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H. FREEDMAN
ARTIFICIAL DENTURES
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2,555,403

Fig. 1.

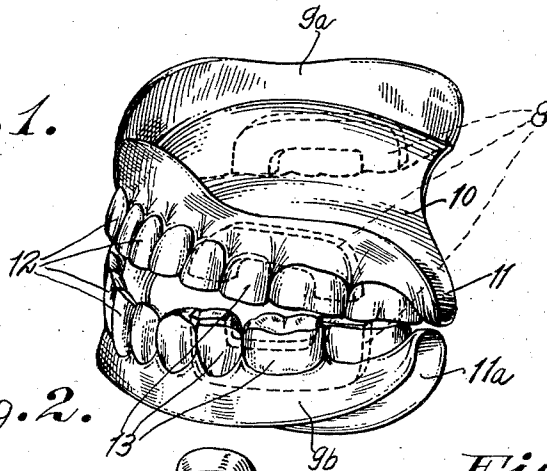


Fig. 2.

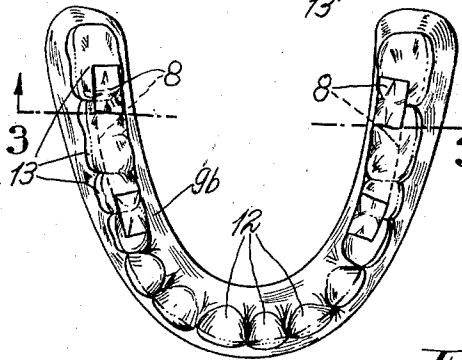


Fig. 3.

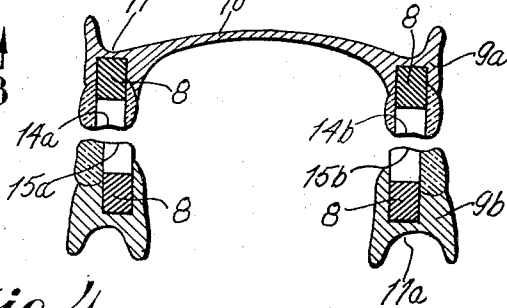


Fig. 4.

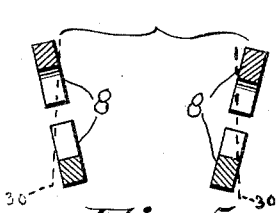
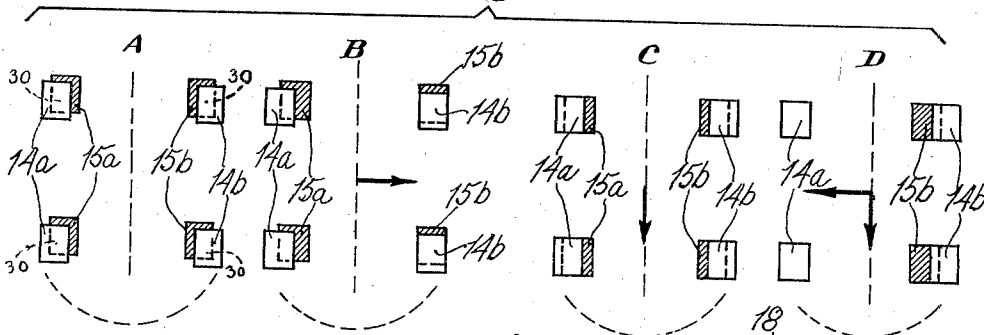


Fig. 5.

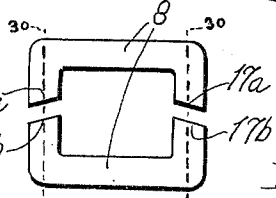


Fig. 6.

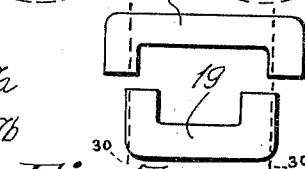


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2,555,403

ARTIFICIAL DENTURES

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15 Claims. (Cl. 32-2)

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This invention relates to improvements in artificial dentures and has particular reference to the type of dentures disclosed in my U. S. Letters Patent No. 2,149,048, dated February 28, 1939.

