

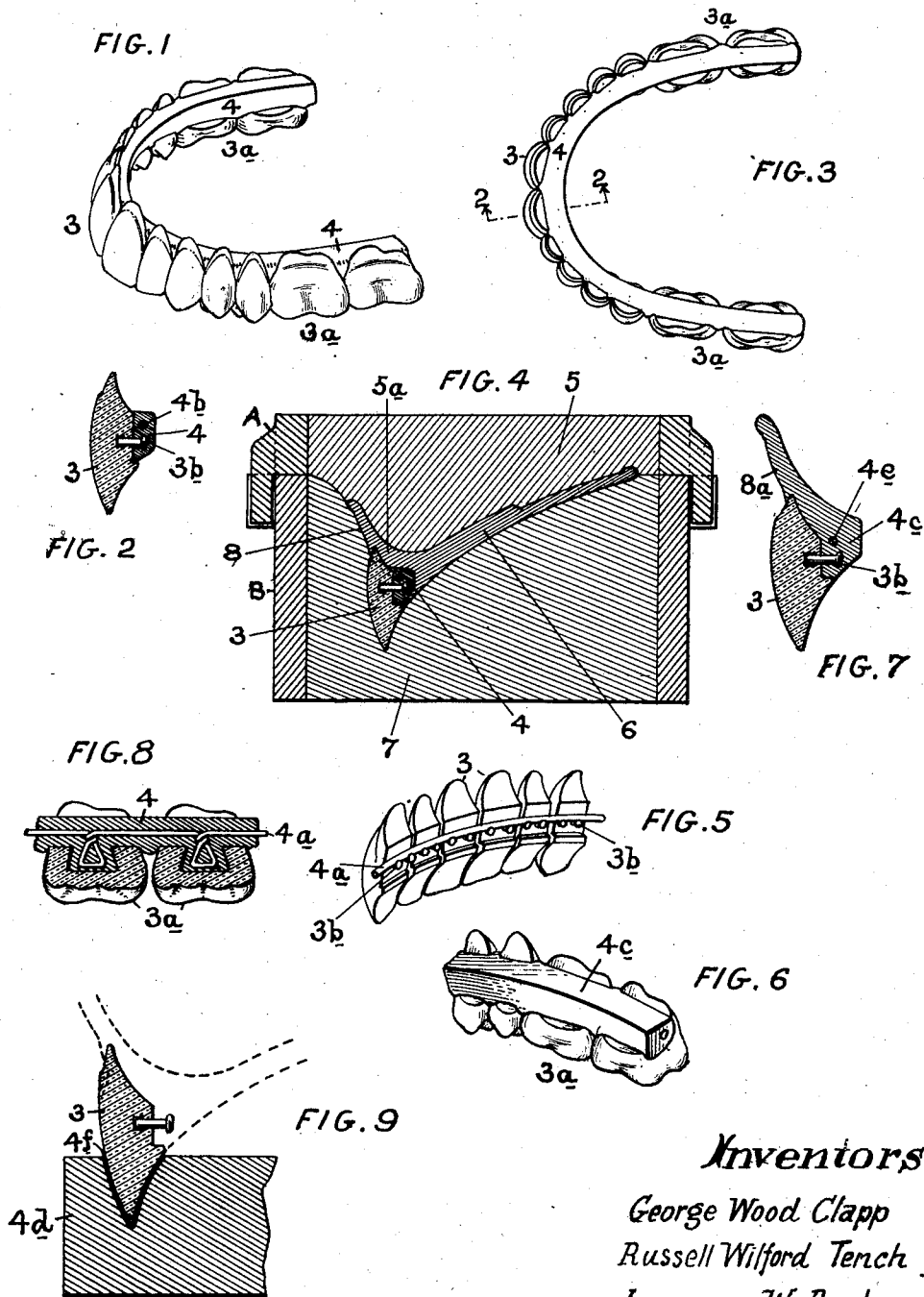
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DENTURE, PARTIAL DENTURE, AND METHOD OF MAKING SAME

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DENTURE, PARTIAL DENTURE, AND METHOD OF MAKING SAME.

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In the making of full upper and lower dentures and where dentures involving the frontal teeth are required, many dentists are insufficiently skilled in mechanical dentistry and laboratory work to set up the artificial teeth in a scientific manner as to secure, not only a perfectly fitting denture, but also an artistic and scientifically correct positioning of the teeth therein, such that a natural appearing mouth will result.

