

Specification of George Davies : artificial teeth.

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A.D. 1862, 11th MARCH. N^o 662.

SPECIFICATION

OF

GEORGE DAVIES.

ARTIFICIAL TEETH.

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A.D. 1862, 11th *MARCH*. N° 662.

Artificial Teeth.

LETTERS PATENT to George Davies, of No. 1, Serle Street, Lincoln's Inn, in the County of Middlesex, and No. 28, St. Enoch Square, in the City of Glasgow, Civil Engineer and Patent Agent, for the Invention of "**IMPROVEMENTS IN ATTACHING ARTIFICIAL TEETH TO PLATES AND TO EACH OTHER, AND IN MOULDS FOR FORMING ARTIFICIAL TEETH.**"—A communication from abroad by Abraham Merritt Asay and Jacob Lambert Asay, both of the City of Philadelphia, Pennsylvania, in the United States of America.

Sealed the 5th September 1862, and dated the 11th March 1862.

PROVISIONAL SPECIFICATION left by the said George Davies at the Office of the Commissioners of Patents, with his Petition, on the 11th March 1862.

I, **GEORGE DAVIES**, of No. 1, Serle Street, Lincoln's Inn, in the County of Middlesex, and No. 28, St. Enoch Square, in the City of Glasgow, Civil Engineer and Patent Agent, do hereby declare the nature of the said Invention for "**IMPROVEMENTS IN ATTACHING ARTIFICIAL TEETH TO PLATES AND TO EACH OTHER, AND IN MOULDS FOR FORMING ARTIFICIAL TEETH,**" to be as follows:—

The first part of this Invention consists in securing artificial teeth to metal plates, by interposing between the said teeth and plates a strip or mass of gum, and vulcanizing or hardening the same after the teeth have been adjusted to the plate, as fully described hereafter. Also in forming dovetailed

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recesses in artificial teeth, substantially as described hereafter, for the purpose of securely attaching the teeth to the plate and to each other, by vulcanizable gum, or any other suitable cement. Also in the use of staples embedded in artificial teeth, as a means of securing the latter to vulcanizable gum plates, in the manner described hereafter.

5

The second part of the Invention consists in making moulds for forming artificial teeth, substantially as described hereafter, so that depressions of any size or shape may be formed in the bases of the teeth. In attaching teeth to a metal plate by means of vulcanizable gum, a plate of the desired form is first prepared by any of the known processes, and at the point where the teeth 10 have to be secured a metal rib is soldered or otherwise secured to the plate. This rib may be plain, but it is preferable to make it thicker on the outer edge than it is at the point where it is secured to the plate, or the rib may be perforated or serrated. In the teeth or block of teeth, as the case may be, is formed a groove or recess to coincide with the rib or projection of the plate, 15 the groove being somewhat larger than the rib and dovetailed, as explained hereafter. A strip or sheet of vulcanizable gum is placed over the rib of the plate, care being taken to keep both the teeth and plate warm. The teeth are now applied to the plate and pressed tightly against the same, so that the rib of the plate may penetrate the groove of the teeth, carrying with it a suffi- 20 cient quantity of gum to make a tight joint, and to fill up all irregularities or interstices. The whole is then placed in a mixture of plaster of Paris and whiting, and the gum subjected to a vulcanizing or hardening process, when the block of teeth will be found to adhere with the required tenacity to the plate, the interstices in the block and between the block and plate being 25 filled with the vulcanized gum, and the joint presenting a smooth and uniform appearance. Instead of using a rib of metal on the plate, the surface of the plate at the point where the block has to be attached may be chipped, serrated, or otherwise roughened for receiving the strip of vulcanizable gum, although the use of the rib is preferable, as it tends to afford, with the gum, a 30 more secure fastening.

In securing the teeth to the plates by the usual process of rivetting or soldering, numerous interstices and angular cavities are formed between the teeth and the plate, and between the teeth themselves. These are packed with a vulcanizable gum, which is subjected to the hardening process after the 35 packing has been properly adjusted, so that all cavities and irregularities are fitted with a durable and immovable packing.

