W. E. WALKER, DEC'D.

J. M. WALKER, ADMINISTRATOR.

ORTHODONTIA.

APPLICATION FILED OCT. 14, 1911. RENEWED JULY 21, 1916.

1,217,374. Patented Feb. 27, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

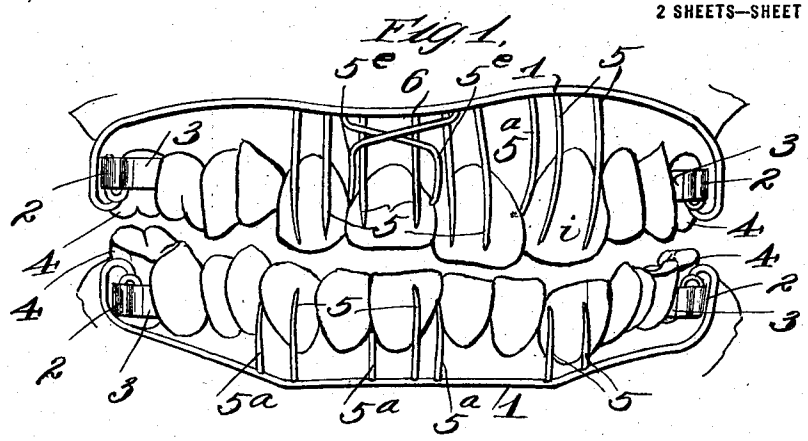


Fig. 1a

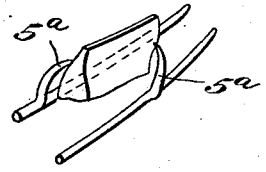


Fig. 2.

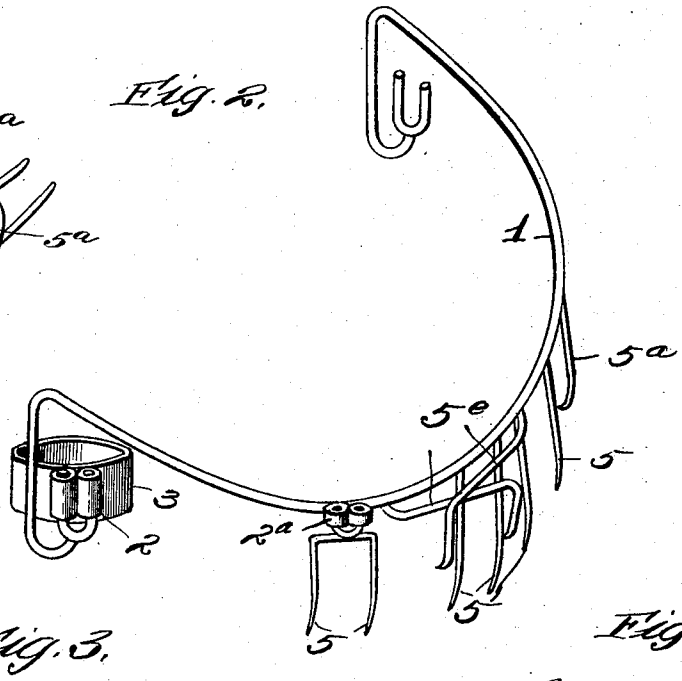
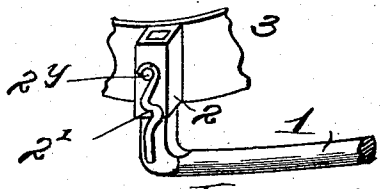


Fig. 3.



Fig. 4.



Witnesses:
G. A. Rauberschmidt
J. W. Wyntkoop

Inventor:
William Ernest Walker;
By Knight Bros
Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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2 SHEETS—SHEET 2.

Fig. 5.

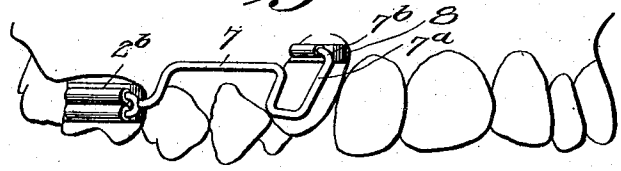


Fig. 6.

