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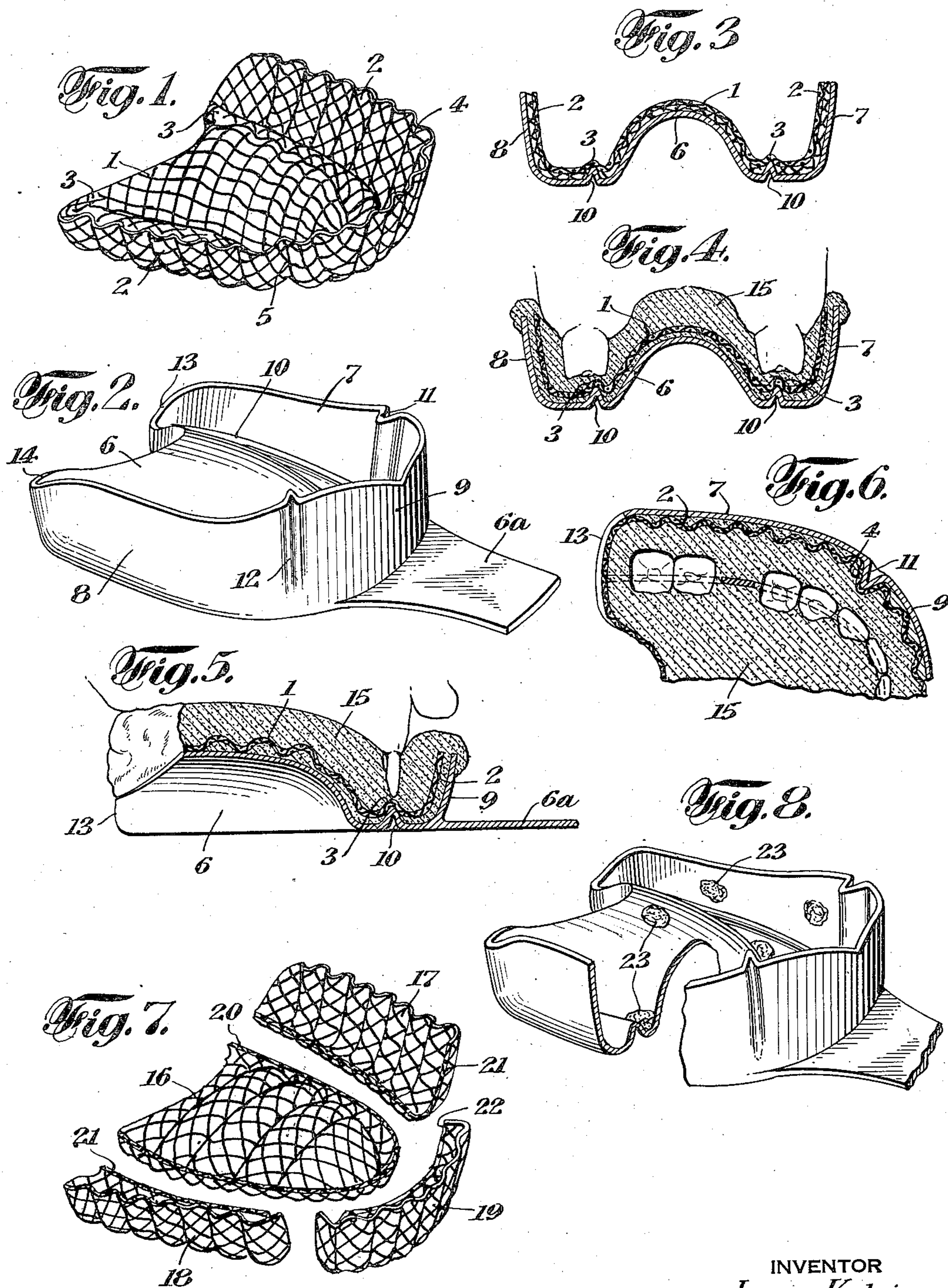
L. KALVIN

2,011,860

DENTAL IMPRESSION REENFORCEMENT TRAYS

Filed Oct. 18, 1932

3 Sheets-Sheet 1



INVENTOR
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Aug. 20, 1935.