The method of securing artificial teeth to vulcanizable gum plates is as follows:—To a block of (say) three teeth are connected three staples made of

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platina or other wire capable of resisting ordinary heat; heads or notches are formed on the two ends of the wire which compose each staple, and these heads are imbedded in the material of which the teeth are formed; while the said material is in a plastic state, and is being reduced to the desired shape
5 by the ordinary moulds, or otherwise, so that when the teeth are properly baked the heads will render the withdrawal of the staples without breaking the teeth impossible. The staples extend beyond the rear of the teeth, so that the gum while still in a plastic state, and prior to the vulcanizing of the same, may be forced between the rear of the teeth and the bent portion of the
10 staples, the projecting portions of the latter being thus thoroughly imbedded in the gum.

The second part of the Invention, which relates to moulds for forming artificial teeth especially applicable for attachment to plates by vulcanizable gum, is as follows:—In the lower portion or base of the moulds are cut
15 recesses of the desired shape for forming the lingual surface of the teeth. This lower portion of the moulds is cut away or recessed at the opposite ends for the reception of blocks, the latter being inclined at the bottom, and adapted to the inclination of the recesses in which the said blocks can be slid freely to and fro. From the ends of each recess of the lower portion
20 of the mould project small rods, which passing through the blocks serve the double purpose of guiding the latter, and of retaining them in the position to which they have been adjusted. Supplementary blocks or plates are to be placed (under circumstances alluded to hereafter) between the blocks and the ends of each recess of the lower portion of the moulds, these blocks having
25 holes through which pass the projecting rods above mentioned. In the under surface of the upper portion or cap of the mould are cut the depressions for forming the labial surface of the teeth. This portion of the mould is bevilled on the under side and at the opposite ends, and adapted to the bevilled tops of the blocks, which are arched, and adapted to the arched under sides of the
30 bevilled ends of the upper portion of the mould, and this arch is of a shape to correspond with the block of teeth to be formed in the mould.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said George Davies in the Great Seal Patent Office on the 11th September 1862.

35 **TO ALL TO WHOM THESE PRESENTS SHALL COME, I, GEORGE DAVIES, of No. 1, Serle Street, Lincoln's Inn, in the County of Middlesex,**

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and No. 28, St. Enoch Square, in the City of Glasgow, Civil Engineer and Patent Agent, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Eleventh day of March, in the year of our Lord One thousand eight hundred and sixty-two, in the twenty-fifth year of Her reign, 5 did, for Herself, Her heirs and successors, give and grant unto me, the said George Davies, Her special licence that I, the said George Davies, my executors, administrators, and assigns, or such others as I, the said George Davies, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the 10 term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**IMPROVEMENTS IN ATTACHING ARTIFICIAL TEETH TO PLATES AND TO EACH OTHER, AND IN MOULDS FOR FORMING ARTIFICIAL TEETH,**" a communication to me from abroad by Abraham Merritt 15 Asay and Jacob Lambert Asay, both of the City of Philadelphia, Pennsylvania, in the United States of America, upon the condition, amongst others, that I, the said George Davies, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, 20 and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said George Davies, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, 25 to be particularly described and ascertained in and by the following statement in writing, and on reference to the accompanying Drawings, that is to say:—

The first part of this Invention consists in securing artificial teeth to metal plates, by interposing between the said teeth and plates a strip or mass of gum or india-rubber, and vulcanizing or hardening the same after the teeth 30 have been adjusted to the plate, as fully described hereafter. Also in forming dovetailed recesses in artificial teeth, substantially as described hereafter, for the purpose of securely attaching the teeth to the plate and to each other by vulcanizable gum or any other suitable cement. Also in the use of staples embedded in artificial teeth, as a means of securing the latter to vulcanizable 35 gum plates, in the manner described hereafter.