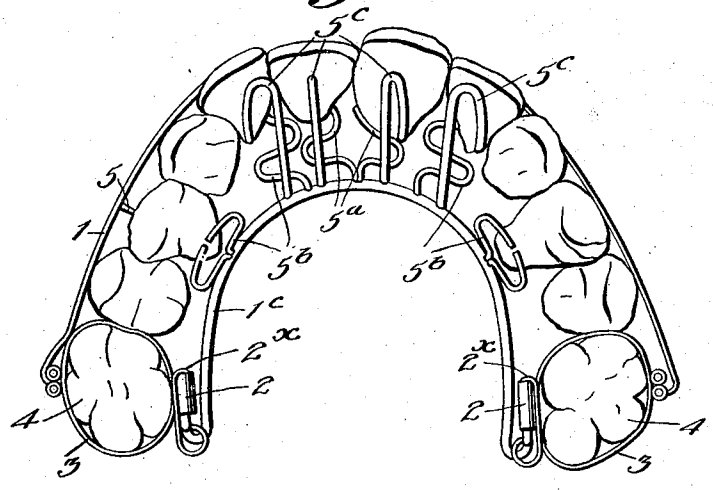


Fig. 8.

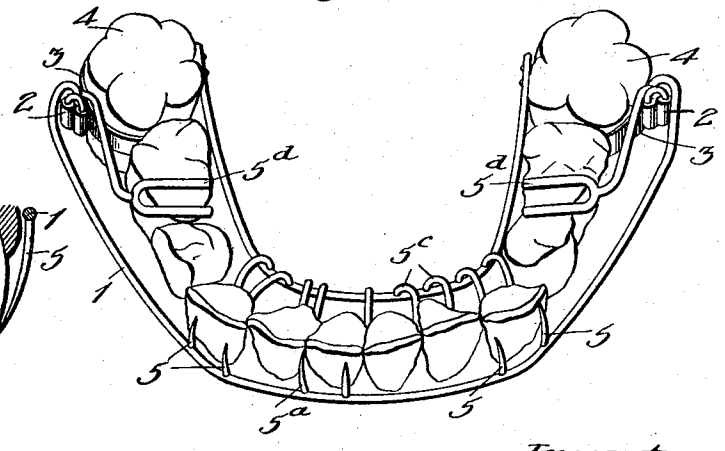
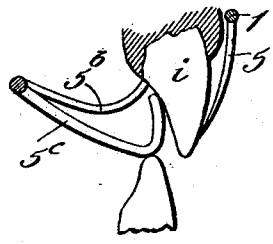


Fig. 7.



Witnesses
D. H. Thornett
Herman Jakobsson

Inventor
William Ernest Walker
By Knight Bros.
Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM ERNEST WALKER, OF NEW ORLEANS, LOUISIANA; J. MORT WALKER, OF NEW ORLEANS, LOUISIANA, ADMINISTRATOR OF SAID WM. E. WALKER, DECEASED.

ORTHODONTIA.

1,217,374. Specification of Letters Patent. **Patented Feb. 27, 1917.**

Application filed October 14, 1911, Serial No. 654,769. Renewed July 21, 1916. Serial No. 110,610.

To all whom it may concern:

Be it known that I, WILLIAM ERNEST WALKER, orthodontist, a citizen of the United States, and a resident of New Orleans, in the parish of Orleans and State of Louisiana, and whose post-office address is 629 Maison Blanche, in said city, have invented certain new and useful Improvements in Orthodontia, of which the following is a specification.

This invention relates to the mechanical treatment of the teeth, individually, or in groups, as for instance by influencing a tooth or teeth for the purpose of correcting existing or impending irregularities either in the immedate tooth treated or in a developing tooth so located as to be improperly influenced by an existing tooth or abnormal forces; or for the purpose of correcting existing or impending abnormal facial lines resulting from mal-development or mal-position of the teeth or jaws; also to the treatment of the jaws as a whole, or one of them, for the purpose of correcting their relative positions and developing proper occlusion.

