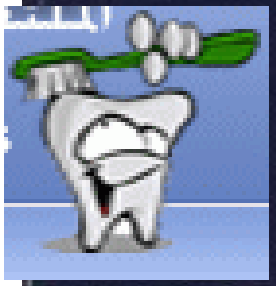
# A Colour Atlas of COMPLETE DENTURES

J.A. Hobkirk



Dental Techniques


# A Colour Atlas of Complete Dentures

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# Contents

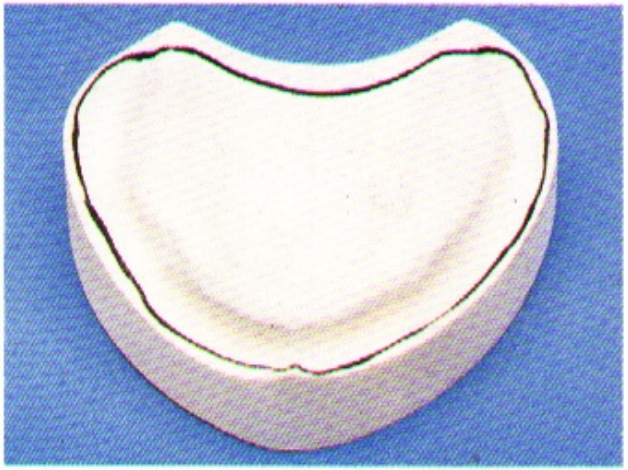
**Fig. 1**

Thermostatically controlled water bath containing compound
Alcohol torch
Bunsen burner and matches
Denture bowl
Mouthwash
Napkin and mirror
Laboratory prescription card and plastic impression bag
Stock impression trays
Trimming knife
Wax knife
Large pair of scissors
Patient's bib and chain

1

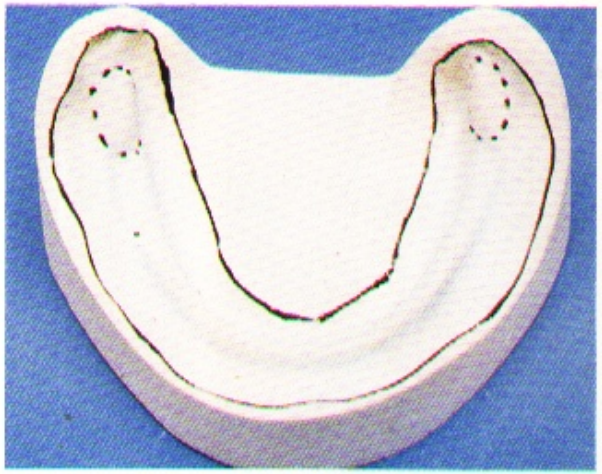
1 Instruments and materials used for recording primary impressions.

2



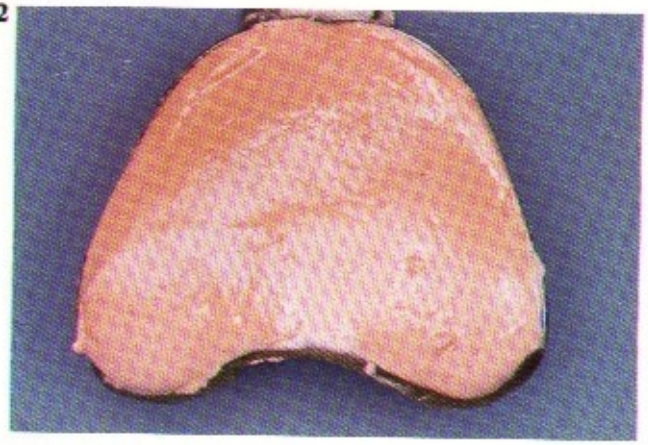
2 The upper denture-bearing area is bounded laterally and anteriorly by the functional sulci. Posteriorly it is limited by the hamular notches and the junction beween the fixed and moveable parts of the palate (vibrating line).

3



3 The lower denture-bearing area is bounded by the functional sulci, and posteriorly on each side by the activities of the buccinator muscle as it crosses the ascending ramus of the mandible. It usually ends at least halfway across the retromolar pads, which should be fully recorded by the impression.

32

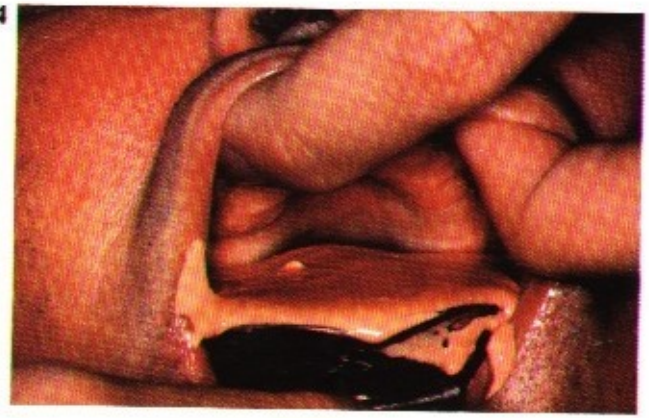


32 Alginate can be used to record impressions where there are undercuts. It may be used in a stock tray which should be coated with a suitable adhesive. Upper impression tray loaded with alginate.