It is the object of our invention, in the case of those dentists not familiar with the science of the arrangement of natural anterior and posterior teeth, to provide them with artificial teeth in set-ups characteristic of the form of tooth required to be employed and of the form of arch necessary for the patient to be incorporated into the denture and much more scientifically arranged for articulation than would be possible by the dentist without extensive study and experience.

The object is further to supply the dentist with artificial teeth which have been arranged in the tooth row form having the characteristics of typical forms of arch, namely, square, tapering and ovoid, and articulated in accordance with the latest dictates of dental science; and whereby by utilizing such set-ups, the dentist will be spared much labor, due to the fact that he can set the teeth thus already arranged in correct juxtaposition on the wax base of the models upon which he is to construct the dentures, making such individual changes as may be unavoidable, and complete the plate or plates at far less cost and trouble and with less labor than would otherwise be required.

Our object is also to so connect the artificial teeth in the set-ups, that while conforming to scientific characteristics, the means for connecting or binding them together will permit of some change in the arch or slight shift or rotation of the teeth to meet special requirements, such as where the jaw characteristics introduce material deviation from a normal arch form; and further, so that when utilization of the present invention is made where the denture for one jaw is to be used in connection with opposing natural teeth on the other jaw, satisfactory articulation of the occlusal surfaces may be had by bending the binder or connecting means to set one row of cusps on one side higher or lower than the normal position as embodied in the set-ups sold to the dentists, thus enabling the dentist to adjust the occlusal surfaces of the artificial teeth, at least in part, to meet any abnormal position of the natural teeth in the opposing jaw.

More broadly stated, the object of our invention is to partially set up and connect individual artificial teeth in whole or partial arch forms, the same to be utilized by the dentist in connection with the model of the patient's jaw, whereby the dentist is thus provided with the teeth already set up in accordance with the best dental scientific knowledge and may apply the same to the model without special technical knowledge or skill on his part as to the science of anterior and posterior tooth arrangement or typical forms of arch.

Our invention embodies, an improved method or process of manufacturing dentures and also certain improvements in the set-ups which are utilized in the practice of the said method or process, and in the completed dentures formed by the use of said set-ups, all of which is more fully set out in the following specification and pointed out in the claims forming a part thereof.

Referring to the drawings: Fig. 1 is a perspective view of a set-up for an upper denture and embodying a tooth arch in accordance with our invention; Fig. 2 is a cross section of same on line 2—2 of Fig. 3; Fig. 3 is a plan view of the set-up shown in Fig. 1; Fig. 4 is a vertical section through a model of the arch of the patient's upper jaw with the set-up applied thereto, the wax additions to complete the shape of the plate, and with the plaster cast addition to complete the mold; Fig. 5 is a perspective view showing the six anterior teeth fastened together as a set-up where the denture is to be utilized with the bicuspid and molars either in the natural state or in separate set-ups; Fig. 6 is an elevation of the lingual side of bicuspid and molars as separate set-ups; Fig. 7 is a vertical section corresponding to Fig. 2, but of a modification of the binder; Fig. 8 is a longitudinal section through pinless molars showing a modified method of binding them together; and Fig. 9 is a vertical

section illustrating a still further modification of our invention in respect to mounting the teeth in arch form.

In Fig. 1 is shown a set-up in arch form for a full upper set denture, 3 being the six anterior teeth and 3^a the molars and bicusps on each side of the arch. 4 represents the binder which in this case may be a vulcanite band of relatively small cross section fitting to the lingual side only and receiving the pins 3^b of the teeth and so as not to interfere with the building up of the plate proper and gum festoon. This vulcanite band is intended to be only sufficient in cross section to hold the teeth in arch relation during shipment and when applying the set-up to the model of the jaw arch, the vulcanite is capable of being softened by heat and in that manner permitting bending of the arch in case of necessity for insuring perfect occlusal articulation when using the denture with natural teeth in the other jaw. Where pins are not employed in the molars 3^a, the vulcanite may enter the recesses therein as is sometimes customary in making dentures. The vulcanite binder band or rim 4 may be reinforced by a wire 4^b, if so desired.