The invention consists primarily in the art of orthodontia by bringing to bear upon the tooth or teeth to be affected individually, a force as from occlusion, or by applying a force produced by light resilient extensions from a carrying member; these forces being localized and directed to the change in position to be induced. Other cases may require a combination of the individual conditions above recited, such for instance as combined bodily movement with rotation, or one bearing member may be given a set or bias of movement which will develop some or all of the directional influences required to produce the desired result and so connected to a tooth that it can impose upon the tooth strains of torsion, or of pressure and torsion combined. One method of developing such torsion of the tooth is by anchoring the bearing member to the tooth to be corrected and having its free end projected into the path of a distant tooth on the opposite jaw so as to develop lever action, the bearing member being given such a direction as to act torsionally, as well as by lever action, upon the tooth, if desired.

The invention further relates to certain improved instrumentalities for the convenient and successful carrying out of the improvements in the art above briefly outlined.

One feature of this part of the invention consists in providing a bow or arch or other carrying member to be used either on the lingual or buccal side, and which is deflected or offset from the plane of the teeth, beyond its attaching ends, to bring it opposite the gums or alveola arch, for both hygienic and esthetic considerations, in that it thereby leaves the teeth free for cleansing and is kept out of sight on the labial side, and away from the tongue in speech, if on the lingual side; said carrying member being looped when necessary to accommodate the frenum and being made larger in some places than others as at the frenum loop to prevent injury to the lingual or labial frenum or at the attaching end in order to maintain the general position of the carrying member with relation to its anchoring connection, or made smaller as at a point where it is necessary to reshape it frequently. This carrying member is in most instances provided with relatively long and thin projecting fingers or bearing members with inherent resiliency, located at convenient points to be brought into bearing in the desired direction on the teeth and adapted to be given a new set from time to time in order to follow up the adjustment of the teeth as they respond to the treatment and so keep the bearing members under the tension necessary to maintain the relatively light continuing force, which is an underlying feature of this part of the invention.

Another feature of this part of the invention relates to a separable attaching means, whereby the carrying member may be angularly fixed with relation to an anchoring means, either in the form of a band or a special embodiment of gripping member attached to an anchorage tooth, or whereby the bearing members may be angularly fixed in detachable relation to the carrying member; this connection comprising a tubular socket, so constructed (as for instance by making it double or, if single, of non-circular section) as to resist torsional displacement of the member which it receives, with or without a locking device to prevent axial

displacement of the end or ends of the carrying member or bearing member received within the socket or sockets.

Another feature consists in the pliable, yet resilient bearing members adapted to be attached to the bow or arch, or other carrying member or directly to an anchorage upon a tooth and to receive such shaping and setting as will cause them to extend parallel with the inter-dental spaces, in developing the desired bearings against the teeth to be treated; these bearing members being caused to bear against the teeth either by their ends or by specially shaped portions where it is desired to provide a broader bearing and being in some instances socketed or otherwise connected to a tooth so as to impose a torsional as well as a bearing strain upon the tooth.

A further feature relates to novel means for securing anchorage upon a tooth, by providing a positioning ring which embraces the cusp-end of the tooth to prevent lateral displacement of the anchoring member, and a gripping member which partially encircles the tooth above the knuckle, whereby the parts are releasably held in position, the positioning ring being further provided, if necessary, with a projection overlying the cusp of the tooth to limit the upward movement and prevent the gripping part interfering with the gum. In some instances, the anchoring member will be provided with the tubular socket to receive the carrying member or the bearing member, and in other instances it may be found desirable to provide a stud or projection on the anchoring member with which the carrying member may engage through an elongated slot which provides for adjustment of the carrying member relatively to the teeth to be corrected.

A further object is to provide bearing members which will, for the most part, extend in substantial parallelism to the inter-dental spaces, that is to say will bear against the teeth cervical-occlusally instead of transversely as heretofore, with obvious hygienic as well as esthetic advantages; said bearing members being extended from the carrying bow or arch with resiliency sufficient to maintain their directing influence even after the tooth begins to yield to the same, and made pliable so that they are adapted to be set to localize pressure wherever desired. The bearing members may be soldered direct to the carrying or anchorage member from which they project, without departing from the feature of parallelism to the inter-dental spaces.