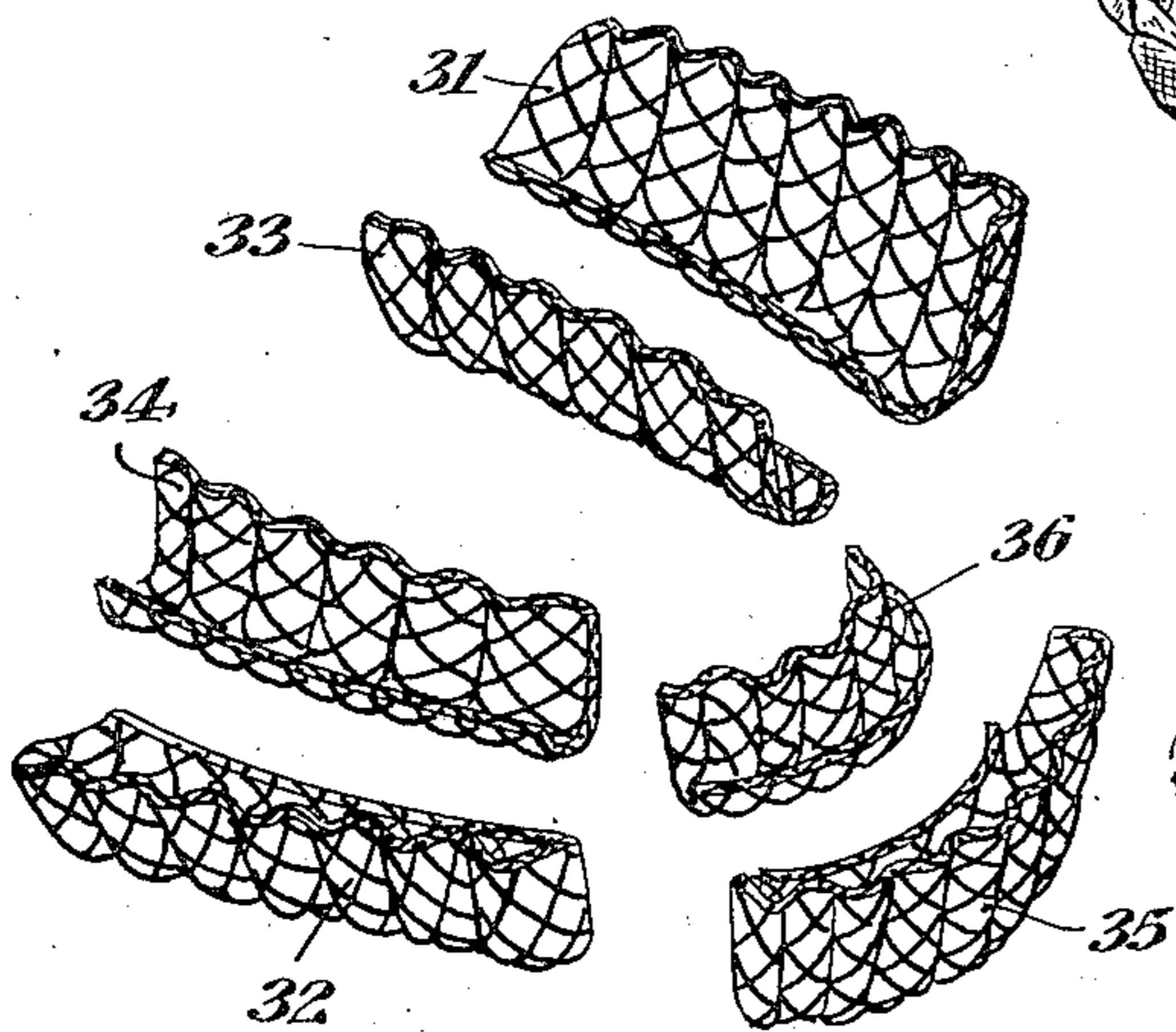
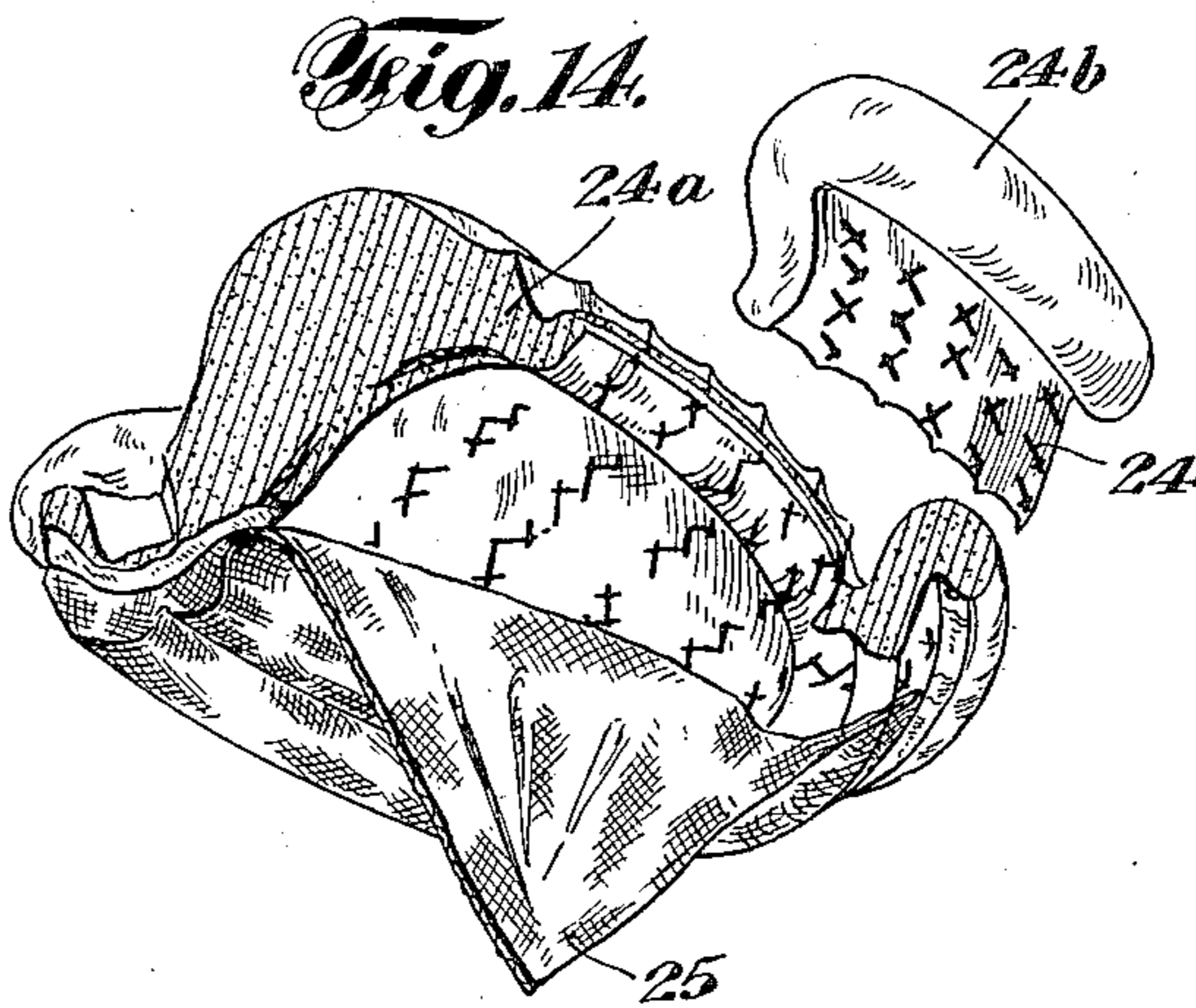
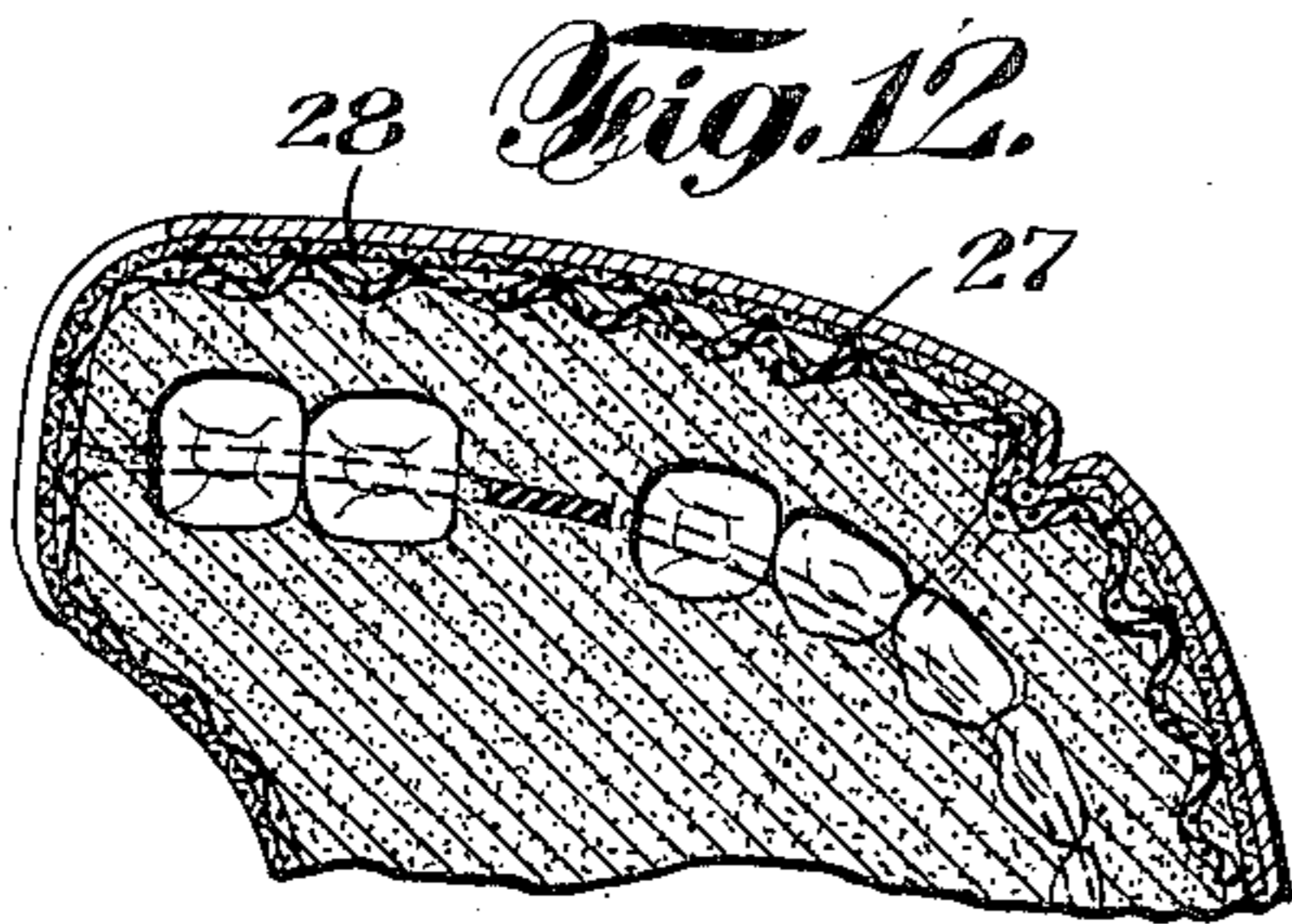
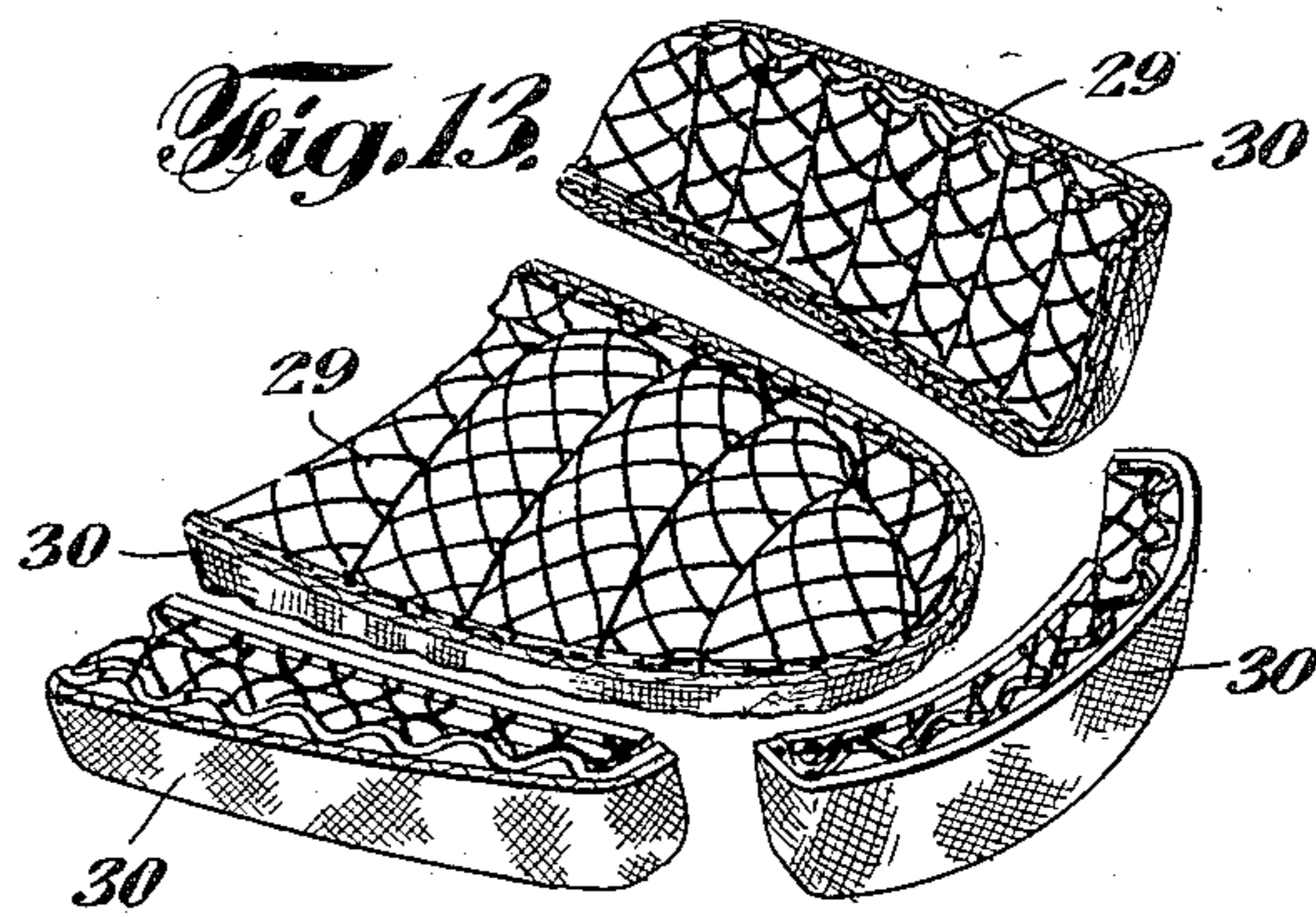