33

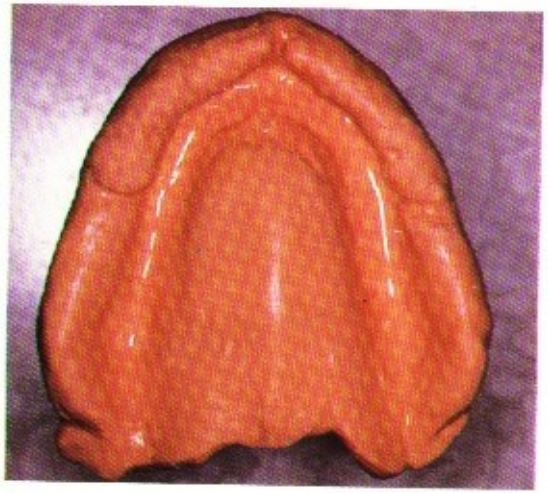
33 The escape of alginate from the back of an upper impression tray may be minimised by placing a strip of carding wax on the fitting surface.

34



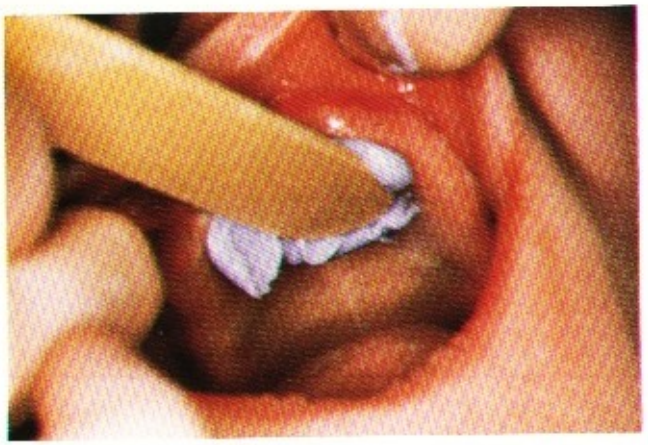
34 The loaded tray should be seated first at the back of the mouth, and then lifted gently at the front. Note the position of the upper lip. Once the tray has been seated the patient should be asked to make functional movements of the cheeks and lips, and move the jaw from side to side.

35



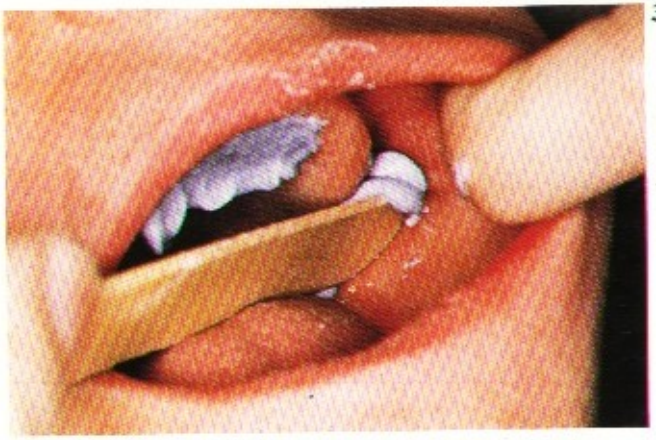
35 The completed alginate impression.

36



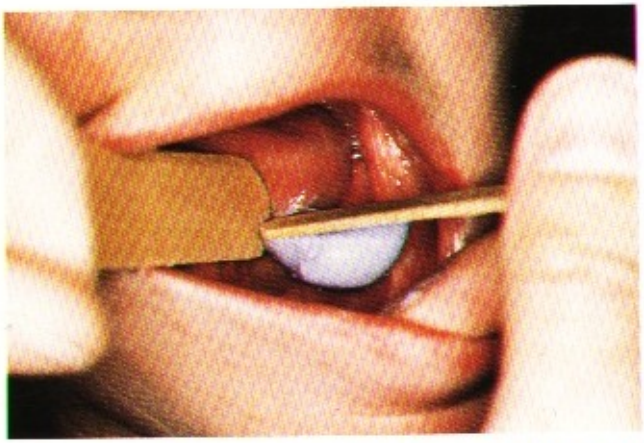
36 It can sometimes be helpful to prepack (preload) areas of the mouth where the impression may be underextended because of deficiencies of the tray, or where air may be trapped. Such an area is the anterior part of the palate.

37



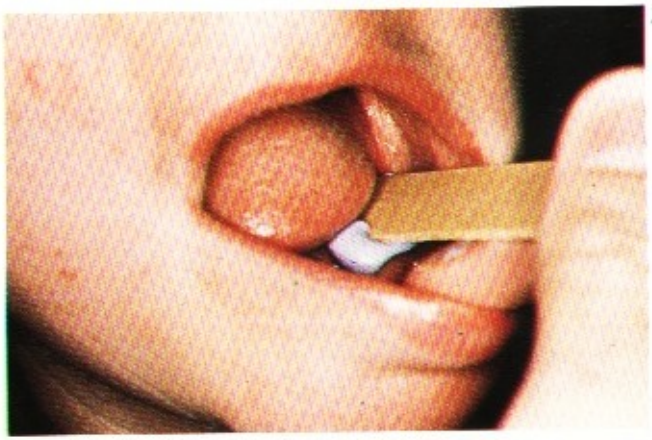
37 Prepacking adjacent to the maxillary tuberosities can also be advantageous.

38



38 Prepacking the lingual pouches is best carried out using two spatulae — one to retract the tongue, the second to insert the impression material.

39



39 Once the material is in place, the first spatula may be removed and the second retracted, keeping it pressed against the ridge so that the impression material is 'wiped off' into the sulcus.