Further features relate to the socketing of the bow, arch, or other carrying member, adjustably to the anchoring band, and consist in means for retaining the adjusting nut against unintentional rotation on the threaded portion of the carrying member, as well as means for holding the carrying member in an open-sided socket adapted to receive the carrying member laterally or vertically.

The several features of the invention will be hereinafter fully described and then particularly pointed out in the claims, reference being had to the accompanying drawings forming part of this specification, and in which,

Figure 1 represents a front view of the upper and lower jaw with my device in position on the labial side of the jaws;

Fig. 1[a] a perspective view of part of the device showing parts of the labial and lingual members with bearing members exerting torsional force on a tooth in the lower jaw;

Fig. 2 is a perspective view of the device for the labial side of the upper jaw as represented in Fig. 1;

Fig. 3 is a detail of a staple as illustrated in Figs. 1 and 2;

Fig. 4 is a non-rotating bearing socket;

Fig. 5 shows a modified form of tilting bearing support for the anchorage member;

Fig. 6 is a bottom plan view of Fig. 1, showing both the labial and lingual carrying and bearing members in position on the upper jaw;

Fig. 7, is a detail view in cross section of the device as shown in Figs. 1 and 6 representing the tooth in the upper jaw marked *i*;

Fig. 8 is a similar view to Fig. 6 of a slightly modified form of my device.

According to Figs. 1 and 2, the bows or carrying members 1 are connected by socketing connections 2 with the bands 3 on the molars 4 and are provided with any suitable number of bearing members 5, 5[a], of which the members 5 are positioned and tensioned to induce lingual displacement of the teeth against which they bear, some of said bearing members being duplicated upon the tooth for the purpose of affecting the tooth evenly, while the bearing members 5[a] impinge against the teeth in the inter-dental spaces in a lateral direction for the purpose of producing torsion in connection with similarly located, though oppositely acting bearing members 5[a] on the lingual side (see Figs. 1[a] and 6). The effect thus produced is somewhat similar to the effect produced by inner and outer bearing members against the lingual and labial faces of the teeth, so long as the bearing members 5[a] do not enter the spaces sufficiently to press on substantially opposite points. An advantage of using this means for inducing torsion is that it prevents lifting action on the carrying member which would be transmitted as a tipping influence upon the anchorage tooth or teeth, which is to be avoided

in some cases. It is further advantageous in that it will avoid producing intrusion of the tooth acted upon, which would result from a bearing member impinging against an inclined surface of the tooth. It will be observed that the bearing members 5 are of relatively small dimension. They are also resilient and being held by the bow 1, they exert a constant but gentle pressure against the teeth. It will also be observed that they are selectively positioned with reference to the teeth, so that by the proper distribution of the forces which they impose, the tooth will receive the exact direction and degree of displacement necessary to bring it into proper position. A further advantage of these bearing members arises from the fact that they constitute combined straightening and retaining means, in that after they have accomplished their primary purpose, they may be relieved of their tension just sufficiently to enable them to thereafter serve as retaining means to prevent retrograde movement of the adjusted tooth. They thus do away with the trouble, expense and unsightliness of separate retaining means heretofore employed. The said resilient bearing members being independently adjustable, may be independently transferred from the stage of adjustment to the stage of retention, or even clipped off altogether, leaving the others to continue their own work.

Figs. 1 and 2 also show a case of extrusion and a device applicable thereto, respectively, in that the pair of bearing members 5^e crossing substantially horizontally from the carrying member to get vertical resiliency and extending thence downwardly to develop lateral resiliency, embrace the neck of the tooth above the node or enlargement which I term the knuckles and exert a downward force to produce extrusion.