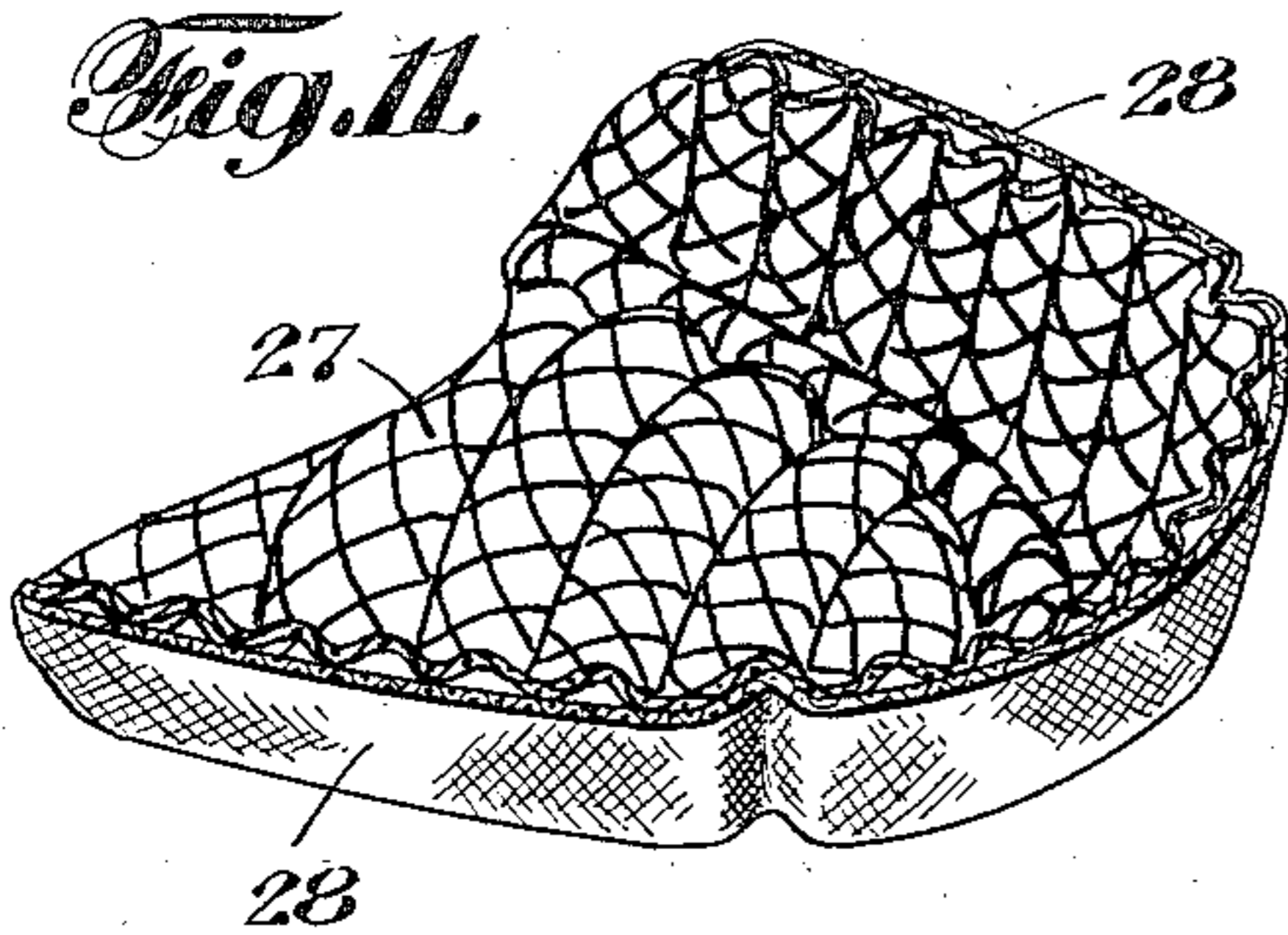
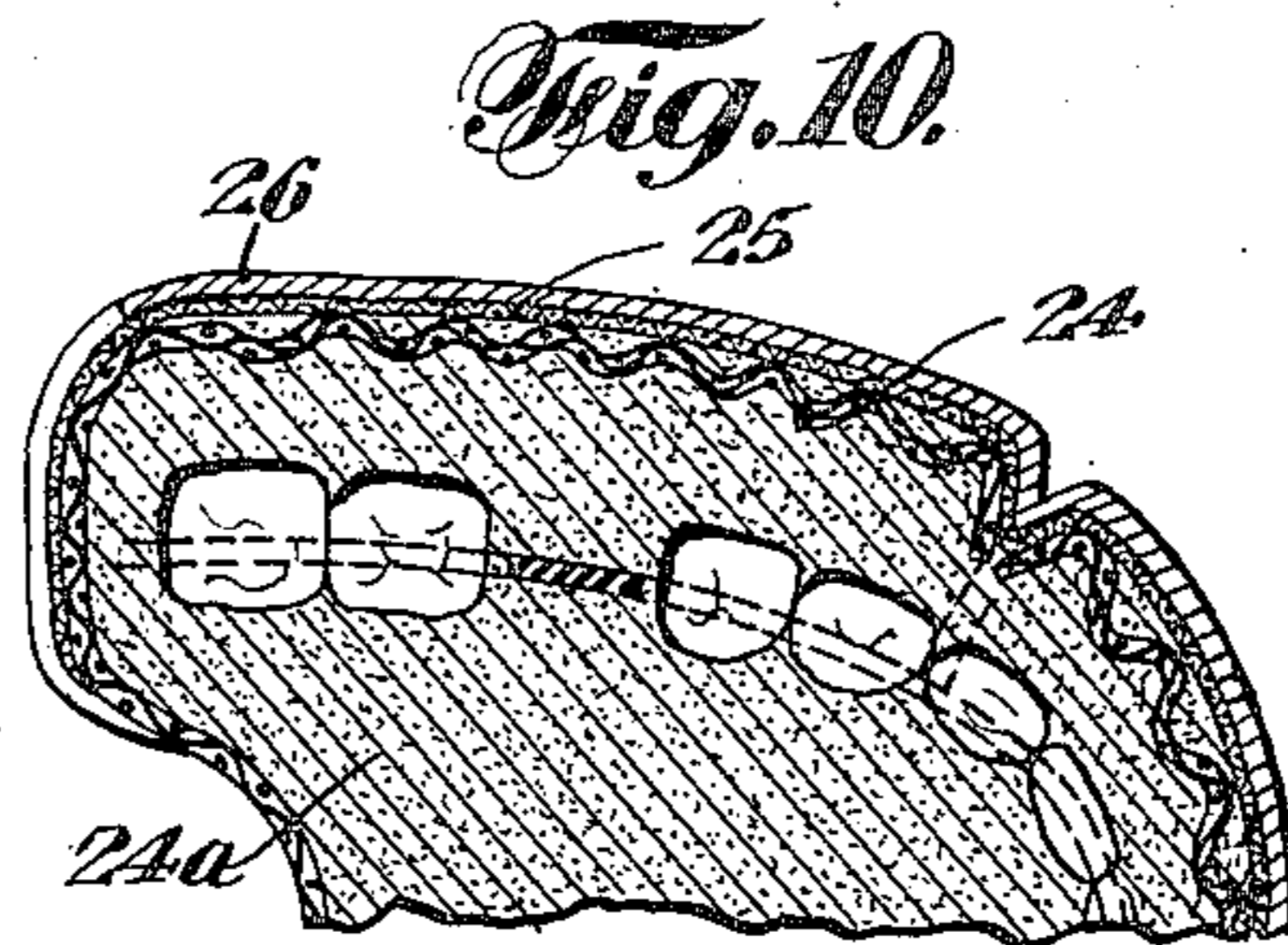
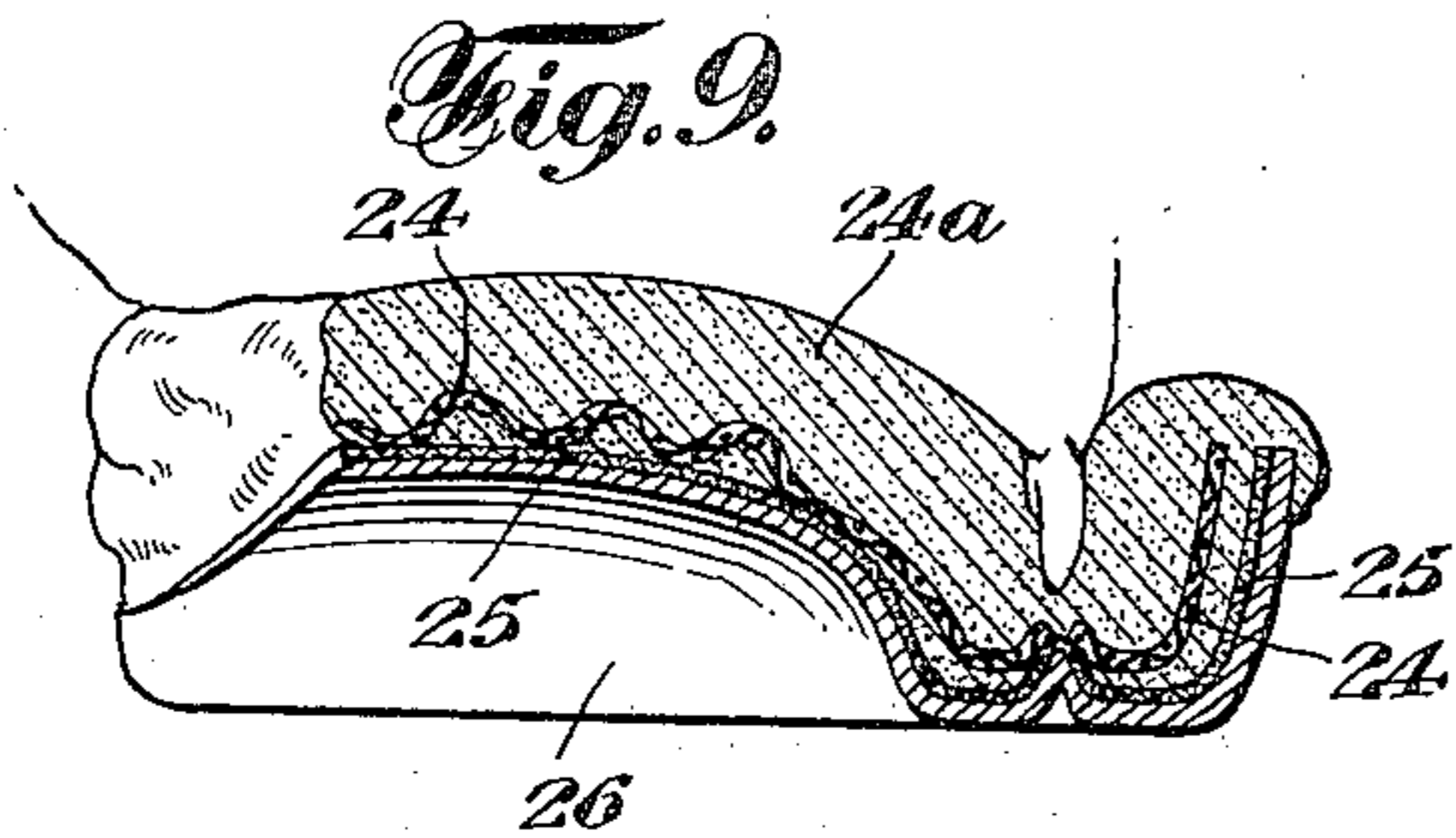
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2,011,860