Referring now to Fig. 4: The model arch 5 of the upper jaw is made as a cast from the impression made from the mouth of the patient. To this model arch 5, the dentist would endeavor to fit the set up selected as to tooth form and typical arch, and if it did not fit, he would change its form by bending, or heating and then bending the binder band 4 to the requisite shape. When this is done, the dentist would also then change the opposing tooth arch of the other jaw to correspond, if he required full upper and lower dentures. When he uses the set-ups in connection with opposing natural teeth on the other jaw, the vulcanite may be softened by heat and the teeth adjusted to insure proper occlusal articulation with the natural teeth to compensate for any abnormal position thereof.

Before further reference to the structural features of our improved set-ups is made, we will first describe the method or process for utilizing the same and thereby impart a more full understanding of the advantages and utility of the invention. Assuming that the dentist has ordered and received from the manufacturer or dealer the desired arch of teeth as to the shade and typical form of tooth, whether it be square, tapering or ovoid, and also as to size and typical shape of the arch itself; he next fits it to the model of the jaw of the patient, said model being made from the impression of the jaw and prepared with wax in the usual manner. If the arch of teeth so obtained does not reasonably fit the model arch of the jaw, the form of the tooth arch is changed to fit by bending and if the band be made of vulcanite, by heating the same before bending. If the denture was being made

to oppose natural teeth in the other jaw, then the fitting may be two-fold, namely, to fit the arch of the model mainly in a horizontal plane and to fit the occlusal surfaces of the natural teeth of the opposing jaw vertically and also laterally by rotation where such is necessary owing to mal-positioning of any of the teeth, whether natural or by reason of crowns, cups or bridge work; and where a denture of our invention is also to be made for the lower jaw, then the fitting thereof may have to be adapted to the upper denture as well as to the arch of the model of the lower jaw itself. Whatever fitting may be required, the connecting arch band is pliable or may be made temporarily pliable to permit of such fitting before the actual making of the denture is proceeded with.

In a case where a patient is to be provided with full upper and lower sets of teeth, there will be two models, one of the upper jaw and the other of the lower jaw; and these, when properly opposed in the articulator, will be employed in the fitting of the two arches of teeth purchased by the dentist, to insure proper occlusal positioning of the opposing teeth. In this case, there will be less fitting required, because having once fitted one of the tooth arches to one of the models, the dentist would only be required to change the opposing tooth arch of the other model to insure perfect occlusal results, and unless the jaws of the patient were materially deformed, there would be required little or no fitting in a vertical direction such as would require bending of the binder band or connecting means of the tooth arch. It will be understood, therefore, that where upper and lower complete sets of teeth are to be made for the patient, the extent of fitting and labor thereof, is likely to be less than where the fitting of the denture being made for one jaw is to be fitted to the natural teeth of the other jaw. Assuming, therefore, that by the use of models of plaster or investment material and articulator, the tooth arches have been fitted and waxed in position properly, the subsequent procedure in completing the denture may be carried out in the usual manner, keeping in mind, however, that the binding band or connecting means between the teeth of the tooth arch may be and in some cases will be incorporated into the finished plate, so that as a matter of fact, the finished plate may embody in its make up a portion prepared by the manufacturer of the tooth arches and the balance prepared by the dentist or the laboratory he may employ in completing the denture; and preferably, the binder or connecting material be wholly enveloped by the vulcanite plate prepared by the dentist.

With the foregoing explanation of the general procedure, the nature and extent of the invention will be better understood by a further specific reference to the drawings.