The construction of the sockets 2 will be best understood upon reference to Figs. 2 and 3, which show the preferred form, and Fig. 4, which shows a modification. The essential characteristics of this socket member are that it is adapted to be soldered or otherwise secured to the anchorage member, such as a band cemented around a tooth in position either vertical or horizontal to receive the pin or pins Fig. 3 constructed to enter the socket, and a pin or pins carried by the member to be supported, the pin or pins fitting the socket in such manner as to prevent torsional displacement of the member which is to be supported. According to Figs. 2 and 3, the socket is made double, while the pins which enter it are in the form of a staple rigidly connected to the member which they support. The ends of the staple-pin are, preferably, of unequal length. The short end is shorter than the socket, so that the pincers may be applied, one jaw to the staple, and the other jaw to the end of the socket in order to press the connection to a firm seating. This form of socket and staple-pin is convenient because the stock of material used for making the socket pin is preferably round. Fig. 4, however, illustrates the use of a single non-circular tubular socket which would have the effect of preventing torsional displacement of any member supported by a pin fitting said socket. In many cases, it will be desirable to lock the pin or pins against axial displacement, for which purpose the pins or the part carrying them may be provided with a locking finger 2^x (Fig. 6) that snaps over the end of the socket 2. Or the socket may have a stud 2^y over which a spring 2^z snaps, as shown in Fig. 4.

An important feature of the invention is in the location of the bow or other carrying member 1, beyond the teeth and opposite the gums, for practical as well as hygienic and esthetic considerations. That is to say by offsetting the carrying member as stated, greater resiliency may be attained in the bearing members, and when the carrying member is on the inner or lingual side of the teeth, it is sufficiently out of the way of the tongue to avoid inconvenience in speech. Moreover, the particular location of the carrying member avoids interfering with the cleansing of the teeth and obscures the part from view.

The upper carrying member when used on the outer or labial side may be provided with a loop 6 Fig. 1 to accommodate the frenum of the lip and the carrying member may even be made of increased thickness at this point to avoid injury to the frenum. In like manner, a carrying member used on the lower lingual side may be provided with a similar loop to accommodate the frenum of the tongue.

As will be seen more clearly in Fig. 2, some of the bearing members 5 or 5^a may be secured to the bow by means of socket connections 2^a similar to those already described for connecting the bow to the anchorage.

According to Fig. 5, a combined bearing and carrying member 7 socketed to an anchorage as at 2^b, may be constructed with a bearing 7^a adapted to impose inward pressure upon a corner of a tooth as well as an end 7^b socketed to a band 8 surrounding the tooth; said end 7^b being given a set or bias which causes it to impose torsional force upon the tooth.

According to Fig. 6, a lingually disposed lower carrying member 1^c is connected by sockets 2 to bands 3 on anchorage teeth 4, and carries a series of bearing members 5^b deflected for the purpose of increasing resiliency and bringing them to bear upon the proper positions of the teeth; said bearing members 5^b being brought to bear upon the necks of the teeth for the purpose of moving

the roots outwardly; fulcrums being provided by the outer bearing members 5 near the ends of the teeth. Said carrier also has bearing members 5^c of peculiar construction extending toward teeth of the opposite jaw in order to encounter the latter and open the bite, but having their ends deflected into bearing relation against the necks of the teeth for the purpose of using the force of occlusion to induce outward movement of the roots; in the present instance assisting the action of the bearing members 5^b already referred to. The members 5^c will have the further effect of causing intrusion of the lower teeth which impinge against them.

Figs. 6 and 8 illustrate plan views, respectively, of the upper and lower jaws shown in occlusion in Fig. 1, and while disclosing certain details of instrumentalities, they also illustrate the coöperative relation between inner and outer bearing members. For instance, the bearing members 5 on the left upper central incisor *i* in Figs. 1 and 7 are serving mainly as fulcrums or sustaining forces for the tooth whose root is being displaced outwardly by the members 5^b, 5^c, shown in Fig. 6; yet the proximate or mesial one of the said two outer bearing members 5 is tensioned sufficiently to also assist in turning the tooth.