# Recording secondary impressions

Secondary impressions are made to improve on the primary impressions. A superior result is possible because special trays are used. The design of these varies with the impression technique, but they should be rigid, evenly spaced from the mouth, and capable of being adjusted to the optimum extension.

Secondary impressions are commonly recorded in close-fitting special trays using a two-stage technique. This involves first making a record of the width and depth of the functional sulcus, using greenstick compound traced on the tray periphery. An overall impression is then made in the modified tray with zinc oxide-eugenol paste. If the patient has a very dry mouth an elastomeric impression material ('elastomer') should be substituted for the zinc oxide-eugenol paste, because this material is less likely to adhere to the tissues. Elastomeric materials may also be used with benefit where there are large undercuts.

At the end of this visit the impressions should be returned to the technician with a prescription for the record rims and bases.

**Table 1** **Recommended spacer to be used when constructing special trays for some commonly used impression materials**

| *Impression material* | *Spacer* |
|---|---|
| Zinc oxide-eugenol paste | 0.5 mm |
| Alginate | 3.0 mm |
| Plaster | 1.5 mm |
| Elastomeric | 0.5-1.5 mm (Depending on viscosity) |

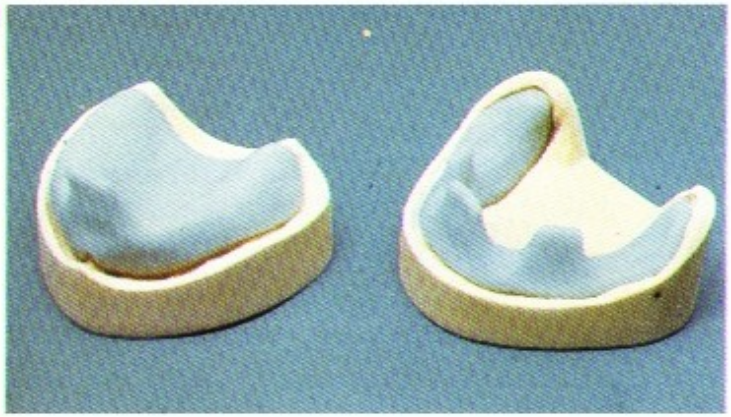
40

**40** Instruments and materials used when recording secondary impressions.

**Fig. 40**

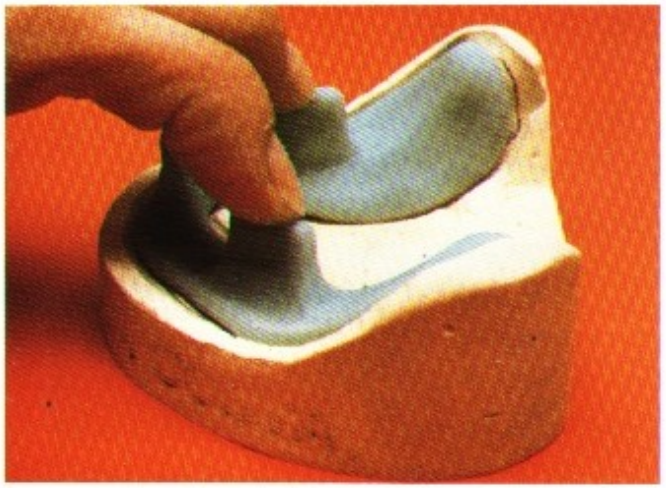
Paper mixing pad on glass block with spatula
Zinc oxide-eugenol paste
Proprietary paste remover
Alcohol torch
Bunsen burner and matches
Denture bowl, bib and chain
Mouthwash
Napkin and mirror
Laboratory prescription card and plastic impression bag
Indelible pencil
Straight handpiece and burs
Special trays
Tracing compound
Trimming knife
Wax knife
Large pair of scissors
Le Cron carver
Scalpel

41



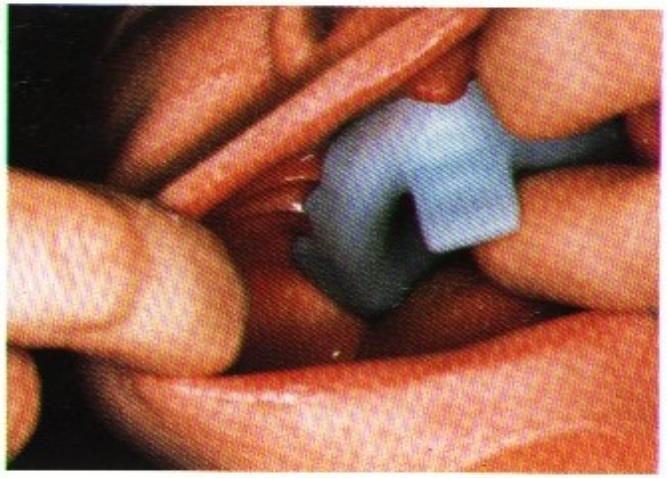
**41** Acrylic resin impression trays constructed on the primary casts with a 0.5 mm thick wax spacer, for use with zinc oxide-eugenol paste. Note the location of the handles and finger rests. The handles should be small and vertical so as not to interfere with the action of the lips.