The second part of the Invention consists in making moulds for forming artificial teeth, substantially as described hereafter, so that depressions of any size or shape may be formed in the bases of the teeth. In attaching teeth to

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a metal plate by means of vulcanizable gum, a plate of the desired form is first prepared by any of the known processes, and at the point where the teeth have to be secured a metal rib is soldered or otherwise secured to the plate. This rib may be plain, but is preferable to make it thicker on the outer edge
5 than it is at the point where it is secured to the plate, or the rib may be perforated or serrated. In the teeth, or block of teeth, as the case may be, is formed a groove or recess to coincide with the rib or projection of the plate, the groove being somewhat larger than the rib and dovetailed, as explained hereafter. A strip or sheet of vulcanizable gum is placed over the rib of the
10 plate, care being taken to keep both the teeth and plate warm. The teeth are now applied to the plate and pressed tightly against the same, so that the rib of the plate may penetrate the groove of the teeth, carrying with it a sufficient quantity of gum to make a tight joint, and to fill up all irregularities or interstices. The whole is then placed in a mixture of plaster of Paris and
15 whiting, and the gum subjected to a vulcanizing or hardening process, when the block of teeth will be found to adhere with the required tenacity to the plate, the interstices in the block and between the block and plate being filled with the vulcanized gum, and the joint presenting a smooth and uniform appearance. Instead of using a rib of metal on the plate, the surface of the
20 plate at the point where the block has to be attached may be chipped, serrated, or otherwise roughened for receiving the strip of vulcanizable gum, although the use of the rib is preferable, as it tends to afford, with the gum, a more secure fastening.

In securing the teeth to the plates by the usual process of rivetting or
25 soldering, numerous interstices and angular cavities are formed between the teeth and the plate, and between the teeth themselves. These are packed with a vulcanizable gum, which is subjected to the hardening process after the packing has been properly adjusted, so that all cavities and irregularities are fitted with a durable and immovable packing.

30 Such being the nature and object of the said Invention for "Improvements in Attaching Artificial Teeth to Plates and to each other, and in Moulds for forming Artificial Teeth," I will now proceed to describe more in detail the manner in which the same is to be or may be performed or carried into practical effect; & in order that the same may be distinctly understood, I
35 have annexed hereunto a Sheet of Drawings illustrative thereof, and have marked the same with figures and letters of reference corresponding with those in the following explanation thereof, that it to say:—

In the accompanying Drawing, Figure 1 is a plan view of the plate, with some of the teeth secured to the same; Figure 2, a transverse section on the

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line 1, 2, Figure 1; Figure 3, a transverse section on the line 3, 4, Figure 1; Figures 4, 5, and 6, sectional views illustrating modifications of the improvements.

A is a plate prepared in the usual manner, and near the edge of this plate, at the point where the teeth have to be secured, is attached a rib or projection 5. α , which is serrated or perforated with a number of holes as seen in Figure 2. In the present instance the teeth to be attached to the plate are made in sections, each section having one, two, or three teeth, and having a dovetailed recess, seen in Figure 3, for receiving the perforated or serrated rib α , the said recess being somewhat wider than the rib. At the end of each section of 10 teeth another recess communicating with the above-mentioned recesses is formed, so that at the point where two sections meet the end recesses of one will coincide with that of the other, the two recesses forming a dovetailed chamber shown at x , Figure 2. In securing the teeth to the plate any vulcanizable gum may be used as a cement, the gum being deposited while in 15 a plastic state in the recesses of the sections, as well as in the dovetailed chambers x , formed between the sections. A strip of the same material is also placed on the plate at the points where the teeth have to be secured. The blocks are held in their proper position during the process of vulcanizing the gum by means of plaster of Paris and whiting, after which they will be securely 20 attached to the plate as well as to each other, inasmuch as the gum penetrating the perforations or serrations of the rib α , effectually confines the latter to the dovetailed recesses of the blocks of teeth, and at the same time the hardened gum having penetrated the dovetailed chamber x renders the removal of one block without disturbing the whole almost impossible. In place of 25 vulcanizable gum any silicious or other cement, capable of being reduced to a plastic or fluid state, and subsequently hardened, may be advantageously used; and in place of the rib α , a simple perforated, notched, or serrated projection y , Figure 5, is used, the projection being soldered or otherwise secured to the plate, one of these projections being situated at the point where two sections 30 meet each other, and one or more between these points, as seen in Figure 4, and dovetailed recesses being formed in the sections for the reception of these projections, and the cement being deposited in these recesses. It will be evident that the result as regards the securing of the teeth to the plate and to each other will be precisely the same as that above described in reference 35 to Figures 1, 2, and 3. Occasionally it may be necessary to secure a single tooth instead of a section to the plate, in which case a single recess in the tooth and one projection on the plate, as seen in Figure 6, are adopted. The method of securing artificial teeth to vulcanizable gum plates is illustrated in

