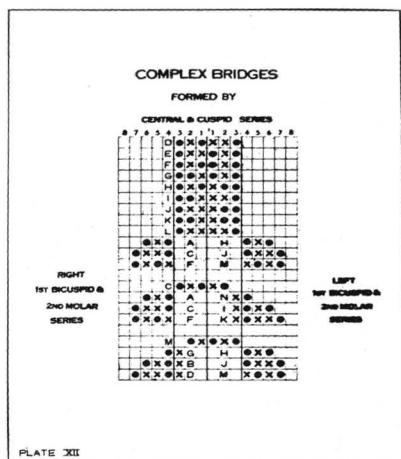
Showing complex bridges formed by Central and Lateral Series joined bilaterally to Right and Left Cuspid and Third Molar Series, also complex bridge formed by Central and Lateral Series joined bilaterally to Right and Left Bicuspid Series.



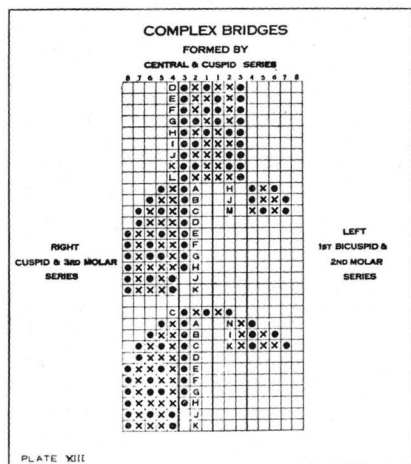
Showing complex bridges formed by Central and Lateral Series joined bilaterally to Right Cuspid and Third Molar Series and Left First Bicuspid and Second Molar Series. Also complex bridges formed by Central and Lateral Series joined bilaterally to Left Cuspid and Third Molar Series and Right First Bicuspid and Second Molar Series.



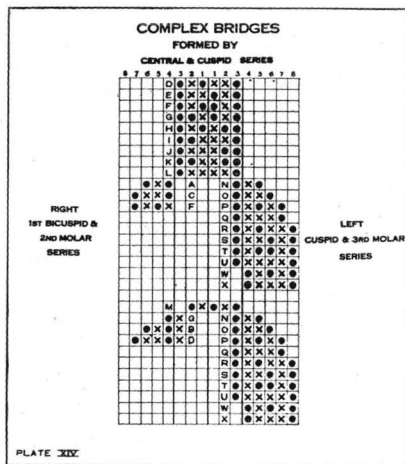
Showing complex bridges formed by Central and Cuspid Series joined bilaterally to Right and Left Cuspid and Third Molar Series.



Showing complex bridges formed by Central and Cuspid Series joined bilaterally to Right and Left First Bicuspids and Second Molar Series.



Showing complex bridges formed by Central and Cuspid Series joined bilaterally to Right Cuspid and Third Molar Series and Left First Bicuspids and Second Molar Series.



Showing complex bridges formed by Central and Cuspid Series joined bilaterally to Left Cuspid and Third Molar Series and Right First Bicuspids and Second Molar Series.



tion might have rendered a still greater service had they been effected more strictly in accordance with the principles involved.

of incalculable benefit to teachers especially: yet, I offer the results of my efforts in this direction with full knowledge of the imperfections that generally

**TOTAL NUMBER OF FIXED BRIDGES, UPPER & LOWER,  
ACCORDING TO SERIES CLASSIFICATION AND  
LAW GOVERNING THEIR APPLICATION.**

**SIMPLE BRIDGES**

Central and Lateral Series.....	6
Central and Cuspid Series.....	34
Cuspid and Third Molar Series.....	48
1st Bicuspid and 2nd Molar Series.....	12
	100

**COMPOUND BRIDGES**

Central and Lateral Series joined to Cuspid and 3rd Molar Series.....	80
Central and Lateral Series joined to 1st Bicuspid and Second Molar Series.....	36
Central and Cuspid Series joined to Cuspid and 3rd Molar Series.....	480
Central and Cuspid Series joined to 1st Bicuspid and 2nd Molar Series.....	156
	752

**COMPLEX BRIDGES**

Central and Lateral Series connecting Right and Left Cuspid and 3rd Molar Series.....	68
Central and Lateral Series connecting Right and Left First Bicuspid and 2nd Molar Series .....	36
Central and Lateral Series connecting Right Cuspid and 3rd Molar Series with Left 1st Bicuspid and 2nd Molar Series .....	108
Central and Lateral Series connecting Left Cuspid and 3rd Molar Series with Right 1st Bicuspid and 2nd Molar Series.....	108
Central and Cuspid Series connecting Right and Left Cuspid and 3rd Molar Series.....	1840
Central and Cuspid Series connecting Right and Left 1st Bicuspid and 2nd Molar Series.....	198
Central and Cuspid Series connecting Right Cuspid and 3rd Molar Series with Left 1st Bicuspid and 2nd Molar Series.....	600
Central and Cuspid Series connecting Left Cuspid and 3rd Series with Right 1st Bicuspid and 2nd Molar Series.....	600
	3558
Total number of combination.....	4410

Plate XV

Showing the total number of fixed bridges, upper and lower, according to proposed classification and law governing their application.