In said patent there is utilized a magnetic material in dentures in such a manner that the opposed portions thereof tend to repel one another and thus assist in maintaining said dentures in operative position in the wearer's mouth. However, the nutcracker action of the jaws positions the denture plates at various angles relative to each other and, since the lines of force between the magnetic structures tend to be as short as possible, the forces acting on the plates have components anteriorly directed in the mouth, thus tending to force or slide the dentures forward. The lower plate is particularly subject to this forward movement since it is anchored only by the slippery convex or ridge-like structure of the gums alone. Further, the lower plate of the denture also is acted on to dislodge it from its proper position when, as in the actions of mastication, the jaws are laterally offset from the usual position of coincidence of one above the other, and the repulsive forces between the plates tend to have buccal components exaggerating the slippage of the plates on the ridges of the gums.

It is the purpose of this invention to correct the shortcomings of the prior disclosure, and to improve thereon, so that the dentures, when properly fitted in the mouth, will tend to remain more firmly seated on the ridges of the gums, regardless of the position of the jaws, by changing the form of orientation of the magnetic structures therein disposed so that the lines of force between them, when not perpendicular to the dentures, will not have anteriorly directed components, but components directed posteriorly so as to maintain the position of the denture structure without slippage.

The inventive idea involved is capable of receiving a variety of expressions, some of which are shown in the accompanying drawing; it being expressly understood that the structures therein shown are for purposes of illustration only, and are not intended to limit or define the invention in any way, reference being had to the appended claims for that purpose.

In the drawing:

Fig. 1 is a perspective view of a pair of dentures, showing the invention applied thereto;

Fig. 2 is a top plan view of the lower denture, showing the position of the magnetic structure therein;

Fig. 3 is a transverse sectional view of an op-

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posed pair of dentures such as shown in Fig. 1;

Fig. 4 is a diagrammatic top plan view of the magnetic structures contained in said dentures, illustrating how their orientation may be varied, as during mastication;

Fig. 5 is a cross-sectional view, showing another form of magnetic structures wherein the same are angularly disposed instead of perpendicular, as illustrated in Fig. 3;

Fig. 6 is an elevation of another form of magnetic structures in which the pole faces of the opposed magnets are angularly disposed; and

Fig. 7 is an elevation of still another variation in which the opposed magnetic structures are of different sizes.

In carrying out the invention, it is proposed to employ, in the making of the magnets 8, a non-corrosive material which is particularly suited to this invention because of its ability to retain a high degree of magnetism over a long period of time.

The form of the upper and lower dentures, as shown in the drawing, may be accomplished by following any of the preferred techniques established in the art. Thus the plate of the upper denture 9a comprises the usual palatal portion 10 merging at its margin into the base or cavo-structure 11 which receives the ridge of the upper bone structure of the mouth when the denture is in its operative position. The same is true of the lower denture 9b, the corresponding cavo-structure being designated at 11a. The artificial teeth or facings of the dentures comprise the usual types which may be described for purposes of this invention as anterior facings 12 and posterior facings 13, both sets being attached to a plastic or vulcanized rubber base in the customary manner.

Embedded within the plastic portion and projecting into the facings of the dentures are the four magnetic structures 8 arranged in pairs on opposite sides of the mouth and extending from the posterior toward the anterior faces, as shown in Figs. 1 and 2, and with their pole faces exposed and in substantially the same plane as the facings of the artificial teeth.

When the dentures are at rest and in normal position in the mouth, they are in the imbricated relation, as shown at A in Fig. 4, the surfaces 14a, 14b representing the pole faces of the magnets 8 embedded in the opposite sides of the upper denture 9a, while the surfaces 15a, 15b represent the pole faces of the magnet 8 embedded in the opposite sides of the lower denture 9b. The pole

faces 14a, 15a and 14b, 15b are similar magnetic poles and the force between them will be one occasioned by the poles repelling each other, the same acting along the shortest path between them. Since this path, because of the imbrication of the pole faces, is not perpendicular to the latter, it will have components which may be resolved into the faces of the poles and at right angles thereto, and these components will tend to seat the dentures more firmly by forcing the cavo-structures 11, 11a more firmly against the ridges of the gums, and the components at right angles, being directed at right angles and toward each other and being equal in magnitude, will tend to center the dentures within the mouth with respect to each other.