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Figures 7, 8, and 9. Figure 7, representing the inside view of a block of artificial teeth with the staples; Figure 8, a sectional plan on the line 5, 6; Figure 9, a transverse section, with a modified arrangement of staples. E represents a block of three teeth, to which are connected the two staples *e, e*, made of platina or other wire capable of resisting ordinary heat, the form of the staples being shown in Figure 8; heads or notches are formed on the two ends of the wire which compose each staple, and these heads are imbedded in the material of which the teeth are formed, while the said material is in a plastic state, and is being reduced to the desired shape by the ordinary moulds or otherwise, so that when the teeth are properly baked, the heads will render the withdrawal of the staples without breaking the teeth impossible. It will be seen that the staples extend beyond the rear of the teeth, so that the gum while still in a plastic state, and prior to the vulcanizing of the same, may be forced between the rear of the teeth and the bent portion of the staples, the projecting portions of the latter being thus thoroughly imbedded in the gum. After the latter has been vulcanized by the usual process, and thereby reduced to the well known tough and hard state, it will be impossible to detach the teeth from the gum plate without tearing or disintegrating the latter or breaking the staples or teeth, the projecting portions of which are imbedded in, surrounded, and held by the vulcanizable gum. In some cases the staples may be attached to the teeth in the manner shown in Figure 9, where a mass of vulcanizable gum is secured to a plate A, and the staple imbedded in that gum, which thus forms the rear of the teeth; in fact, the disposal and number of staples used will in a great measure depend upon the form and size of the teeth or the extent of the block of teeth.

The second part of the Invention which relates to moulds for forming artificial teeth, especially applicable for attachment to plates by vulcanizable gum, is illustrated by Figures 10, 11, 12, and 13; Figure 10 being a side view partly in section of the improved moulds; Figure 11, a plan view with the upper portion of the mould removed. Figure 12, an end view; Figure 13, detached views of part of the improved mould.

A is the lower portion or base of the moulds, in which are cut recesses *a, a*, of the desired shape for forming the lingual surface of the teeth. This lower portion A of the moulds is cut away or recessed at the opposite ends for the reception of the blocks B, B, the latter being inclined at the bottom and adapted to the inclination of the recesses in which the said blocks can be slidden freely to and fro. From the ends of each recess of the lower portion of the mould project the rods *x*, which passing through the blocks B, B, serve the double purpose of guiding the latter, and with the pins *t, t*, of retaining them in the

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position to which they have been adjusted. C, C, are supplementary blocks or plates to be placed (under circumstances alluded to hereafter) between the blocks B and the ends of each recess of the lower portion of the moulds, these blocks having holes thro' which pass the projecting rods *x, x*. D is the upper portion or cap of the mould, into the under surface of which are cut 5 the depressions for forming the labial surface of the teeth. This portion D of the mould is bevilled on the under side and at the opposite ends, as seen at *y, y*, Figure 10, and adapted to the bevilled tops of the blocks B, which, as seen in the end view, Figure 12, are arched and adapted to the arched under sides of the bevilled ends of the upper portion of the mould, and this arch is 10 of a shape to correspond to the block of teeth to be formed in the mould. Through openings in the pieces B project pins *c, c*, the use of which will be more fully explained hereafter.

Supposing that the parts of the mould are in the relative position shown in the Drawing, the supplementary pieces C, C, having been removed from one 15 end of the mould, the material of which the teeth are to be formed is introduced in a plastic state into the lower portion of the mould, over which is fitted the cap D; pressure is then applied until the upper and lower portion of the mould are brought into contact with each other, the material being thus forced into every portion of the mould, while all excess of the material is pressed out at 20 the sides. The pins *c* are then introduced, and pushed forward until their heads come in contact with the end of the block B. After the mould has been subjected to a heat sufficient to evaporate all the moisture from the material, the pins *c* and *t* are removed, the pieces B and C slid away, after which the two parts A and D of the mould can be separated, and the com- 25 pleted block of teeth readily removed.