While I am confident that a competent classification of fixed bridgework will broaden our comprehension of the principles underlying its employment and be

attend human effort, no matter how perfect they seem to their author, in the hope that enough good will be found therein to merit your consideration.

*Discussions.*

*Dr. Thomas P. Hinman, Atlanta, Ga.*

The essayist has done wonderful work along the line of classification. It of course especially interests the teachers, and it should interest the profession. I believe in the general principles he has enunciated and the law he has laid down as the basis and foundation for fxt bridgework. It defines very clearly, to my mind, the line where fxt bridge-work stops and removable begins. This may not meet entirely with the approval of those who have made up their minds to practise entirely removable bridge-work, but the principles explained and combinations shown are of such a character as to make this work invaluable, not only to teachers, but to individual practitioners.

Where there is no posterior attachment, and only an anterior attachment, we have seen failure after failure, and we should feel encouraged that some one has taken up this principle of classification. He has shown us the safety line, and just how far we can go in our fxt bridgework. If you will take these charts and study them carefully, you will find what a large amount of work was necessary to do this and how carefully the Essayist has worked out the principles involved. We cannot discuss this paper to a great extent, but simply in a general way. I wish to thank the Doctor for bringing it before us, and am sorry I cannot say more in commendation of it. (Applause).

*Dr. Wm. O. Hulick, Cincinnati, Ohio.*

Continuing the discussion of this valuable paper, it will be well for me to make a statement which is apart from the subject somewhat, in order to more forcibly comment on the many good points set forth by the essayist.

Observations have lead me to look upon bridge replacements with suspicion and apprehension, at least as practised

by a too large percentage of dentists at the present time. It is my honest belief, however, that bridge replacements are necessary and will be employed even to the end of time.

It is likewise my belief, that we are in great need of radical reforms in its application both as to classification and technic so as to overcome many objectionable features. To that end many writers have directed their attention, and great progress has been made. Indeed, it would seem at this time, that greater progress has been, "from a scientific standpoint, than in the practical application."

These remarks are, perhaps, apropos at this time. However, you will also pardon, I know, the statement that up to this time writers and clintions have failed to impress, or arouse the profession to the importance of some of the fundamental principles involved in fxt bridge work. It was with this thought of improvement in mind that Dr. Bush has given us today a positive and practical system of classification and application of the laws governing fxt bridge work which if observed carefully will undoubtedly overcome many objectionable features heretofore encountered.

His enthusiasm and earnestness of purpose in the presentation of this subject and others recently, should be an inspiration to all of us to give his methods fair and imparital consideration. His classification, **simple, compound and complex bridge-work** is well put, scientific, practical and a careful study of plates I and II will greatly assist us in equalizing force by combining the different series unilaterally and bilaterally.

I quite agree with the essayist in his proposed law, "all fxt bridge-work of straight alignment should be attached to, or supported by, one or more abutments at each end, and should receive additional attachment or support from one or more intervening abutments when on curved lines."

This statement would, in a way, contradict the simple bridge replacement,

Plate I, of the cuspid and third molar series, unless connected unilaterally with one of the anterior series.

In support of this statement, I wish to call your attention to the natural and physiological law.

In the creation of the human body, all parts were expected to do its respective functions, normally, naturally, until senility; therefore, each tooth was intended to do its work and no more.

Again quoting from the essayist: "If the muscles of mastication are capable of exerting a stress of 275 lbs. upon the first molars and if the supporting tissues of the first molars have been capable of developing a stricture, which will safely bear such a stress, it must be concluded that development of the muscles and the supporting tissues of the teeth are coincident and in accordance with physiological laws."

I grant the above statement to be true of the teeth in their natural environment. However, when any of the posterior series are employed, especially the third molar and cuspid series, even when on straight alignment, the supports are required to bear more force and pressure than nature intended, even tho the bridgework be constructed with masticating surfaces, after nature's plan, and in accordance with the physiological laws governing articulation and occlusion.

It has been stated by some authorities, that by uniting two or more teeth to bridge replacements, the movement of each is so modified and restrained as to enable them to successfully withstand more force than the sum total of their resistance. I do not believe that nature will strengthen teeth so engaged to accommodate our methods of misapplied force that is unnatural and unreasonable in their demands for proper mastication, even if the stress as received by the abutments is normally directed.

The force of the bite, or the pound's pressure with which the jaw may be closed upon an object, in a perfectly nor-

mal or natural condition, as stated by the essayist, is 275 lbs., over the molars, which varies greatly with individuals, and especially, is it true where bridge-work is employed, even according to prescribed methods of procedure; so that the force of the bite will be modified from time to time, pounds pressure becoming less and less, thereby inviting and causing pathological disturbances.