42



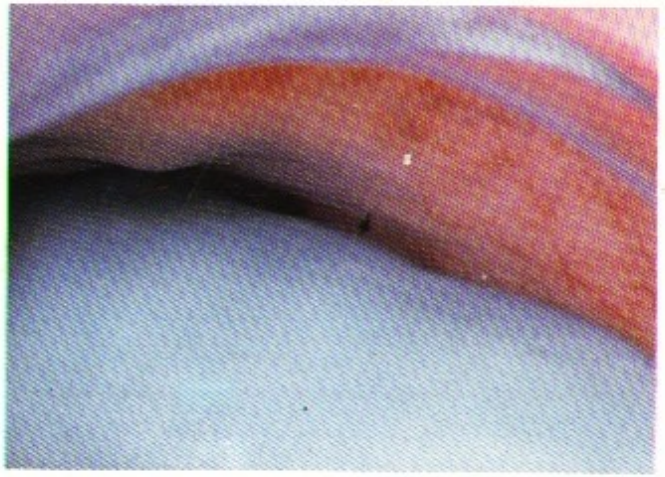
**42** The finger rests are used to seat the lower impression tray, and hold the fingers clear of its periphery so as to avoid distortion of the sulci.

43



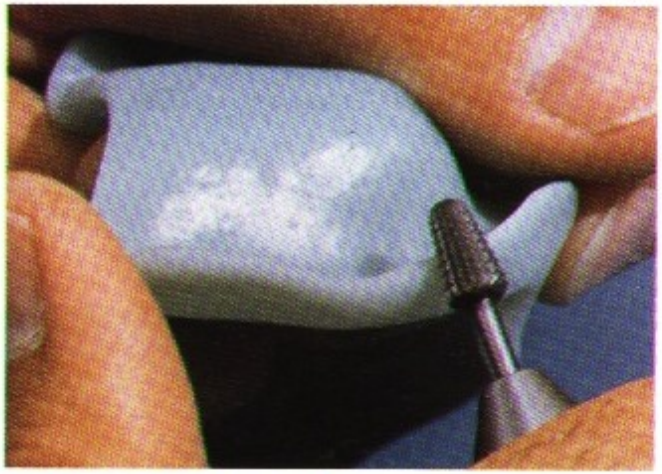
**43** The impression tray should be checked in the patient's mouth to ensure that it has the correct extension.

44



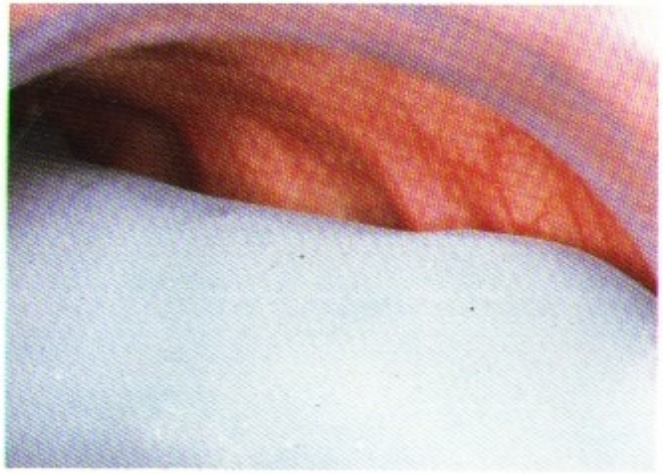
**44** The tray should be some 2 mm short of the functional sulcus (arrowed). This tray is overextended.

45



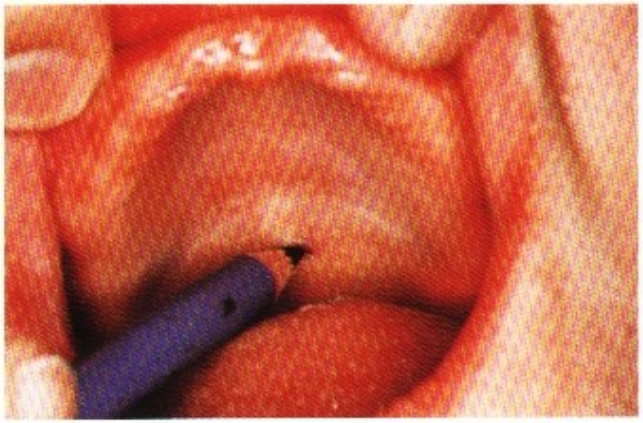
**45** The tray should be reduced until it has the correct extension.

46



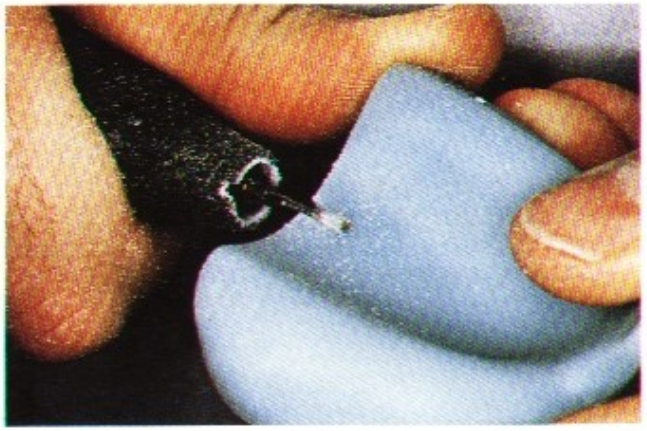
**46** Correctly extended impression tray.