DENTAL IMPRESSION REENFORCEMENT TRAYS

Filed Oct. 18, 1932

3 Sheets-Sheet 2



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DENTAL IMPRESSION REINFORCEMENT TRAYS

Filed Oct. 18, 1932

3 Sheets-Sheet 3

Fig. 16.

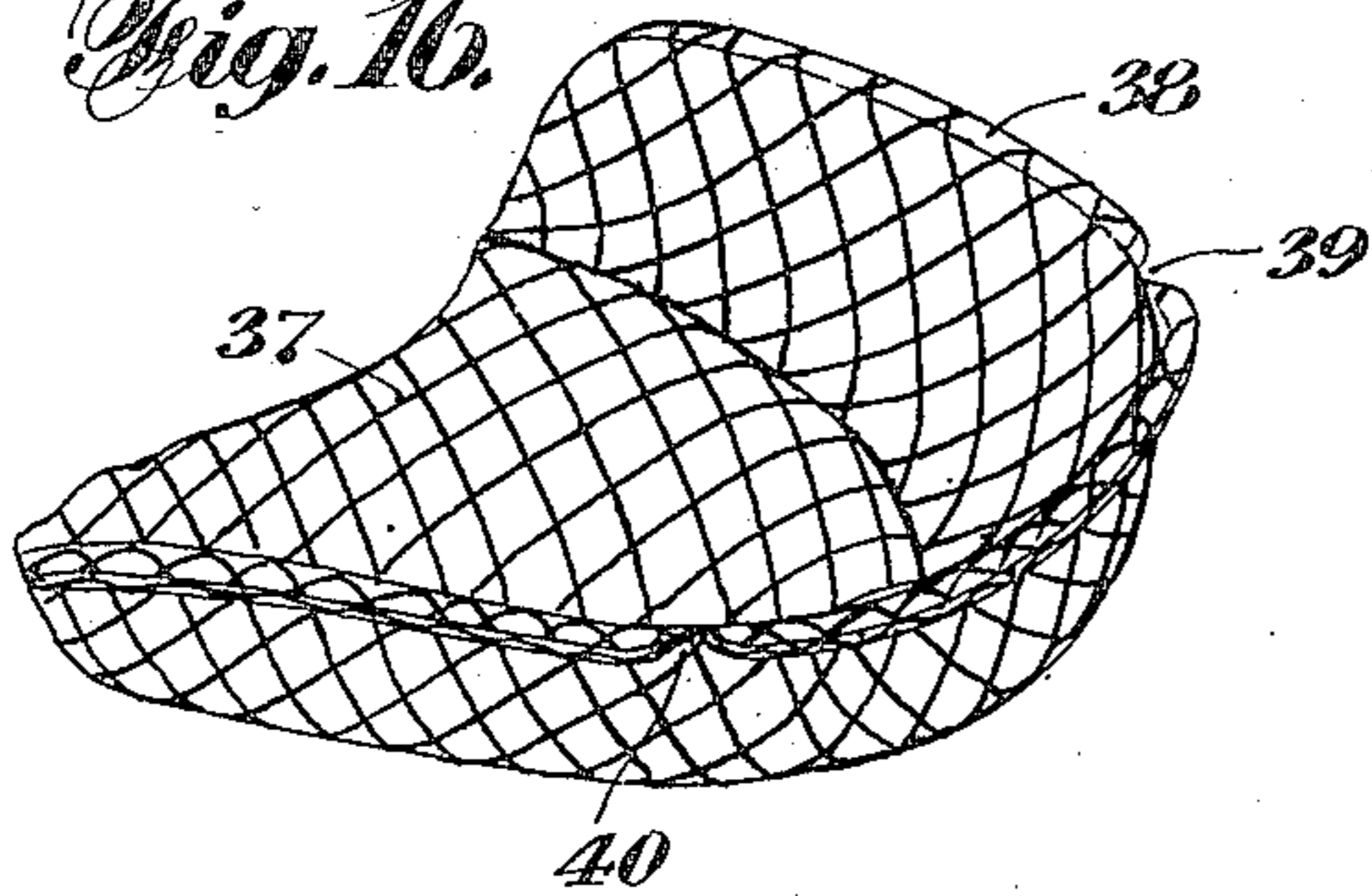


Fig. 17.

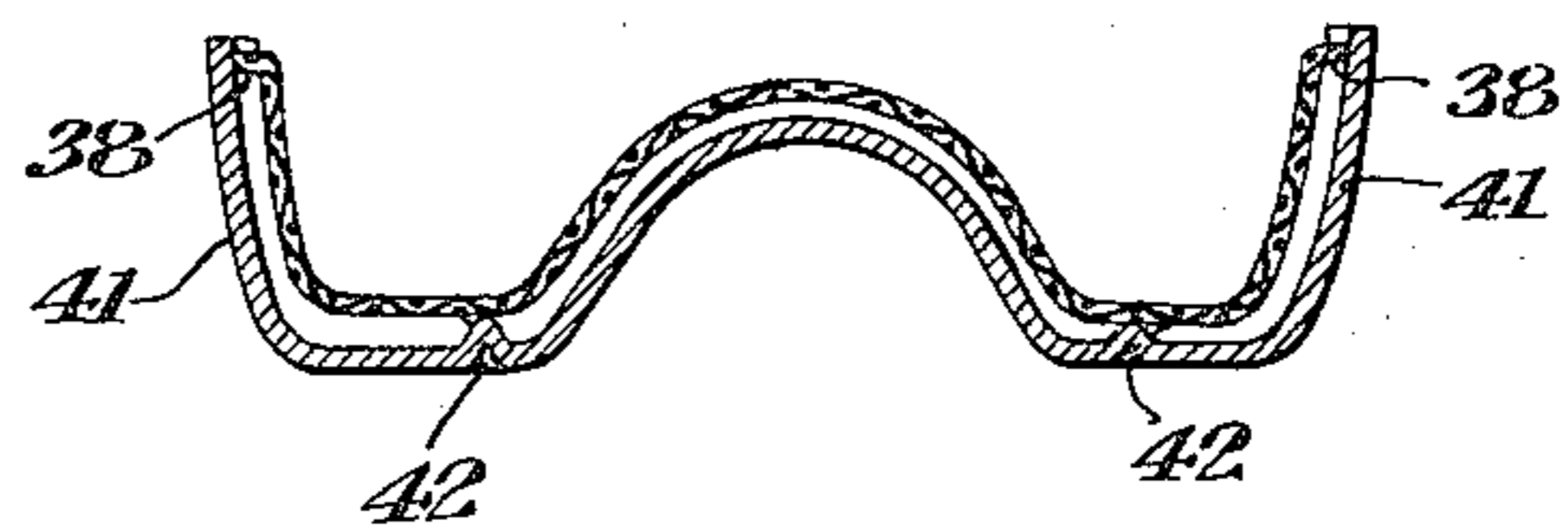


Fig. 18.