Occlusal bearing members may assume various forms according to the forces they are designed to develop or transmit. Thus we have seen from Figs. 6 and 7 that the members 5^c are in the path of the lower incisors of Figs. 1 and 8 for the combined purpose of developing intrusion of said lower incisors and at the same time transmitting the force of occlusion in the form of an outward pressure against the necks of the upper incisors of Figs. 1 and 6, to displace their roots outwardly. Another embodiment of the occlusal bearing member is shown in Figs. 1 and 8, where the bifurcated levers 5^d banded in angularly fixed relation to the molars 4, extend into the paths of the upper first bicuspids well above the corresponding lower bicuspids, so that the occlusal forces of the upper bicuspids are transmitted as tipping strains upon the anchorage teeth to incline them forward and at the same time intrude the occluding bicuspids. The bifurcation of these levers serves to prevent mesio-distal displacement of the occluding teeth which fit in the forks.

I claim:—

1. An appliance in the improved art of orthodontia involving extrusion, said appliance comprising a carrying member anchored to the teeth, bearing members detachably mounted on said carrying member; said bearing members having projecting fingers constructed to impose with their free ends upon opposite sides of a tooth, over the knuckles thereof, and in the direction of extrusion, two relatively light, independent forces.

2. An appliance in the improved art of orthodontia involving intrusion, said appliance comprising a carrying member anchored to the teeth, a bearing member detachably mounted on said carrying member, said bearing member having projecting fingers constructed to be introduced into the path of the tooth to be intruded, acting as a resilient obstacle.

3. An orthodontia appliance comprising a carrying member substantially conforming to but offset, toward the gums beyond the crown of the teeth, from the dental arch, and carrying bearing members extending to and bearing upon the teeth.

4. An orthodontia appliance comprising a carrying member substantially conforming to but offset, toward the gums beyond the crown of the teeth, from the dental arch, and carrying bearing members extending to and bearing upon the teeth; portions of said bearing members overlying the teeth being substantially parallel to the inter-dental spaces.

5. An orthodontia appliance comprising a carrying member substantially conforming to but offset, toward the gums beyond the crown of the teeth, from the dental arch, and carrying bearing members extending to and bearing upon the teeth; portions of said bearing members overlying the teeth being substantially parallel to the inter-dental spaces; said bearing members being resilient in directions perpendicular to the teeth and in the direction of the dental arch.

6. An orthodontia appliance comprising a carrying member substantially conforming to but offset, toward the gums beyond the crown of the teeth, from the dental arch, and carrying relatively light, resilient and independent bearing members extending to and bearing upon the teeth; portions of said bearing members overlying the teeth being substantially parallel to the inter-dental spaces.

7. An orthodontia appliance comprising a carrying member substantially conforming to but offset, toward the gums beyond the crown of the teeth, from the dental arch, and carrying bearing members extending to and bearing upon the teeth; portions of said bearing members overlying the teeth being substantially parallel to the inter-dental spaces; there being a pair of said bearing members adapted to embrace the neck of a tooth and being resilient in the direction of the longitudinal axis of the tooth, to produce extrusion.

8. In an orthodontia appliance, a carrying member substantially conforming to but offset, toward the gums, from the dental arch, and a pair of bearing members extending from said carrying member into position to

embrace the neck of a tooth and bear upon the knuckles thereof; said bearing members extending from the carrying member on the opposite side of the tooth from the point upon which it bears, whereby the bearing members are given vertical as well as transverse resiliency.

9. An orthodontia appliance comprising anchorage members, a carrying member substantially conforming to but offset, toward the gums, from the dental arch, and transversely and torsionally resilient independent bearing members extending from said carrying member in line substantially parallel to the inter-dental spaces, and adapted to bear upon the teeth, said carrying members being detachably mounted on said anchorage members.

10. An orthodontia appliance comprising anchorage members, a carrying member substantially conforming to but offset, toward the gums, from the dental arch, and transversely and torsionally resilient independent bearing members extending from said carrying member in line substantially parallel to the inter-dental spaces, and adapted to bear upon the teeth, said carrying members being detachably mounted on said anchorage members, one of said bearing members being bent inwardly into position to bear against one of the proximal or distal faces of the tooth, and being under torsional strain to cause it to act against said face.