47



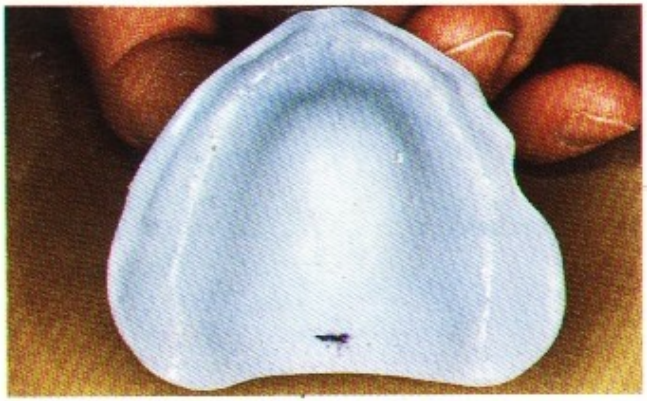
**47** The posterior border of the upper tray should extend as far as the junction between the fixed and moveable parts of the palate (vibrating line). This is usually in the region of the fovea palatina and should be demarcated with an indelible pencil.

49



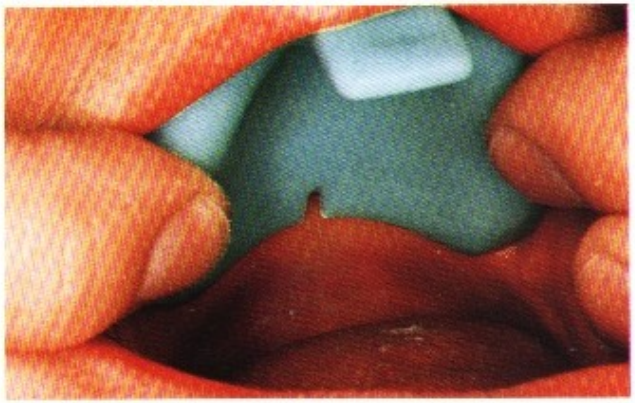
**49** A slot is then cut, with a fissure bur, into the posterior border of the tray as far forwards as the mark.

48



**48** The pencil mark is transferred to the fitting surface of the impression tray when it is seated in the mouth.

50



**50** The tray should then be reinserted in the patient's mouth, and the patient asked to say 'ah'. It will be possible to see whether the anterior part of the slot is coincident with the vibrating line. If not, it may be extended further forwards. If, however, the slot is extended too far forwards, then the line will be seen clearly, and should be marked on the tray with an indelible pencil. The posterior border of the tray is then trimmed to coincide with the vibrating line.

51

51 The buccal extension of the lower tray is then checked in a similar fashion. Posteriorly, it should extend across the retromolar pad until it lies just short of the mobile tissues anterior to the ascending ramus of the mandible.

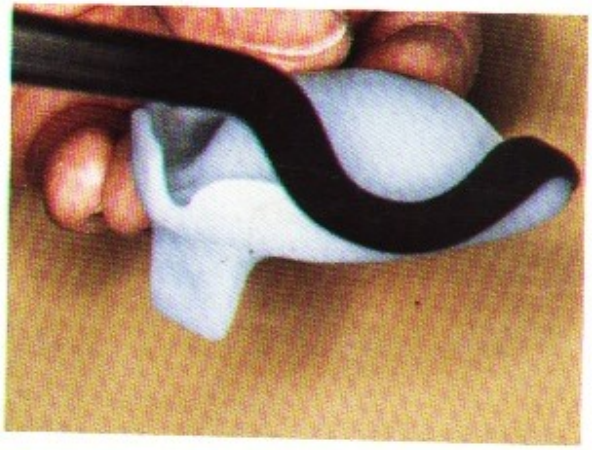
52

52 The lingual extension of the tray should be checked by asking the patient to protrude the tongue, move it from side to side, and put the tip of the tongue on the palate. If the tray lifts then it should be reduced.

53

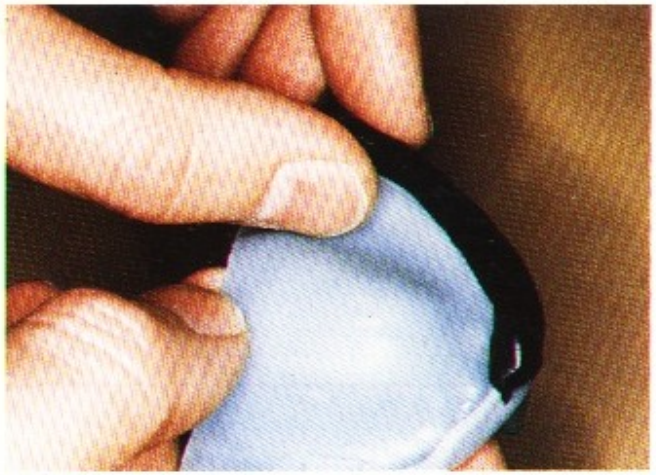
53 Compound should be warmed above a flame until it is soft.

54



54 It may then be traced readily along the periphery of the tray.

55



**55** The material may be adapted with the fingers to correct any minor irregularities.

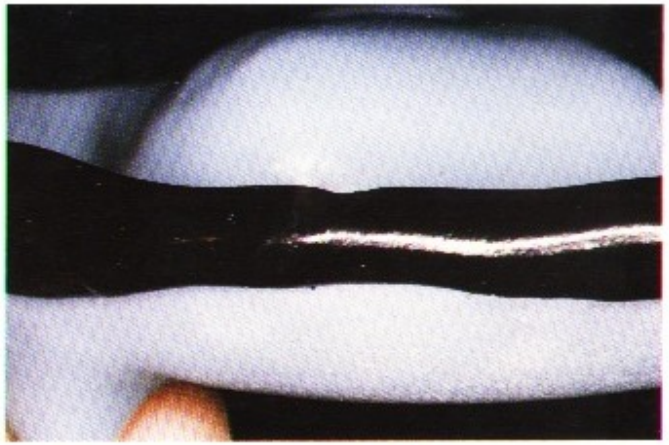
56

**56** During this process the compound tends to become stiff; it should therefore be softened with an alcohol torch, taking care not to burn it.