Fig. 4 also represents different positions during the acts of speaking or masticating wherein the lower jaw may have movements which alter the relations of the pole faces by changing the distance and the relative positions therebetween. If the lower jaw swings laterally to the wearer's left (the dotted arcs representing the front of the mouth) the poles 14b, 15b on his left side are brought nearer in line, making the repulsion stronger while the poles 14a, 15a on his right side are moved further apart making the force between them weaker. The result is a force tending to return the plates to a centered position in the mouth by unbalancing the equal and opposite horizontal magnetic components, while the vertical components will tend to keep the cavo-structures 11, 11a of the plates set firmly on the ridge structure of the gums. This condition is illustrated in Fig. 4—B, wherein the described positions of the poles is shown and the direction of the restoring force is opposite to the motion which is illustrated by the arrow. If the lower jaw of the wearer swings to the right, the conditions are reversed but the action remains the same, with the force again tending to center the lower denture.

If the lower jaw moves forwardly, as indicated by the arrow and illustrated by the position of the poles in Fig. 4—C, the force tending to seat the plates firmly on the ridges of the gums becomes a maximum because the pole faces are then directly opposite to each other and the forces act directly in line with said faces to seat the dentures more securely and thus inhibit any tendency of the lower denture to slip out of the mouth.

Fig. 4—D represents the condition in which movements of the mouth have components in both directions, forwardly as well as laterally. In this instance, the plates are again urged to center and engage more firmly on the gums to the end that forward or buccal slipping is inhibited in all cases.

Thus, by having the upper magnets offset laterally and outwardly with respect to the lower ones, the lower denture is allowed to move sideways without a resultant buccal repellent force developing, and forward without a resultant anterior repellent force developing. Further, the magnets 8 co-act to cause a posterior repellent force to hold the plates, and particularly the lower one, in the wearer's mouth, and further co-act to produce an antibuccal repellent force which centers the plates in the mouth of the wearer. When the jaws are at rest, the fact that there is a lack of direct coincidence between the upper and lower pole faces results in the repellent forces between them being less than maximum which is a condition beneficial

to the wearer since the maximum of repulsion is not required under this condition.

In Fig. 5 the positions of the magnets 8 vary from those illustrated in Fig. 3 by the inclination thereof and their arrangement in a downwardly converging relationship. This type of orientation is useful where there is a pronounced difference in the size of the upper and lower plates of the denture and imparts the same effect as the imbrication of the pole faces illustrated in Fig. 4.

In Fig. 6, the parallel pole faces 16a, 16b, as well as the faces 17a, 17b, are angularly disposed and inclined relative to the horizontal in a manner which will tend to make the lower magnet seek to center itself with respect to the upper magnet, giving a result similar to that produced by the imbrication of the pole faces.

Fig. 7 illustrates a similar result by making the upper and lower magnets 18 and 19 different in size. Since the lower magnet 19 is the smaller, it will tend to remain centered with respect to the upper, while the repelling forces act to retain the dentures in place.

In the various embodiments of the invention disclosed and shown herein, it will be evident that each pair of coacting poles can be shown as having a datum which comprises a line passed perpendicularly through the center of a vertical projection of the outlines of the pair of pole faces in normal or centric occlusion. In each embodiment, the denture which tends to have the undesired movements has a smaller quantity of magnetic material, and therefore a smaller quantity of magnetic force on the side or sides of the datum in the direction of the undesired movement than the other denture. Or expressed in another manner, the anchored denture, that is, the one with which the other denture tends to have undesired movements, has a greater quantity of magnetic material, and therefore a greater quantity of magnetic force on the side or sides of the datum in the direction of the undesired movement than has the denture tending to have the undesired movements.

Such a datum line is shown in approximation by the lines 30 in Figures 4a, 5, 6 and 7. In Figure 4a, the lines 30 appear as dots, since the lines are seen end-on.

The use of the particular relationships of the magnets as described herein may also be useful in providing dental appliances with forces which tend to overcome abnormal conditions, such as malocclusions, crooked teeth and the like.

What is claimed is:

1. In combination, two cooperating artificial dentures, the first of which dentures tends to have undesired movements relative to the second denture in the plane which includes anterior-posterior and bucco-lingual movements, and magnetic elements supported by each of said dentures with the pole faces of each element opposing pole faces of like polarity in the other denture, at least one pole face supported by the second denture having a greater quantity of magnetic material with relation to a datum in the direction of the undesired movement than has the corresponding pole face in the first denture, said datum comprising a line passed perpendicularly through the center of a vertical projection of the outlines of the two corresponding pole faces in normal occlusion.