Referring to Fig. 4, the model of the upper jaw is indicated at 5, and upon the ridge thereof the tooth arch 3, 3^a and 4, is secured in place by positioning wax 5^a and the arch and individual teeth thereof are fitted or adjusted as above explained. The wax 6 is then placed upon the rest of the model where the plate is to be formed and further, wax is also placed on the buccal portion of the model, as at 8, to correspond to the gums at front and sides and form the rim with the festoon structure fitting down into the interdental spaces between the teeth. All of this wax is shaped as desired, to provide the form to be had in the finished denture. It will be understood that the wax 6 and 8, together with the positioning wax 5^a and the binder band 4, fills the total space to be occupied by the vulcanite plate in the finished denture and may be considered, with the teeth, as forming a pattern. When this is done and constituting one-half of the mold and the pattern, as it were, contained in one-half A of the flask 9, the other half B of the flask is placed in position and the investment or plaster mold body 7 is then formed over the teeth binder and wax, as shown in Fig. 4, providing thereby a complete set of mold parts 5 and 7, which, with the flask, provide a mold in which the vulcanite plate material may be encased in association with the teeth and binder during the treatment in the vulcanizer. Before investing the tooth arch and wax pattern and the exposed surface of the model part 5 with the plaster or investment compound to form the mold part 7, a suitable coating as usual may be used to prevent the material of said part 7 sticking to the surface of the model 5. When this mold part 7 is set and completed by hardening, it is then removed upon applying heat and will contain the tooth arch. All of the wax is then removed from the mold parts 5 and 7 and the space filled by soft and pliable unvulcanized rubber material in the usual way, until the complete denture is made up in the mold part 7. It is then securely sealed between the mold parts 5 and 7, the flask placed in the vulcanizer and the plate vulcanized. It will be understood that the vulcanite binder 4 of the tooth arch may be of a thickness such that it will be covered with the extension of the rubber of the roof plate 6, so that all exposed portions of the plate will be of uniform color as a feature of refinement. When the denture is thus made, it will have the general mechanical work of the dentist or laboratory assistant, but the tooth row characteristics will insure the teeth being articulated in accordance with the latest and best dictates of science and having impressed thereon the skill of trained experts, the result of whose experience is incorporated in the tooth arch form set-up employed.

The patient, on his or her part, will re-

ceive the arrangement of teeth harmonious with the form of tooth required together with the proper shade, impossible to be provided by the dentist who is not specially trained. The wearing of plates made with set-ups of this character is more easily learned, are more comfortable in use and more efficient in mastication and speech.

While the teeth are preferably connected in set-ups in which the arch corresponds to the typical forms of square, tapering and ovoid, as now more generally understood, they may be connected in the type known as the "Bonwill" circle, or other form, as may be found desirable to suit the demands of dentists and, therefore, we do not restrict ourselves to the preferred typical forms first referred to.

The manufacturer, in providing these set-ups of semi-articulated teeth, would necessarily have to provide them in stock covering several sizes of arch and shades, also covering the several typical forms of teeth, square, tapering and ovoid, as well as sizes of these types, and finally, would have to provide the arches in the corresponding square, tapering or ovoid types. When these may be had from the manufacturer or dental depot, it becomes only necessary for the dentist to order the arch by mold number and shade number of the teeth and specification as to uppers or lowers required. In fact, where a dental depot is at hand, the dentist may take his model to the depot and immediately select the tooth arch desired.

In Fig. 5 we have shown a partial arch made of the six anterior upper teeth, and in this case the teeth are connected by a curved wire 4^a soldered to the pins of the teeth and the teeth relatively positioned in a scientifically correct manner. When these teeth are employed in making up the denture, the procedure is substantially the same as in Fig. 4, except as to the bicuspid and molars, and those would be selected by the dentist as in the usual practice. It is part of our invention to provide the posterior teeth for each side of the jaw also made in set-ups and these may be employed by the dentist in connection with the set-ups of the anterior teeth. An example of the posterior teeth set-ups is shown in Fig. 6, in which 3^a are the molars and the bicuspid and 4^a the binder band, which in this case may be of either vulcanite, hard wax, or gutta percha. In case wax is used as the binder, it will be understood that when the teeth are mounted on the model this wax will ultimately be all removed and rubber compound capable of vulcanization substituted. It will, therefore, be seen, that while our invention may be most successful when applied to full sets of upper and lower teeth, or either of them, nevertheless, we may apply the same to partial sets such as the six anteriors, independently of the bi-

cuspid and molars constituting the posterior teeth, and may also arrange the right and left posterior teeth in separate set-ups according to our invention independently of the anterior teeth.

While the binder vulcanite 4 may be incorporated into the plate structure in the completed denture, this incorporation would not be possible where the binder between the teeth of the arch was of wax or of material which would not unite with or reinforce the vulcanite of the final plate. This, however, does not apply to the case of the use of a wire connector as 4^a of Fig. 5, as any metallic connection between the teeth may be embedded within the vulcanite and form a reinforcing for the same. In respect to this feature, we would point out that while the wire 4^a of Fig. 5 would become a reinforcement to the new rubber compound to form the plate, the use of a wire 4^b may be embedded in the binder vulcanite band 4 to reinforce it as indicated in Fig. 2, being united to the pins 3^b of the teeth as in Fig. 5, or independent of them as in Fig. 2, said wires reducing the quantity of binder material required.