57

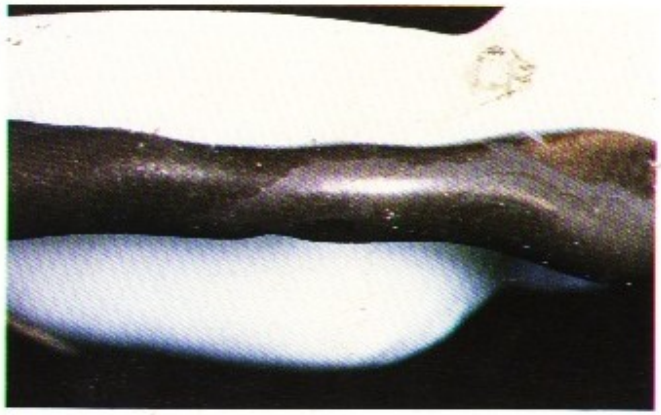
**57** Before being inserted in the mouth the compound should be tempered in the water bath, and checked with the operator's fingers.

58



**58** If the impression material is rigid when it is inserted, or does not come into contact with the tissues, then it will have a shiny appearance.

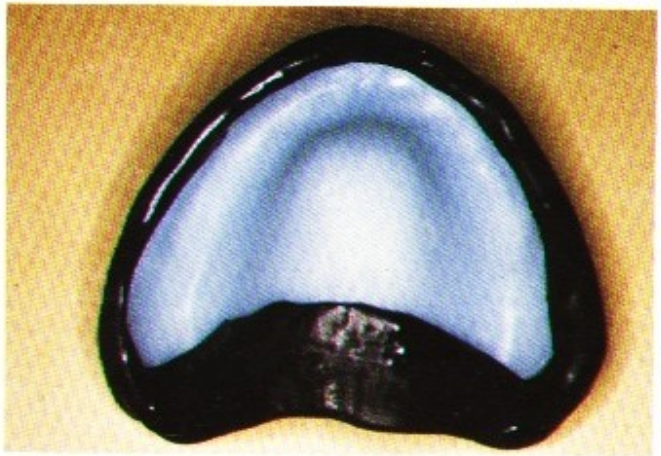
59



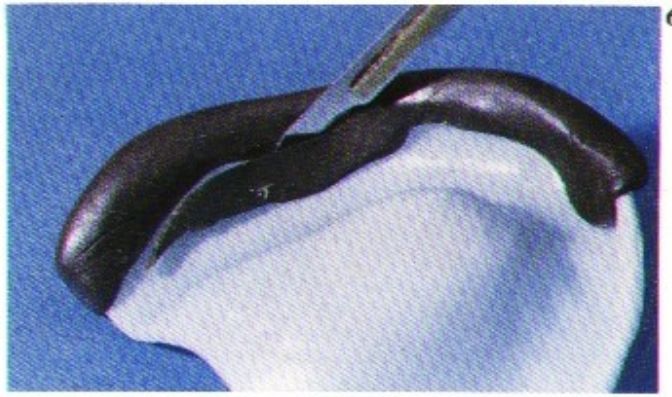
**59** Compound which has been moulded by the tissues will have a matt surface.

The impression tray should then be inserted in the patient's mouth and the patient asked to suck in the cheeks, pull down the lip, and move the jaw

61



**61** The completed upper tracing. The greenstick compound at the posterior border should be trimmed to the back edge of the impression tray, so as to accurately indicate the palatal extension of the denture. This patient had undergone relatively little alveolar resorption and the functional sulcus was therefore comparatively narrow.



60

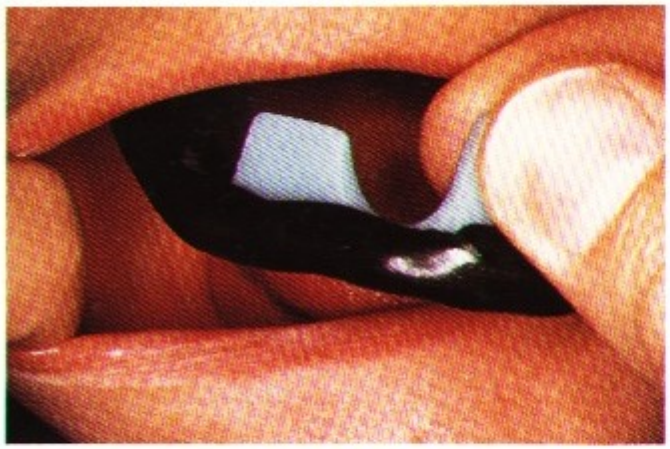
from side to side so as to create an impression of the sulci as they are narrowed by the coronoid processes.

**60** Excessive compound on the fitting surface of the impression tray is readily removed with a scalpel. A similar impression is then made on the opposite side, and compound finally placed along the posterior border of the tray on the fitting surface, so as to produce displacement of the soft tissues in the post-dam region.

62

**62** Flattening of the lateral aspect of the impression in the tuberosity region caused by the coronoid process of the mandible during lateral excursions of the jaw.