2. In combination, two cooperating artificial

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dentures, and magnetic elements supported by each of said dentures with the pole faces of each element opposing pole faces of like polarity in the other denture, at least one pole face supported by one denture having a greater quantity of magnetic material in the anterior direction with relation to a datum than has the corresponding pole face in the other denture, whereby said other denture is urged posteriorly, said datum comprising a line passed perpendicularly through the center of a vertical projection of the outlines of the two corresponding pole faces in normal occlusion.

3. In combination, two cooperating artificial dentures, and magnetic elements supported by each of said dentures with at least one pole face on each side of each denture and with each pole face opposing a pole face of like polarity in the other denture, the pole face on the left side of the first denture having a greater quantity of magnetic material to the left of a datum than has the corresponding pole face in the second denture, the pole face on the right side of said first denture having a greater quantity of magnetic material to the right of a second datum than has the corresponding pole face in the second denture, whereby buccal movements of said second denture are inhibited, said data comprising lines passed perpendicularly through the centers of the vertical projections of the outlines of each of the left and right pairs of pole faces, respectively, in normal occlusion.

4. The combination set forth in claim 3, said pole faces of said first denture having greater quantities of magnetic material anteriorly of said data than the corresponding pole faces in the second denture, whereby said second denture is urged posteriorly.

5. In combination, two cooperating artificial dentures, and at least one magnetic element supported by each denture with each pole face in one denture in imbricated relation with a pole face of like polarity in the other denture.

6. In combination, two cooperating artificial dentures, and at least one magnetic element supported by each denture with each pole face in one denture in imbricated relation, both anteroposteriorly and bucco-lingually, with a pole face of like polarity in the other denture.

7. In combination, two cooperating artificial dentures, magnetic elements supported by said dentures with the poles in each denture opposed to poles of like polarity in the other denture, said magnetic elements being angularly disposed relative to the vertical with the lines of force of the poles coacting to inhibit both anterior and buccal movements of one denture relative to the other.

8. The combination as set forth in claim 7, said magnetic elements being disposed in non-parallel planes.

9. In combination, two cooperating dental appliances adapted to be worn by a person, at least one magnetic element carried by each appliance with the pole faces in one appliance opposing

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pole faces of like polarity in the other appliance, at least one pole face in the first appliance having a greater quantity of magnetic material in at least one direction with respect to a datum than the corresponding pole face in the second element, whereby said second appliance is urged away from said direction, said datum comprising a line passed perpendicularly through the center of a vertical projection of the outlines of the two corresponding pole faces, in normal relation.

10. In combination, two cooperating dental appliances adapted to be worn by a person, at least one magnetic element carried by each appliance with the pole faces in one appliance opposing pole faces of like polarity in the other appliance, at least one pole face in the first appliance having a greater quantity of magnetic force in at least one direction with respect to a datum than the corresponding pole face in the second appliance, whereby said second appliance is urged away from said direction, said datum comprising a line passed perpendicularly through the center of a vertical projection of the outlines of the two corresponding pole faces, in normal relation.

11. In combination, two cooperating artificial dentures, and at least one magnetic element supported by each denture with each pole face in one denture in off-set relation with a pole face of like polarity in the other denture.

12. In combination, two cooperating artificial dentures, and magnetic elements supported by each denture with at least one pole face in one denture in off-set relation with a pole face of like polarity in the other denture.

13. The combination set forth in claim 1, at least one pair of opposing pole faces being sloped with regard to said datum.

14. The combination set forth in claim 1, in which the magnetic elements of each denture have at least two pole faces positioned, respectively, in anterior and posterior positions, each pair of opposing pole faces being sloped with regard to said datum in a direction opposite to the slope of the other pair.

15. The combination set forth in claim 1, in which the upper denture has on each side a pair of pole faces located, respectively, in anterior and posterior positions, the anterior pole face being sloped at an angle to said datum so as to face rearwardly, the posterior pole face being sloped at an angle to said datum so as to face forwardly, the opposing anterior and posterior pole faces of the lower denture being sloped in the opposite direction to the pole faces of the upper denture.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,149,048	Freedman	Feb. 28, 1939