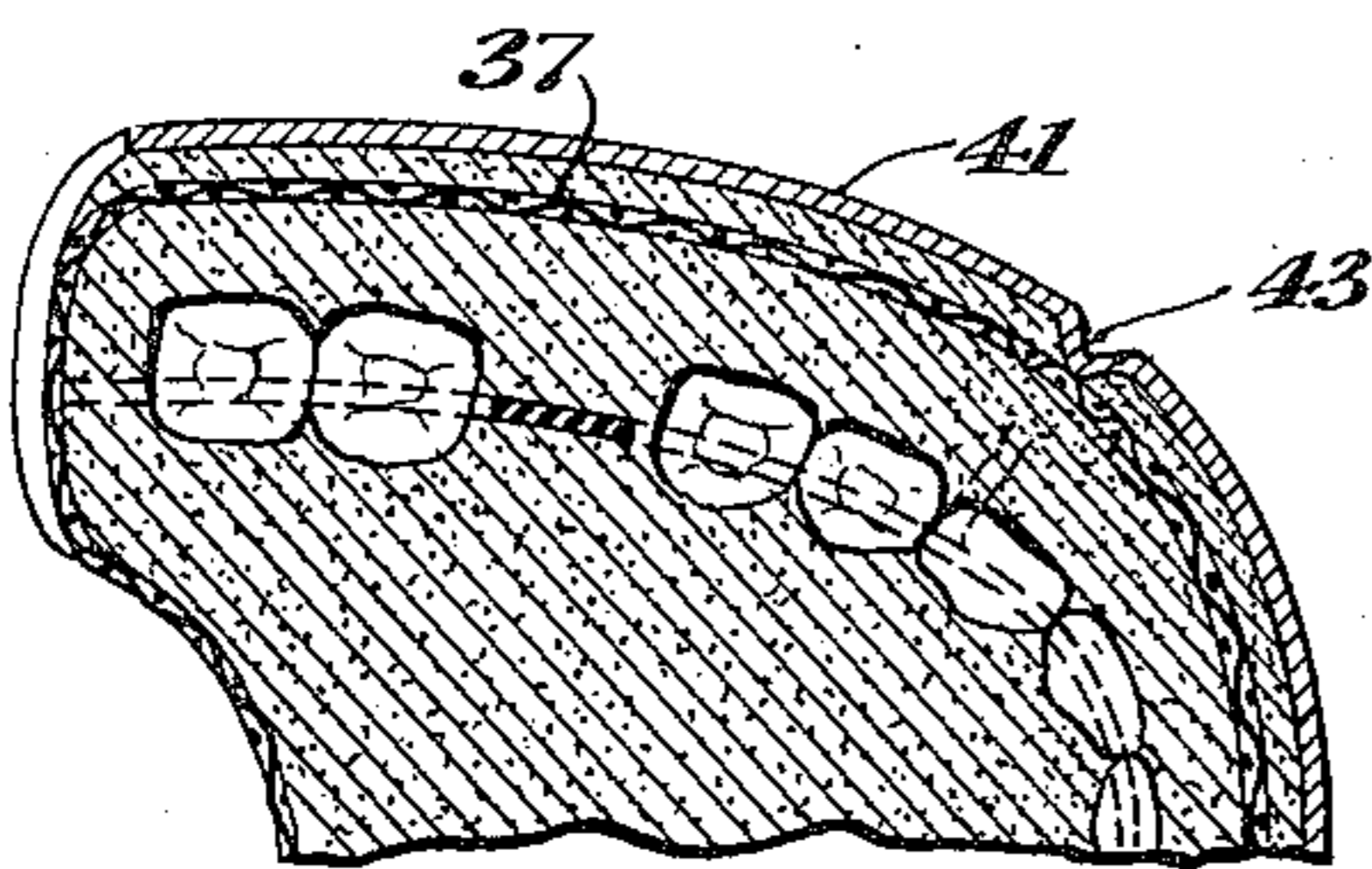


Fig. 19.

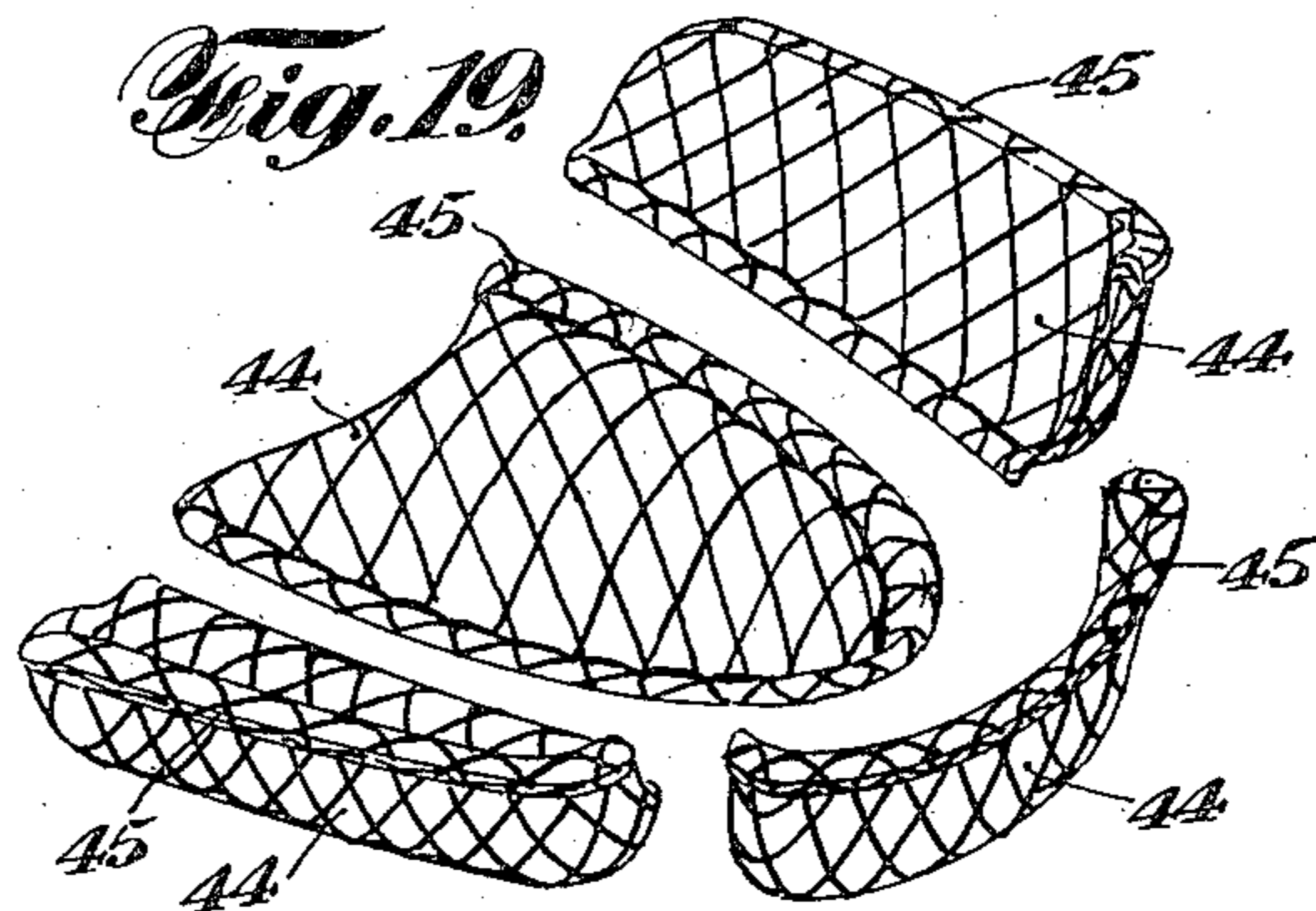


Fig. 20.