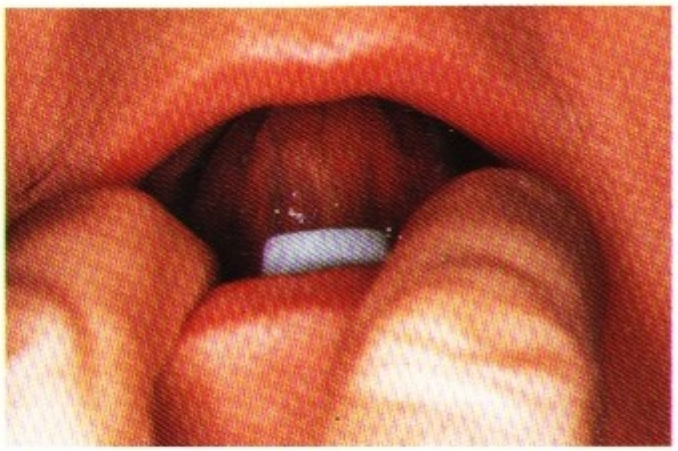
63



**63** Greenstick compound is then traced along a section of the lower impression tray, tempered, and the tray inserted into the mouth.

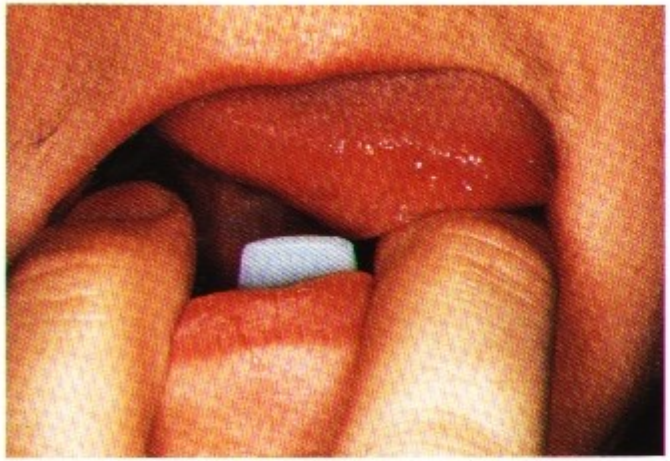
The impression of the functional buccal sulcus is made by asking the patient to suck in the cheeks.

64



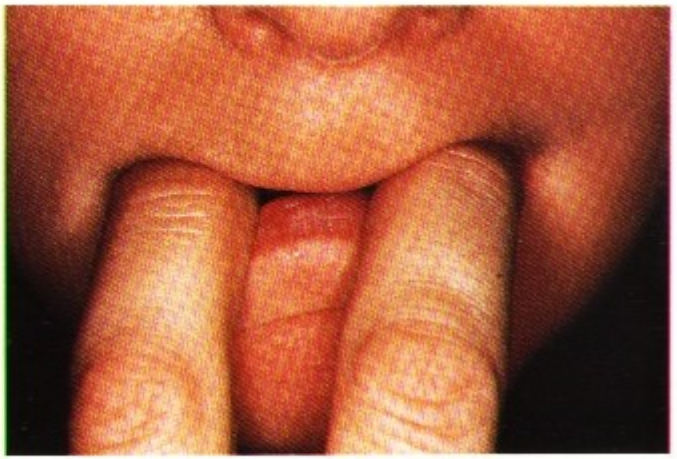
**64** The lingual sulci are recorded by asking the patient to put the tip of the tongue to the back of the mouth . . .

65



**65** . . . move it to the left and right . . .

66



**66** . . . and press the lips together and swallow. Note the position of the operator's fingers on the finger rests. The thumb is used to support the mandible during these manoeuvres.

67

67 The impression of the lingual and buccal sulci.

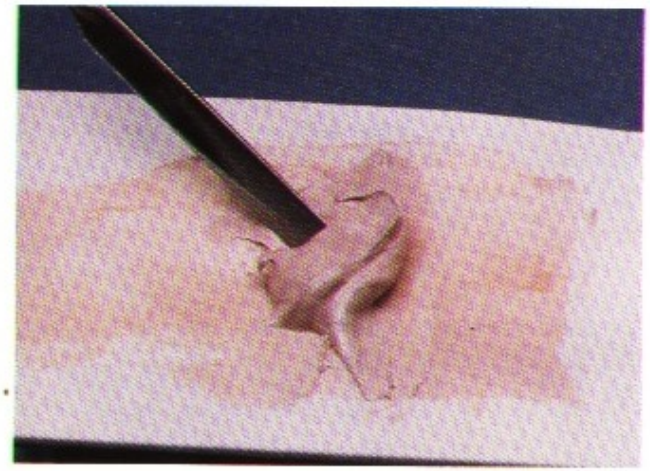
68

68 The completed lower tracing.

69

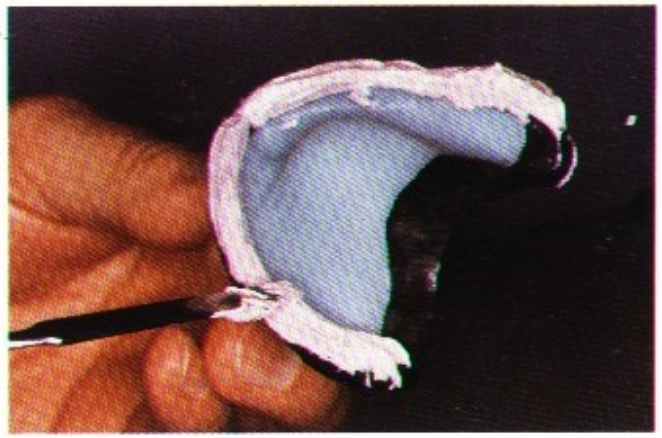
69 Having completed the tracing of the upper and lower impression trays, a thin wash of zinc oxide-eugenol paste is then placed over the compound so that any minor errors may be corrected. Equal lengths of the zinc oxide and eugenol based pastes are extruded on to a mixing pad . . .

