

Mounting Study Models for Diagnosis and Visual Conception of Prospective Tooth Movements Previous to Treatment*

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WHEN THIS WORK was premeditated, the question arose as to the best way to present it. It now appears that a definite procedure must be followed in order to orient your minds to the possibilities of this technic and give you a foundation on which you may build in order that the process may be of value to you in your practice.

No doubt many of you are acquainted with much that this process contains. However, there may be some who must start at the beginning so that the important items may be followed out in practice. You will really see as we progress, that to cover the entire subject in a few hours is impossible. We, therefore, will advance as much as possible today and whatever remains can be taken up later.

Since the day we recognized the necessity of moving molars and premolars distally, as in Class II, Div. 1 cases, our service to the public has improved. But the philosophy of Charles Tweed we now have accepted demands not only the movement of the maxillary but also the mandibular molars and premolars distally in all classes of malocclusion with the exception of Class III cases and those cases in which teeth are to be extracted. There may be exceptions to these rules in some compromise cases. This advanced step in our technique has also improved our service.

Now whether our efforts in moving teeth distally are successful or not, we can honestly say that, at least, we do not move the anterior teeth forward, which seems to be the greatest advancement in our procedures and, if this is a fact, it adds materially to the possibility of finding the correct position for the posterior teeth in both arches.

We know that Dr. W. G. A. Bonwill in 1884-85 suggested geometrical laws and drawings as guides for the articulation of artificial teeth. The drawing we are now making and using as a pattern for our archwire forms, with some modifications, is part of Dr. Bonwill's work.

Many dentists, in the early part of this century, also used his work as a basis for anatomical articulation and among them was Dr. George Monson. He was trained as a mechanical engineer, a dentist and an orthodontist and worked with Dr. Edward H. Angle. To what extent he was associated with him, no one seems to know, and because Dr. Monson did not write very much, the record of his work did not become well publicized until he began using the instrument he designed for orthodontic diagnosis and for setting up artificial teeth. Apparently, when Dr. Monson was confronted with the

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complications of applying his instrument to the diagnosis of malocclusion, he concluded it was a fallacy and it probably was at that time. He then applied it to prosthetic reconstructions. I was very fortunate in having had instruction from Dr. Monson. Since that time I have used his instrument in many cases to determine the proper occlusion and in every case it has been a valuable adjunct in correctly designing the occlusal curve, cuspal adjustment and in demonstrating the extent and direction of tooth movements indicated in treatment.

The technique necessary to use the Monson instrument is not complicated. When a set of orthodontic models are correctly mounted in this

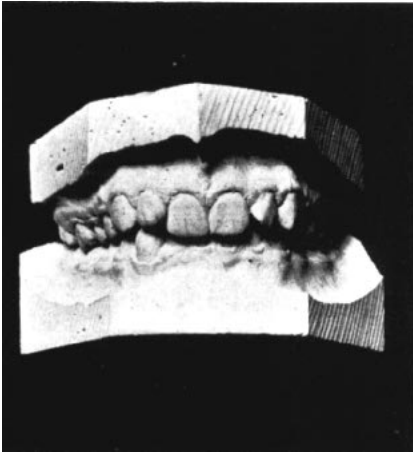


Fig. 1

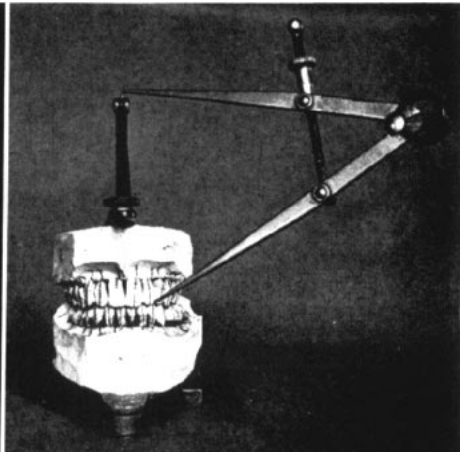


Fig. 2

Fig. 1.—Record model of case before cutting off teeth which you see in figures 2 and 3. Second lower left premolar extracted and the space entirely closed by migration of the lower anterior teeth and slight forward movement of left lower molars.

Fig. 2.—Showing lead pencil lines on teeth which were cut off the model and reset with all the occlusal surfaces touching the lower point of the divider and the upper teeth then set up to the lower permitting them to move harmoniously in every direction. If we are capable of placing a mechanism and manipulating it in the mouth to bring about the changes made in the positions of the teeth which you see on the instrument we then should agree we have produced a harmonious staple correction for this type of individual.

device, one can visualize the extent and direction of every tooth movement required to place them in proper occlusal relationship. Having mounted the casts in this articulator, the teeth of the lower denture are cut off and reset into ideal positions, according to the dictation of the instrument. It is the same as if one were preparing dynamic anchorage in the mouth, with the exception that you do not tip the teeth distally any more than the articulating surface demands.