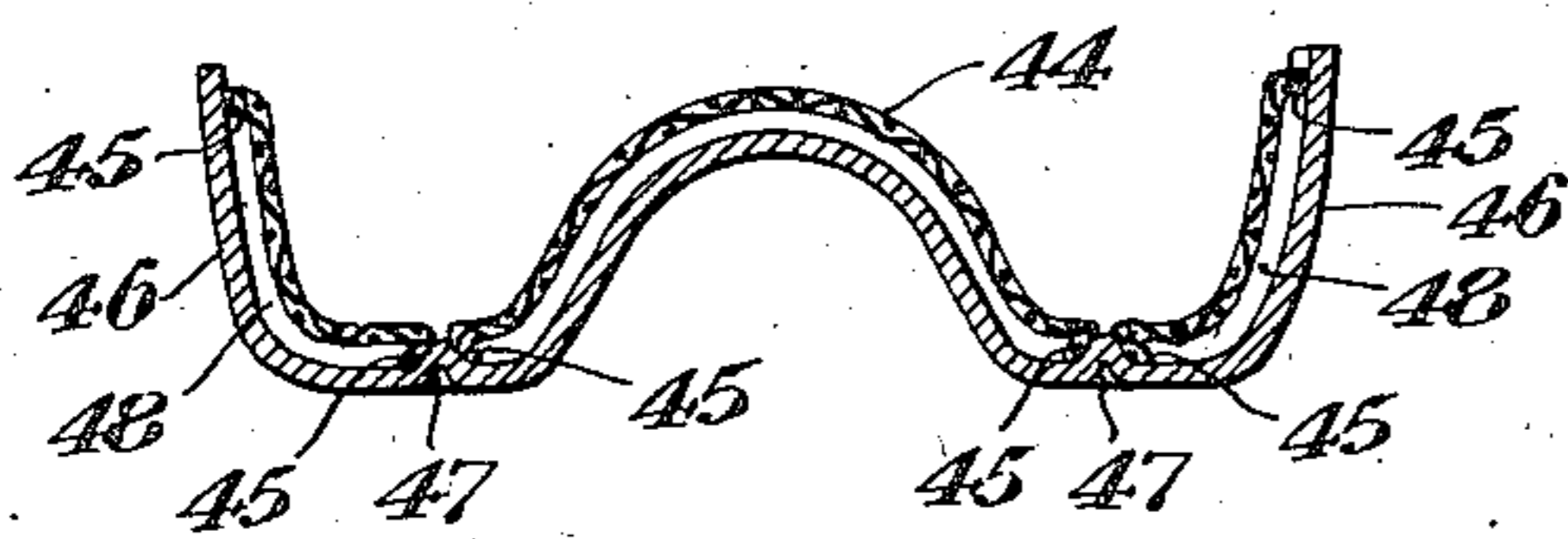


Fig. 21.

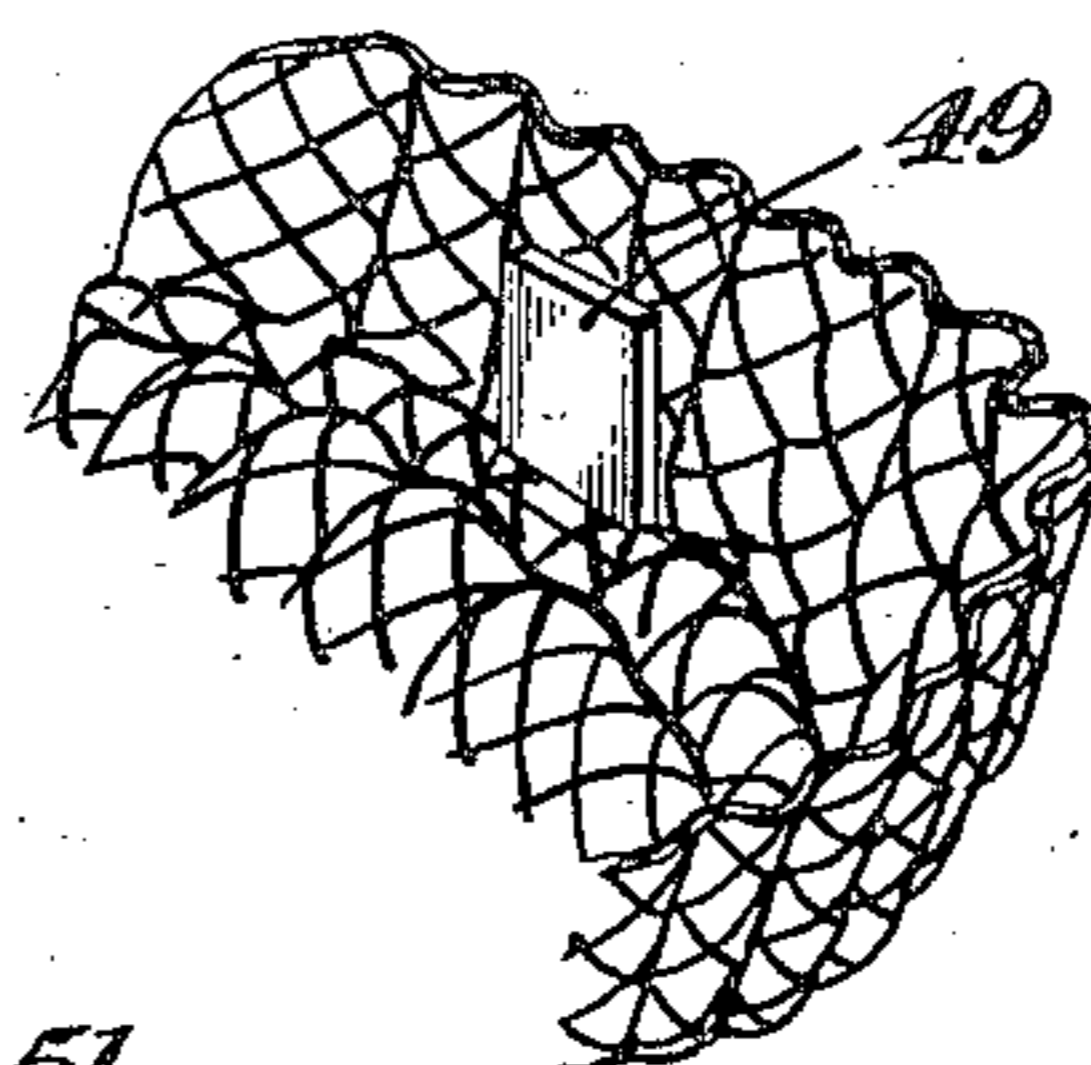
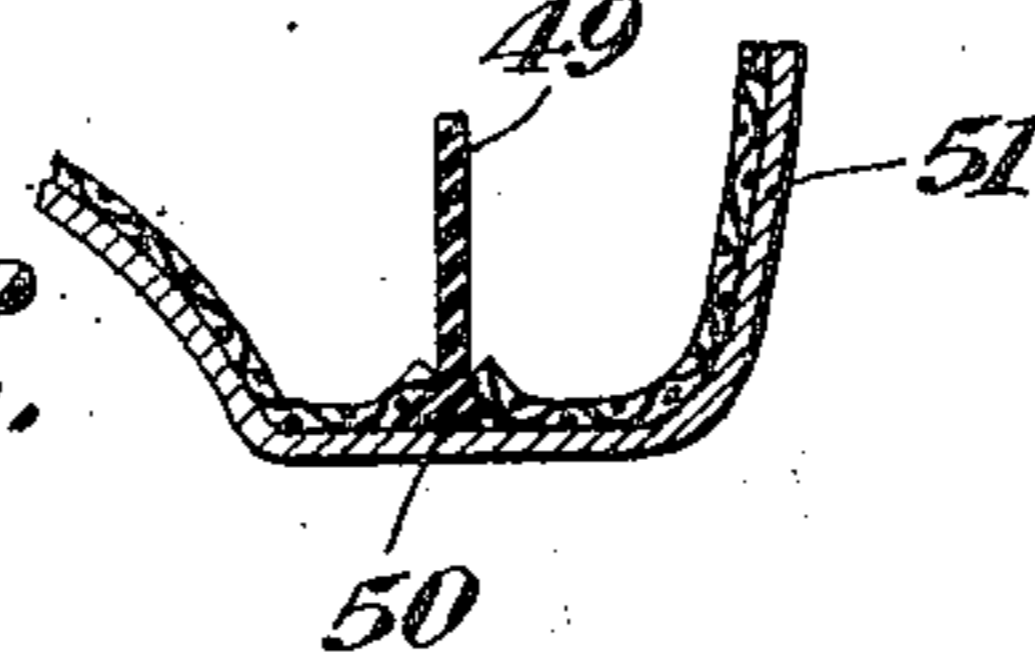


Fig. 22.



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UNITED STATES PATENT OFFICE

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DENTAL IMPRESSION REINFORCEMENT
TRAY

Louis Kalvin, New York, N. Y.

Application October 18, 1932, Serial No. 638,310

10 Claims. (Cl. 32—18)

This invention relates to trays for bonding and reinforcing dental impressions which are to be made in plaster, modeling compound, or other plastic material.

5 The present application is a continuation in part of my prior application, Serial No. 551,869, filed July 20, 1931.

10 An important object of the invention is to improve the practice with regard to making dental impressions so as to render the results more dependable.