I do not wish to comment further, except to compliment the essayist for the very able and scientific presentation of a subject we should all look more seriously into.

DR. GILLETT, New York.

While acknowledging the enthusiasm and earnestness of the Essayist, I want to voice my feeling that it is a misplaced earnestness and enthusiasm. I regard the day of fixt bridgework as having past, and I believe the next decade will see the end of its use. It is time the colleges of the country stopt teaching it, because it has been most thoroly discredited. The time has past when fixt bridgework should be used for cases of more than one tooth, and then only in carefully selected conditions. I say that dogmatically. I believe it is so true that there can be no exception to it. I believe it is not possible for our patients to keep their mouths in a clean condition with fixt bridgework, regardless of whether it be called physiological or any other name. (Applause).

DR. HERMAN E. S. CHAYES, New York.

I differ with the Essayist, and I am sorry, because I know that his earnestness is absolutely unquestioned. But I must state that I believe that the definitions in these classifications are entirely incorrect.

I want to call attention to the so-called simple bridges and to the definition given us. It will have to be accepted sooner or later by those who teach bridgework according to physiological and physical laws, that a simple bridge

is one in which the abutments and the dummies are subjected to the same physical stress, that is a physical stress exercised in the same direction. (Example). Supplying a second upper or lower molar, using the third and first molars as abutments.

A compound bridge is one in which the artificial substitute, by virtue of its position and acquired occlusal relation, is subject to a stress different from that which works upon the abutments. Example: Supplying a lateral incisor upper or lower, using the cuspid and central as abutments; or supplying a second lower bicuspid, using the first molar and first bicuspid as abutments.

A complex bridge is one in which the artificial substitutes are subjected to a stress wholly foreign to the stress of the abutments, and where the abutments are situated upon opposite sides of the arch. Example: Supplying four anterior teeth, using the cuspids as abutments, or supplying the four incisors and the four bicuspids and first molars, using the cuspids and second molars as abutments or piers.

That, according to mathematics and physics and according to the bridge-building would be the correct definitions of simple, compound and complex bridge-work.

To these must be added the cantilever bridge, which is one attached to natural abutments at one end only, and depends upon the resilient mucosa for its major support. Combinations of complex and cantilever bridges may exist, such as cases presenting anterior abutments upon both sides of the arch and posterior abutments on one side only.

Now let us for a moment see where the essayist has brought us to. We are today in the throes of change. All of us are dissatisfied with the results of fixt bridgework. The best thought in the country and in the dental profession, during its history, has been applied to the solu-

tion of the problem of getting away from fixt bridgework. And why? All of us know that every bit of living organism is in a state of constant motion. There isn't an atom in our body that is in a state of complete rest. Every molecule is in a state of constant rhythmic motion, which motion is in definite relation to the motion of the molecules neighboring it, which warrants the conclusion that the molecules influence one another to the point of causing corresponding geometric gyrations or movements in each other. How inconsistent with this law must be the fixation of any two, three or four teeth by a denture fixt in the mouth! There isn't a bit of tissue in your body, in any organ, that isn't subject to constant motion, and that does not need this exercise to replenish it with vitality and nutriment to re-stimulate it which comes only from that exercise. And when you fix two teeth in the human mouth and cause them to carry two more artificial teeth, and when you put them in the jaw and rob them and the surrounding structure of the motion it is intended they should have, during mastication, you cause retroactive changes in their structure which makes it impossible to have a condition of perfect physiological balance.

I speak with vehemence on this, because I have devoted years to the elimination of that fixation problem, and I thought we had come to the point where the schools of the country recognized that normal exercise of every tissue is what is needed by that tissue, and that we haven't a right to rob it of that.

What would happen to your arm if you tied it up in a sling? It would atrophy. When you exercise a tooth in mastication, the stress is distributed to the structures surrounding the tooth by way of its periodontal membrane, in a series of motion waves, until a complete physical change of these structures has taken place. When you remove the mastication

tory stress, there is a return to normal, providing your teeth are not immovably fixt to one another, and your surrounding structures are unhampered by tooth fixation.

But if you enjoin these teeth, by putting a fixt artificial denture upon them, then you rob the surrounding structure of its motion wave, and the thing you accomplish is the elimination of the possibility of the action of these tissues. You get an inhibition of the restimulating mobility of these tissues, and you get an atrophy. I thank you. (Applause).

DR. BUSH: I want to thank those who have taken part in this discussion.

My object in giving you this classification of fixt bridgework was to classify something that we are doing in every day work. I care nothing about entering into a discussion of the advisability of the employment of this class of work, neither do I care to say anything as to the indications or contra-indications governing the use of bridgework. Those who wish to discard fixt bridgework may do so, but I do not consider my efforts in attempting its classification as entirely lost. It is very gratifying to me to know that this work is appreciated by those who I was most hopeful would appreciate it. I wish to thank you again very much. (Applause).