Dr. Monson knew a great deal about the condyles of the mandible and laid great stress on the rule that both condyles should be similarly related to their respective mandibular fossae. In order to produce the necessary changes in the condyles, when they were not adjusted harmoniously on both sides, he gave his patients so-called treatments in the form of consecutive, modified denture set-ups until the condyle position was satisfactory and

the finished set-up was ideal. All who worked with him agreed that he attained much success in improving the position of the condyles as related to their mandibular fossae. Of course, there are many, so-called anatomical articulators but I must ask you not to bring any of these into our discussion, because it will create confusion as my work has been carried on entirely with the Monson instrument. Consequently I believe that we will get more out of the subject if the discussion is thus limited to this one device.

Having seen the excellent results that Dr. Monson obtained in his

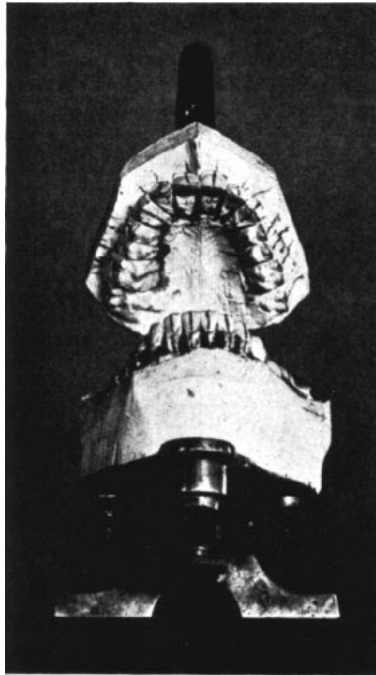


Fig. 3.—Visualizing the arch form of the upper by following closely the pencil marks on the occlusal facial ridges.

prosthetic work, as illustrated by dentures that were marvellously stabilized, it seemed reasonable to me that if it was possible to place natural teeth, well supported by healthy bone, in the positions dictated by his instrument, such corrected maloccluding teeth should remain permanently in their new location and exhibit unusual functional efficiency. It is interesting to note that in using this instrument, the importance of basal bone support was emphasized to a striking degree.

Since Dr. Kesling's work on his tooth positioner became known, I have cut off all of the teeth from models mounted on this instrument and reset them as if making an artificial denture. Before this time, my investigations were made only on the different segments of the models, which was also very enlightening and profitable during treatment and solved many problems as well as giving me confidence that the directions of tooth movement was correct and the end result would be satisfactory. But with the new philosophy in treatment, resetting all of the teeth into an ideal form with the help

of an instrument on which you may see and measure all movements, gives tremendous relief from orthodontic worries and uncertainties.

If any questions arise during case analysis before treatment, the case is mounted on the instrument for further study and I have invariably found that my conception of the proper direction of individual tooth movement becomes clarified. This has saved many hours of time. During treatment one may constantly refer to this model for further study. I believe that such a technic is rational and often necessary. Since this instrument has proved its value in the hands of many for the study of occlusion, it appears logical that orthodontists can adopt this method or one equally good, in order to make an analysis of malocclusion that is as complete and accurate as possible, before any tooth movement is inaugurated. In most instances the clinical examination and the study of models, X-rays and photographs, are all that are considered essential, but in many cases I have not found such procedure sufficiently enlightening.

The various steps necessary, when using this method of diagnosis, are as follows:

- (1) Make two sets of models for the case to be studied.
- (2) With lead pencil, mark vertical lines in the center of the facial surface of each tooth, excepting molars. Extend these lines to the apex of the roots. These lines will plainly show the general inclination and any torsion of the teeth. Lines are now drawn on the molars, passing through the anterior buccal cusps of the maxillary molars and overlying their mesio buccal roots, and continuing downward over the mandibular occluding molars to their root apices. Make the same series of marks on the lingual sides of the teeth of both dentures. Then trace, with pencil, the buccal occlusal ridges and the incisal occlusal ridges of all the teeth. The purpose of these lines is to correctly visualize the extent of tooth movement in all directions and also the arch form of the two dentures subsequent to treatment.

- (3) It is now necessary to examine the patient for the purpose of locating the condyles. To do this, the tips of the little fingers are placed in the external auditory meati and the thumbs on the forehead, above the root of the nose. This area is called the glabella and is the point toward which all teeth should radiate, when on basal bone.

Next have the patient open and close the mouth while the fingers are in this same position. Palpation now demonstrates the relationship of condyle to the external auditory meatus. If a strong thrust of the condyle against the tips of the fingers is evident, and there is a closed bite in the malocclusion under analysis, the operator can be quite certain that this condition is due to an infraocclusion of the molar teeth accompanied by shortening of the dento-facial area below the nose.

- (4) With an eyebrow pencil, make marks on the face about $\frac{1}{4}$ inch in front of the tragus of each ear. By palpating with two first fingers on these two marks, it will be possible to feel the lateral surface of the condyles. By looking carefully one may see the condyles move. These points are used to align the face-bow arms on each side, by which means the relationship of denture to the mandibular base is established. The models are then attached to the face-bow wax bite and mounted on the instrument.