15 In the ordinary process of making dental impressions of, for example, plaster of Paris, the plaster is mixed with water, then poured into a supporting tray of metal or other suitable material, the tray containing the plaster being inserted into the patient's mouth and pressed against the teeth and gums while the plaster is still wet and fluid, then held in place under
20 suitable pressure while the partial setting of the plaster occurs, whereupon the supporting tray is freed by tapping or the like from the partially set plaster and the plaster left in place until it has completely set.

25 The impression is then broken into several pieces along uncertain and irregular lines so as to admit of its removal. The making of the impression is frequently the cause of great discomfort to the patient, and the result is often a failure, so that the entire operation has to be repeated. It is not uncommon for three or four failures to occur before a satisfactory impression is finally obtained.

30 One of the principal causes for failure in the ordinary practice is the breaking of the impression into so many pieces, or the crumbling of the edges of the pieces to such an extent as to preclude the making of a good cast from the impression.

35 In accordance with my invention I ensure the parting of the impression on predetermined parting lines so as to always separate the impression into a definite number of pieces, each piece being reinforced or bonded to avoid crumbling or injury. At the same time, the bonding and reinforcing tray, in accordance with my invention, facilitates the removal of the metal supporting tray when the plaster has partially set.

40 In principle, the bonding and reinforcement tray of my present invention comprises a body formed with floor and flange members to more or less closely fit the proper size of supporting tray and to provide a pouring space for the impression material. The bonding and reinforcement tray is made preferably of stiff, corrugated,
45

open-work or mesh material, through the spaces of which the fluid or plastic impression material can flow, and with which the impression material becomes adherent when set, so that a firm keying of the latter to the bonding tray occurs. To facilitate the separation of the impression into a predetermined number of pieces on definite and certain parting lines, the bonding and reinforcement tray may be provided with parting partition ridges which project into the pouring space and are backed with an impervious backing so that the resulting impression is weakened on these lines. Such impervious backing may be provided by the temporary supporting metal tray, or by an outer ply of closely woven fabric, temporarily or permanently secured to the open-mesh reinforcement tray. In one of the preferred forms of the invention, the open-mesh tray is in sections or segments registering with each other along these parting partition lines or ridges, such segments being properly positioned in an outer layer of impervious, closely woven fabric, to which the segments are normally firmly adherent on the contacting lines of their corrugations, but which become separable therefrom under the influence of moisture or heat present in the plaster during the process of setting, so that the impervious outer layer may be stripped from the reinforcement segments when the impression has set, and thus enable the impression to be broken along the definite parting partition lines or ridges without the necessity of severing the reinforcement tray.

Several embodiments of the invention are illustrated by way of example in the accompanying drawings, in which

Figure 1 is a perspective view of a reinforcement tray comprising a single layer of corrugated, open-mesh material.

Figure 2 is a perspective view of a metal supporting tray which may be used as a backing for the reinforcement tray shown in Figure 1.

Figure 3 is a cross-section of the reinforcement tray and supporting tray, shown in Figures 1 and 2 respectively.

Figure 4 is a similar view, with the impression material in place at the time of making an impression.

Figure 5 is a longitudinal section of the same.

Figure 6 is a horizontal fragmentary section of the same.

Figure 7 is a perspective view of a single layer reinforcement tray formed in separate sections or segments.

Figure 8 is a perspective view of a metal supporting tray for the reenforcement tray, shown in Figure 7.

Figure 9 is a longitudinal section of a segmentary reenforcement tray with an impervious backing layer, shown in a metal supporting tray during the taking of an impression.

Figure 10 is a horizontal fragmentary section of the same.

Figure 11 is a perspective view of a one-piece reenforcement tray provided with a one-piece impervious backing.

Figure 12 is a horizontal fragmentary section of the same with the impression therein.

Figure 13 is a perspective view of a segmentary reenforcement tray, each segment of which is provided with an impervious backing layer.

Figure 14 is a perspective view with parts in section, of a formed impression having the reenforcement tray embedded therein, with an outer impervious backing layer, such as shown in Figures 9 to 12 inclusive, being removed, and one of the segments of the impression or cast having been parted.

Figure 15 is a perspective view of a segmentary reenforcement tray for use in making lower impressions.

Figure 16 is a perspective view of a one-piece reenforcement tray of uncorrugated material provided with a peripheral flange to space it from its supporting tray in use.

Figure 17 is a cross-section of the same as positioned in a supporting tray.

Figure 18 is a fragmentary horizontal section through an impression employing a tray of the type shown in Figures 16 and 17.

Figure 19 is a perspective view of a segmentary reenforcement tray of uncorrugated material provided with peripheral flanges to space the segments from the supporting tray.

Figure 20 is a cross-section of the parts shown in Figure 19, as positioned in the supporting tray.

Figure 21 is a detail perspective view of one of the forms of reenforcement trays having a parting fin inserted in the parting partition ridge.

Figure 22 is a cross-section of the same with the parts mounted in a supporting tray.

The underlying principles of the invention are applicable to the production of either upper or lower dental impressions, and it is believed the examples illustrated will be sufficient to enable those skilled in the art to understand and practice the invention in making both upper and lower impressions.

In Figure 1 the reenforcement tray is illustrated as comprising a single piece of open mesh fabric such as stiff and rather heavy buckram. This material may be moistened and pressed into shape in hot dies of suitable configuration so as to provide a floor portion 1 with a flange 2 extending around the sides and front, with a horizontal parting partition ridge 3 following the line of intersection between the flange and floor portions and with two vertical parting partition ridges 4, 5 between the front and side walls or flanges. This reenforcement is rather deeply corrugated so that when placed in a supporting tray such as illustrated in Figure 2, it will provide flow spaces between the inner corrugations and the supporting tray in order that the plaster or the like may almost completely enclose the reenforcement prior to setting. The supporting tray illustrated in Figure 2 comprises a floor portion 6 with side flanges 7, 8 and front flange 9 with a horizontal parting partition ridge 10 extending around the

line of intersection between the side and front flanges and the floor portion, and vertical parting partition ridges 11, 12 between the front flange and the respective side flanges 7 and 8. The side flanges 7 and 8 have rear walls 13 and 14, which merge into the rear arch of the floor portion 6. A handle portion 6^a is usually formed on the front of the supporting tray.

The parting partition ridges 3, 4 and 5 of the reenforcement tray register with the parting partition ridges 10, 11 and 12 of the supporting tray, and are preferably formed to make substantially continuous contact therewith so as to prevent or limit the flow of plaster through the mesh on these lines. Figure 3 illustrates the position of the reenforcement tray in the supporting tray prior to pouring the plaster, and Figure 4 illustrates the same after the plaster has been poured and the impression made. In Figure 4 it will be observed that the plaster 15 has passed through the reenforcement tray to the impervious supporting tray except on the lines of the parting partition ridges. The same effect is illustrated in Figures 5 and 6.

After the plaster has partially set, the supporting tray is removed, leaving the plaster with its embedded reenforcement in place, after which the reenforcement tray may be severed with a knife or other suitable implement along the lines of the parting partition ridges and the reenforced impression or cast then broken along these lines into definite segments, each of which will contain its reenforcement.

In Figures 7 and 8 the same principle of construction is illustrated, with the exception that in this example the reenforcement tray is formed into previously separated segments comprising the floor segment 16, side segments 17 and 18, and the front segment 19. Each of these segments has its respective peripheral flange or lip 20, 21 or 22, which follows the parting partition ridge of the supporting tray. These segments are placed in the supporting tray, as illustrated in Figure 8, being spotted thereto by wax or the like 23. The construction illustrated permits the removal of the supporting tray after the plaster has partially set, and eliminates the necessity of severing the reenforcement tray along the parting partition ridges prior to the breaking of the cast into segments.

Figures 9 and 10 illustrate the embodiment of a segmentary reenforcement tray in an impervious backing tray of fabric, the latter being in one piece. Here the reenforcement tray 24 in segments is temporarily secured in the impervious backing tray 25 of suitably sized close mesh fabric. The sizing of the backing tray or layer 25 serves as an adhesive for securing the reenforcement segments in place by the heat and pressure of the forming operation during the manufacture of the tray. The dampness and temperature of the setting plaster soften this adhesion so that after removal of the outer supporting tray 26, this backing layer 25 may be stripped from the cast preparatory to the breaking of the latter along the parting partition lines. This operation is illustrated in Figure 14 of the drawings, in which the backing layer 25 is partly removed and one of the side segments 24^b, of the cast, is shown broken out from the main body 24^a. Figure 10 shows a detail of the formed cast prior to the removal of the outer supporting tray 26 and the backing layer 25. It will be observed from Figures 9 and 10 that the segmentary re-

enforcement tray 24 follows in construction the principles already illustrated in Figure 7.

Figures 11 and 12 illustrate a construction in which a one-piece reinforcement tray 27, similar to that shown in Figure 1, is mounted in a one-piece backing layer 28, similar to that shown in Figures 9 and 10, the construction being such that the two layers may both be severed simultaneously along the parting partition ridges prior to the breaking of the cast into definite segments, or the backing layer may be stripped from the cast prior to the separation of the cast into segments.