On reference to Figures 10 and 11, it will be seen that that the pieces B have a rounded projection *m*, which makes a depression along the whole length of the base of the block of teeth, so that the latter could not be withdrawn from the mould without first drawing away the pieces B. In ordinary moulds 30 which are formed of but two pieces, it is necessary to make the bases of the block of teeth either bevilled or slightly curved, as seen in Figure 14, in order that they may be removed from the mould.

The advantages of the pieces B, B, will be apparent when it is considered that the blocks of teeth procured at the wholesale manufacturers are of the 35 form shown in Figure 14, and that it is necessary to grind away a portion of the block until it assumes the form shown in Figure 15, an operation requiring nice and tedious manipulation.

In extensive establishments for the manufacture of artificial teeth, a new

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mould is required for every different size of block, and in many cases this difference in size is demanded by an increase in or diminution of the length of the gum, without any necessity for altering the shape of the teeth.

By sliding back the pieces B, B, and introducing pieces C, C, blocks of 5 teeth of any required size may be cast from one mould, so far as the length of the gum is concerned, while the recess for fitting over the alveolar process on the plate may be made of any required shape by making the projecting portion *m* of the piece B of the desired form.

After the blocks are taken from the moulds, in which condition they are 10 very fragile, it is necessary to drill holes perpendicular to the base, through which rivets may be passed to secure them to the plate. To prevent the risk of cracking the teeth incurred by this operation, we form the desired holes by introducing into the material in its plastic state the pins *e, e*, which remain until the block is hard enough to be removed from the mould, when 15 they are withdrawn. This method of lengthening the bases and forming the depressions at the base may be also applied to single teeth as well as to those cast in blocks of two or more. The supplementary pieces C, C, may be dispensed with, and the blocks B, B, rendered adjustable by means other than those described.

20 Figure 16 represents a section, Figure 17 a plan view, and Figure 18 an end view of a modification of the above, wherein the supplementary blocks C, C, are dispensed with.

Having now described the nature and object of the said Invention for "Improvements in Attaching Artificial Teeth to Plates, and to each other, 25 and in Moulds for Forming Artificial Teeth," together with the manner in which the same is to be or may be performed or carried into practical effect, I would remark, in conclusion, that I claim as the Invention communicated to me by the aforesaid Abraham Merritt Asay and Jacob Lambert Asay,—

30 Firstly, fastening artificial teeth to metallic plates by interposing between the said teeth and plate a strip of vulcanizable gum, and vulcanizing or hardening the same after the teeth have been adjusted to the plate, as herein set forth.

Secondly, packing with vulcanizable gum the interstices between the teeth 35 and plate, or between the teeth themselves, where the latter are secured to the plate by rivetting or any other of the usual modes, and vulcanizing or hardening the packing after it has been adjusted as specified.

Thirdly, dovetailed recesses formed in artificial or blocks of artificial teeth, in combination with perforated, serrated, or notched ribs or projections on the

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plate, so that the teeth may be firmly secured to the plate through the intervention of vulcanizable gum, or any silicious or other suitable cement, as herein set forth.

Fourthly, forming in artificial teeth, or blocks of teeth at the point where they meet each other, dovetailed recesses of such a form that vulcanizable gum or other cement introduced into the said recesses will prevent the separation of said teeth or said blocks from each other as specified.

Fifthly, the use of staples imbedded in artificial teeth as a means of securing the same to vulcanized gum plates, or to masses of vulcanizable gum attached to metal plates as described.

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Sixthly, so constructing moulds for artificial teeth, that by means of the adjustable pieces B, B, blocks of teeth of any required depth of gum may be formed in the same mould.

Seventhly, the use of a moveable piece B with its projection *m* for the purpose of forming a depression of any required form in the base of the block of teeth.

Eighthly, the combination of the base A and cap D of the mould with the moveable pieces B, guide rods *x*, and pins *e*, the whole being arranged substantially as and for the purpose set forth.

And, ninthly, I claim the modification of the above exhibited in Figures 16, 17, and 18, or any other mere modification thereof, constructed and operating in substantially the same manner.

In witness whereof, I, the said George Davies, have hereunto set my hand and seal, this Eleventh day of September, in the year of our Lord One thousand eight hundred and sixty-two.

25

GEORGE DAVIES. (L.S.)

LONDON:

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