11. An orthodontia appliance comprising anchorage members, carrying members located on the outer and inner sides of the dental arch, offset toward the gums from the dental arch and carrying bearing members extending to and bearing against the teeth; said carrying member being detachably mounted on said anchorage members, an outer and an inner member being bent toward and brought into bearing upon the proximal and distal faces of a tooth, but on opposite sides of the center of the tooth, and being set to exert opposite torsional strain upon the tooth, whereby rotation of the tooth is influenced.

12. In an orthodontia appliance, a carrying member and a plurality of relatively light, resilient and independent bearing fingers extending from said carrying member in position to bear with their free ends upon opposite sides of a tooth and to exert opposing forces thereon, anchorage members constructed to detachably support said carrying member.

13. In an orthodontia appliance, a carrying member and a plurality of relatively light, resilient and independent bearing members extending from said carrying member in position to bear upon opposite sides of a tooth and to exert opposing force thereon; one of said forces being applied at an axis of movement to sustain the tooth against movement at its axis, and the other being applied at a point remote therefrom, anchorage members constructed to detachably support said carrying member.

14. In an orthodontia appliance, a carrying member and a plurality of relatively light, resilient and independent bearing members extending from said carrying member in position to bear upon opposite sides of a tooth and to exert opposing force thereon; said bearing members being applied to the tooth on opposite sides of an axis of movement, anchorage members constructed to detachably support said carrying member.

15. In an orthodontia appliance, an occlusal bearing member projecting over and bearing upon a tooth in position to receive occlusion from a corresponding tooth, and an anchorage member adapted to detachably support said bearing member.

16. In an orthodontia appliance, an occlusal bearing member projecting over and bearing upon a tooth in position to receive occlusion from a corresponding tooth; said bearing member encountering the tooth upon which it bears at a point to one side of its vertical axis, whereby it causes tipping action upon the tooth and an anchorage member adapted to detachably support said bearing member.

17. In an orthodontia appliance, a bow substantially conforming to the dental arch, and independent removable connections between said bow and a plurality of teeth, holding the bow in fixed angular relation to the several teeth; said bow carrying means for influencing a tooth to be treated, said removable connections comprising twin sockets.

18. In an orthodontia appliance, a bow substantially conforming to the dental arch, and independent removable connections between said bow and a plurality of teeth, holding the bow in fixed angular relation to the several teeth; said bow carrying means for influencing a tooth to be treated, and being also connected to the tooth to be treated by a socket extending in the direction of movement to be imparted to said tooth, said removable connections comprising twin sockets.

19. In an orthodontia appliance, the combination of a bow or carrying member, and an independent socketing connection between said bow or carrying member and each of a series of fingers, holding the bow in rigid angular relation to the teeth; said bow carrying means for influencing a tooth to be treated, said socketing connection having twin sockets.

20. In an orthodontia appliance, means for socketing a carrying member to a member to be connected therewith, comprising a twin socket carried on one of said parts and

a pin connection carried by the other of the parts fitting in non-rotating relation with the socket.

21. In an orthodontia appliance, means for connecting two members, comprising a double tubular socket carried by one of the parts, and a double pin connection carried by the other of the parts and adapted to fit the socket.

22. In an orthodontia appliance, means for connecting two members, comprising a double tubular socket carried by one of the parts, and a double pin connection carried by the other of the parts and adapted to fit the socket; one portion of the pin member being longer than the other and adapted to protrude beyond the socket which receives it, to receive pressure in disassembling the parts.

23. In an orthodontia appliance, means for connecting two members, comprising a double tubular socket carried by one of the parts, and a double pin connection carried by the other of the parts and adapted to fit the socket; one portion of the pin member being longer than the other and adapted to protrude beyond the socket which receives it, to receive pressure in disassembling the parts, and the other portion of said pin member being shorter than the socket which receives it, whereby it is adapted to be pressed to a firm seating in the socket by a pressure instrument applied over the end of the socket and to the pin member.

The foregoing specification signed at Washington, D. C., this 16th day of September, 1911.

WILLIAM ERNEST WALKER.

In presence of—
HERVEY S. KNIGHT,
EDWIN S. CLARKSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."