Figure 13 illustrates a segmentary tray, each segment comprising an inner pervious reinforcement 29, and an outer impervious backing layer 30. These segments, being initially distinct, are assembled in a supporting tray, as already described, for example, in connection with Figures 7 and 8, so that the finished cast may be broken apart without the necessity of preliminarily stripping or severing the backing or severing the reinforcement.

Figure 15 illustrates the construction described in connection with Figures 7 and 8, as applied in this instance to the lower impression. The number of segments in the case of an upper is usually four, whereas in the case of a lower the segments are usually six in number. The construction illustrated in Figure 15 thus comprises two outer segments 31, 32 for the sides, two inner segments 33, 34 for the sides, one outer segment 35 for the front, and one inner segment 36 for the front. This difference in the number of segments in upper and lower impressions may be regarded as generally inherent to all of the constructions illustrated.

The embodiments of the invention thus far described have illustrated the use of corrugations extending more or less over the entire area of the reinforcement tray, for the purpose of spacing it from the impervious outer surface, whether such outer surface be the wall of a metallic supporting tray or an impervious backing layer of closely woven sized fabric. The principles illustrated, however, are in large measure applicable in other respects to non-corrugated material.

In Figures 16, 17 and 18, for example, a one-piece open mesh fabric reinforcement 37, in non-corrugated form, is illustrated, this having an out-turned peripheral flange 38 along the upper edge, interrupted at 39, 40, to engage the sides and front of a supporting tray 41 to space the reinforcement layer from the supporting tray and thus provide flowing space for the plaster. The supporting tray 41 may have the horizontal and vertical parting partition ridges 42 and 43 against which the reinforcement tray rests. Such parting partition ridges thus cooperate with the out-turned edges 38 of the reinforcement, in spacing the latter from the supporting tray.

The interruptions 39, 40, in the peripheral out-turned edge of the reinforcement, engage the vertical parting partition ridges 43 of the supporting tray, to hold the reinforcement tray in place. Such interruptions may be produced either at the time of manufacture, or they may be formed by cutting out notches at the proper points at the time the reinforcement is fitted into the supporting tray.

Figures 19 and 20 illustrate the spacing of a segmentary reinforcement in much the same manner as that illustrated in Figures 16, 17 and 18, in connection with a single reinforcement tray. Each segment in this instance comprises

a body portion 44 with out-turned edges 45, so that they may be properly fitted into an impervious supporting tray 46 which is provided with a horizontal parting partition ridge 47 and vertical parting partition ridges 48, the latter separating the front from the two side segments of the reinforcement tray.

Where teeth are missing, difficulty is often experienced in producing a cast which can be readily removed, since the vacant space becomes filled by a solid mass of plaster. Figures 21 and 22 represent diagrammatically the provision of a parting fin 49, which is preferably constructed of elastic material such as partly vulcanized gum rubber. This fin 49, cut in proper width from a strip, has a triangular or wedge-shaped base 50, conforming with the angle on the under surface of the parting partition ridge of the reinforcement, so that it may be inserted upwardly through a slit formed in the reinforcement tray at the proper point, and be held in vertical position by the engagement of its base with the under surface of the parting partition ridge, as clearly shown in Figure 22. By pulling this fin upwardly into its seat, the elasticity of the fin material allows it to stretch under the tension, and when the tension is released, the return to normal thickness will result in its being firmly held by the pinch of the slitted reinforcement or backing layer. The construction illustrated is applicable more particularly where a supporting tray 51, without the horizontal parting partition ridge, is employed, and in such case the flat under surface of the base 50 of the parting fin engaging the flat surface of the supporting tray further steadies the parting fin in its vertical position. This parting fin is furthermore applicable whether the reinforcement tray is in one piece and has to be slit for its reception, or is in segmentary form so that it does not require slitting at the point where the fin is to be applied. It is also applicable to constructions in which the reinforcement tray in one piece, or in several segments, is disposed in a temporary or permanent backing layer in one piece or several segments, as illustrated in Figures 9 to 14 inclusive. With whatever form of reinforcement or backing tray it is employed, it serves to provide a partition extending across the gap from tooth to tooth, as shown for example in Figures 6, 10, 12 and 18, and is inserted before the plaster is poured, so that the resulting cast will be readily broken along the prescribed line of parting. Being made of elastic material, it may be withdrawn by taking hold of it at the base by tweezers or other suitable implement, the elasticity enabling its thickness to decrease as it is stretched, so that it may be very readily withdrawn after the plaster has partly set, or even fully set, and the supporting tray has been removed.

I have mentioned the use of sizing as a means of temporarily securing a reinforcement tray in one piece or several segments in an impervious outer layer or backing. The ordinary sizing employed in buckram, in which starch, tapioca, glue, dextrine and the like are employed, satisfactorily fulfills this purpose, as it holds well on being hot pressed to a dry state, and softens well during the setting of the wet plaster. Plaster of Paris, as is well known, develops heat in the act of setting, and this heat, in conjunction with the moisture which is present, enables the outer backing to be very readily stripped from the cast while the sizing is in this softened condition. Such sizing is, therefore, preferably employed in the

outer layer or backing. It is very desirable, on the other hand, that the plaster adhere permanently with the reinforcement mesh, and for this reason I prefer to employ a sizing or dip for the reinforcement mesh which is not affected in this way by the heat and moisture present in the setting of the plaster. An example of a suitable dip or sizing to answer these requirements is as follows:—

Seven pounds of gum arabic are thoroughly mixed with seven gallons of water, and the mixture is allowed to stand overnight. One ounce of sodium benzoate is dissolved in one gallon of warm water, and five ounces of aluminum sulphate added thereto and thoroughly dissolved. A portion of the gum arabic solution (about one pailful) is then mixed thoroughly with the solution of sodium benzoate and aluminum sulphate, after which the mixture is poured into the remainder of the gum arabic solution and thoroughly mixed. One pound of starch is mixed with one gallon of water, and afterward boiled to a thick, starchy paste. This paste is then added to the mixed solution containing the gum arabic, aluminum sulphate and sodium benzoate, and after thorough mixing, the resulting solution is strained through damp cheesecloth and is ready for use.

The fabric, of which the reinforcement trays are to be made, is first moistened or rinsed in water, and then thoroughly soaked in the dip, prepared as described above. This treatment provides, at the same time, for the stiffening or sizing of the fabric.

Other treatments, giving the same or substantially equivalent properties to the fabric, may obviously be employed, instead of the one particularly described above as an illustration.

The provision of a reinforcement mesh or tray, through or into which the plaster may flow, is an essential feature of my present invention. In its preferred form, this tray is so formed as to provide flow spaces between portions of the reinforcement tray and an impervious backing. The flow spaces may be provided by the corrugations, or by flanges, or by any suitable spacing contour or element, and the impervious backing may be provided by the usual metallic supporting tray, or by a fabric or similar backing layer temporarily or permanently applied to or in contact with the projections of the reinforcement tray.

The resulting dental impression is in itself a new and useful article by reason of the incorporation of reinforcing material directly in contact with, or actually within, the solidified plaster.

I claim:—

1. A reinforcement tray for dental impressions comprising an open mesh fabric for use in conjunction with an impervious backing layer, and provided with means for maintaining flow spaces between the mesh and the backing layer.

2. A reinforcement tray for dental impressions comprising stiffened open mesh fabric and a backing layer impervious to liquid plaster,

said open mesh fabric and said backing layer being spaced apart to provide flow spaces for the liquid plaster.

3. A reinforcement tray for dental impressions comprising a plurality of separate segments of reinforcement material pervious to the liquid plaster and adjoining each other on predetermined parting lines.

4. A reinforcement tray for dental impressions comprising a plurality of separate segments of open-work material, and a backing layer associated therewith to position the segments with respect to each other and limit the flow of plaster therethrough.

5. A reinforcement tray for dental impressions comprising an open-work reinforcement material adherent to setting plaster, and a backing layer, said reinforcement material and said backing layer being secured together by material rendered non-adherent by the setting of the plaster.

6. A reinforcement tray for dental impressions comprising a plurality of segments of open-work reinforcement adherent to setting plaster, and a backing layer positioning said segments with respect to each other and normally adherent thereto, but readily separable therefrom during the setting of the plaster.

7. A bonding reinforcement tray for dental impressions comprising superimposed inner and outer layers of sheet material, said inner layer being exposed directly to the plastic impression material and recessed to be pervious thereto and said outer layer being substantially impervious to the plastic impression material, the two layers being united and formed with floor and flange portions to constitute a pouring space for the impression material.

8. A device for use in the making of dental impressions comprising in combination, a bonding reinforcement tray having a pouring space for the impression material, with a parting partition ridge projecting thereinto, and a parting fin of elastic gum adapted to be inserted through said ridge to project into the pouring space beyond said ridge.

9. A device for use in the making of dental impressions comprising in combination, a bonding reinforcement tray having a pouring space for the impression material, with a parting partition ridge projecting thereinto, and a parting fin adapted to be passed inwardly through the apex of said ridge, and having a base portion conforming with the outer angle of said ridge to steady the fin.

10. A device for use in the making of dental impressions comprising in combination, a tray for the impression material, and a parting fin of elastic gum having a web portion adapted to be inserted into the pouring space through a slit in said tray, and a head portion adapted to abut against the outer surface of said tray.

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