In the construction shown in Fig. 7, we have employed wax as the binder between the teeth and have reinforced it by use of a wire 4^c located adjacent to the pins 3^b as in Fig. 2. In this case, the wax binder may be shaped approximately to what would be needed in positioning the teeth on the model, the part 8^a providing the gum and festoon portions and part 4^c providing the positioning wax to attach the teeth to the ridge of the arch in the model. In this case, the cross section of the binder may be approximately equal to the full cross section of the finished plate except for the roof 6 thereof (Fig. 4). In this construction, the tooth arch may readily be attached to the model and the teeth relatively adjusted either in a vertical direction or lateral with rotation, so that one row of cusps of the bicuspid or molars on a side could be positioned higher or lower than in the initial arrangement as received by the dentist, whereby he may fit the teeth of the arch to the natural teeth in the opposing jaw. In the case of the anterior teeth, these in all cases may be adjusted as may be necessary in a lingual-buccal direction or vice versa; and in fact, almost any direction necessary, such as about a vertical axis, or mesiodistally to some extent providing that in this case the individual teeth are set sufficiently apart to permit such special adjustment. Ordinarily, the teeth are preferably placed so close together as to prevent more than a very slight adjustment. However, in the cases where the binder is normally pliable or capable of being made pliable by heat, the closely arranged teeth may be capable of adjust-

ment in a mesio-distal direction, especially at their incisor ends.

When pinless teeth are used in part or wholly, the teeth must be connected by the binder through means thereof entering into apertures in the teeth and this will be understood by reference to Fig. 8, in which 3^a represents molars having recesses in their upper portions into which a wire 4^a twisted into loops may extend and be embedded in vulcanite material 4. It would not be desirable in these cases to fill the apertures of the teeth with any material which would not become a permanent part of the plate and which could not readily be removed. It would, of course, be possible to shape apertures to firmly receive metal parts of the connectors which would remain permanently a part of the plate structure while leaving the remaining apertures for reception of the rubber of the plate in the usual manner.

In referring to the employment of vulcanite bands or rims 4, as the binder for the teeth, it will be understood that these may be only partially vulcanized before the completion of the dentures, as in this manner the said binder remains more pliable (and hence less brittle) than where full vulcanization is had.

As the tooth arches provided by the employment of our invention are necessarily of more or less frail construction, as to maintenance of the initial typal forms given them, we prefer, in transporting these arches, to mount them in some convenient and inexpensive manner, such for example, as on earthen bases or sheet metal stampings.

Heretofore, we have referred to the tooth arches as being arranged in the typal forms by binder means connecting their body portions while leaving the incisor and occlusal parts free, but it will be understood that while this is preferable, it is not essential, as the teeth may be arranged on a base plate compound, gutta percha, vulcanite, metal or other material, as shown, for example, in Fig. 9. In this figure, 3 represents one of the teeth, 4^a the base plate having recesses into which the incisor or occlusal portions of the teeth are received, and in which the teeth may be attached by a wax lining 4^c. In this manner, the teeth may be shipped and when applied and attached to the mold, the base plate may be heated and detached, leaving the teeth attached to the model in proper arrangement and upon which they may be adjusted if such adjustment is necessary. In the case of the patient requiring complete upper and lower dentures, there will be no necessity of material adjustments of the individual teeth.

We have described our improved method and the article of manufacture produced thereby in that particularity which we deem to be the best exposition of our invention, and that which we prefer in commercial prac-

tice, but we do not restrict or confine ourselves to the minor or secondary details, as such are susceptible of modification and may be resorted to as matters of mechanical skill and without a departure from the spirit of the invention.

Having now described our invention, what we claim and desire to secure by Letters Patent is:—

1. A set-up for use in making dentures, comprising a plurality of artificial teeth arranged in predetermined curved row formation and bound together side by side by a vulcanizable pliable material only partly vulcanized and capable of being incorporated into the finished vulcanite plate, said binder having a greatly smaller cross sectional area than that required by the plate in the finished denture in which the set-up is to be used, whereby it temporarily holds said teeth in relative positions and permits of them being relatively adjusted while the set-up is used in making of a complete denture, and in which the partly vulcanized pliable binder material forms a portion of the final vulcanite plate thereof.

2. The invention according to claim 1, wherein further, the partly vulcanized pliable binder material is reinforced by metal permanently arranged along the lingual side of the row of teeth and enveloped in the pliable material.

3. The invention according to claim 1, wherein further, the partly vulcanized pliable non-metallic material forming the binder is attached to the pins of the teeth and is subsequently fully enveloped on the lingual side by and incorporated in the vulcanite forming the main part of the ultimate plate.

4. The method of making a denture which consists of first making a model of the jaw of the patient for which a denture is required, separately making a set-up of a plurality of teeth placed side by side in a row in proper relative arrangement and held in such relation by a binder which will permit of slight adjustment of the individual teeth, said binder formed of partly vulcanized rubber compound capable of being further vulcanized, placing the set-up upon the molded model and adjusting the teeth relatively thereto by bending the binder in whatever direction and wherever necessary and also temporarily securing the set up in position thereon by wax, building up and shaping the wax to correspond to the shape of the vulcanite plate desired, and subsequently substituting rubber compound for the wax in forming the main portion of the plate and incorporating with said rubber compound the partly vulcanized rubber compound binder of the set-up and finally vulcanizing the entire plate structure including the main portion of the binder whereby said binder together with the rubber compound for form-

ing the plate, after vulcanizing, compose the finished plate structure of the denture.

5. The method of making set-up teeth in properly positioned row formation for use in forming dentures, which consists in securing the artificial teeth side by side in proper relative positions and temporarily holding them in said relative positions by a yielding binder which will permit of slight adjustment of individual teeth, said binder formed of a rubber compound attached to the teeth or parts thereof and having a cross sectional area greatly less than that of the plate denture of which the set-up would form a part, and subsequently partly vulcanizing the rubber compound to an unfinished condition, whereby it retained pliability and capable of further vulcanization when completing the denture in which the set-up is used.

6. A set-up for use in making dentures, comprising a plurality of artificial teeth arranged in predetermined curved row formation and bound together side by side by a binder of vulcanizable rubber material in a partly vulcanized condition and having a greatly smaller cross sectional area than that required by the plate of the finished denture in which the set-up is used, whereby it temporarily holds said teeth in relative positions and permits of them being relatively adjusted when the set-up is used in the making of a complete denture and in which the partly vulcanized rubber binder forms a portion of the final vulcanized plate thereof.

7. A set-up for use in making dentures, comprising a plurality of artificial teeth arranged in predetermined curved row formation and bound together side by side by a binder of vulcanizable rubber material in a partly vulcanized condition and having a greatly smaller cross sectional area than that required by the plate of the finished denture in which the set-up is used, whereby it temporarily holds said teeth in relative positions and permits of them being relatively adjusted when the set-up is used in the making of a complete denture and in which the partly vulcanized rubber binder forms a portion of the final vulcanized plate thereof, and wherein the binder of partly vulcanized rubber material is reinforced by metal permanently arranged along the lingual side of the row of teeth.

8. A set-up for use in making dentures, comprising a plurality of artificial pin teeth arranged in a predetermined curved row formation and bound together side by side by a binder positively connected to the pins of the teeth and to form a reinforcing part of the vulcanized plate of the finished denture, said binder being pliable whereby it permits the teeth to be separately and relatively adjusted when the set-up is being used in the making of the denture and having a cross sectional area greatly less than that of the finished

plate in which it ultimately forms a permanent, part, and wherein further, the pliable binder is formed of partly vulcanized rubber compound in which the pins are embedded and by which they are ultimately connected to and form an integral part of the finished vulcanite plate of the denture.

9. As an article of manufacture, a tooth arch for use in vulcanite plate dentures, comprising a plurality of artificial teeth bound together side by side in a predetermined manner by a permanent non-metallic connection capable of being bent for adjustment of the teeth relatively to each other, said connection to form a permanent part of the finished plate of the denture and of less cross section than the finished plate of the denture in which the arch is employed and confined to a space on the lingual side of the teeth between the upper and lower edges of the same, said connection including partly vulcanized rubber com-

pound and adapted to be incorporated in and form a part of a vulcanite plate denture.

10. The method of making set-up teeth in properly positioned row formation for use in forming dentures, which consists in securing the artificial teeth side by side in proper relative positions and temporarily holding them in said relative positions by a yielding binder which will permit of slight adjustment of individual teeth, said binder formed of a rubber compound attached to the teeth or parts thereof, and subsequently partly vulcanizing the rubber compound to an unfinished condition whereby the binder is capable of further vulcanization so as to form part of the final plate.

In testimony of which invention, we hereunto set our hands.

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