70



70 . . . and thoroughly mixed to an homogenous mass.

71

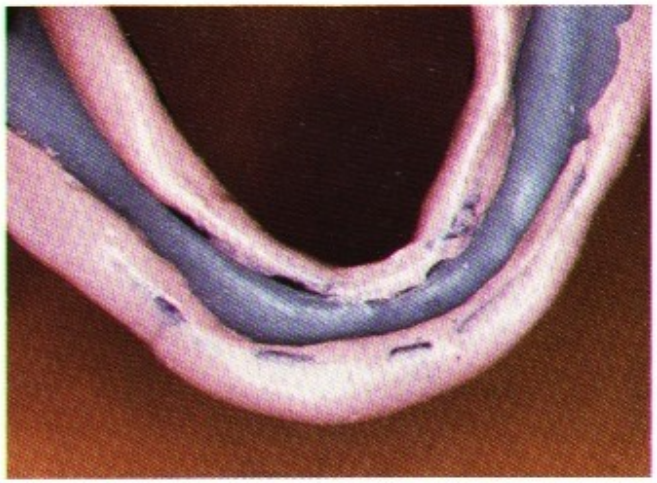


71 A thin layer of paste is then smeared on the greenstick compound. Note that this should not be placed in the post-dam region. The impression tray is then placed in the mouth and the 'functional' movements used to mould the compound repeated.

72

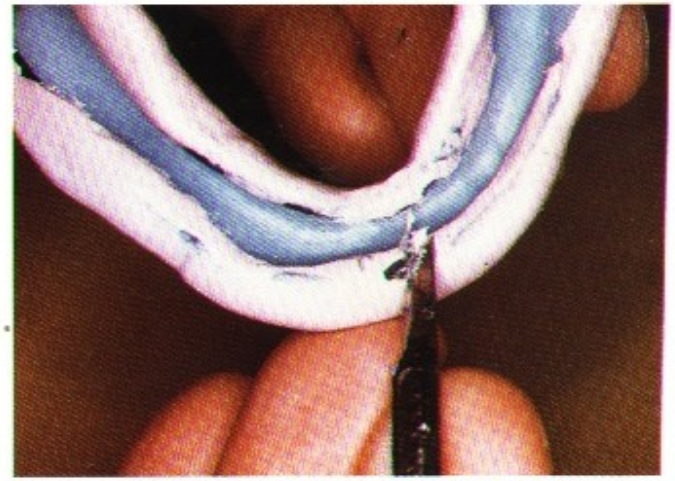
72 The completed peripheral 'washes'.

73



73 Areas of heavy contact are indicated by penetration of the paste.

74

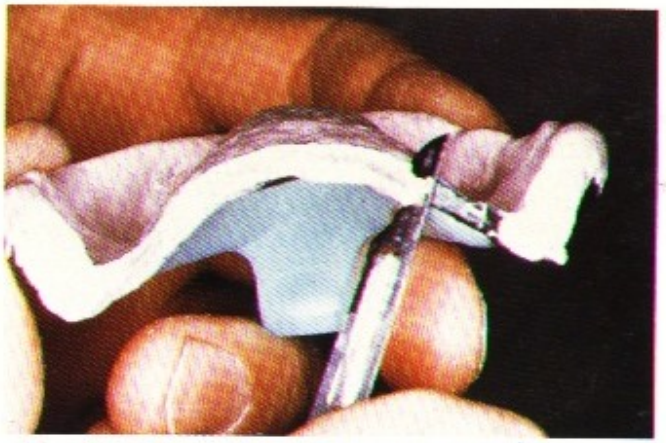


74 The underlying compound should be cut back gently in these areas before the final impression is recorded.

75

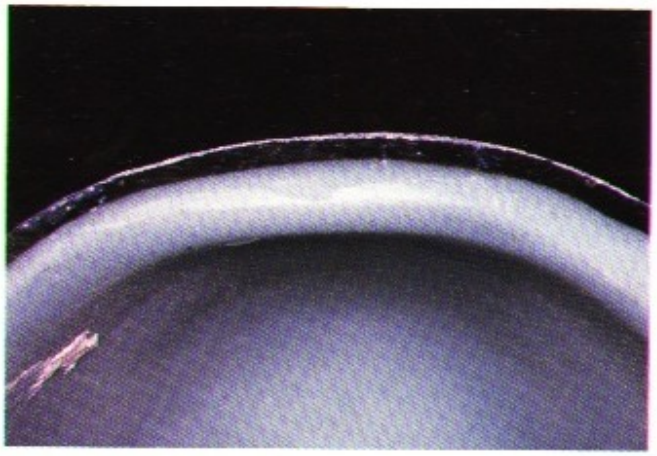
**75** The entire impression tray is then loaded with a fresh mix of zinc oxide-eugenol paste. Overloading of the tray must be avoided. The impression is once again seated in the mouth and the patient encouraged to make functional movements as before.

76



**76** Excessive paste which has flowed beyond the posterior border of the upper tray, should be cut back to the compound with a slightly warm scalpel, so as to avoid fracturing the paste.

77

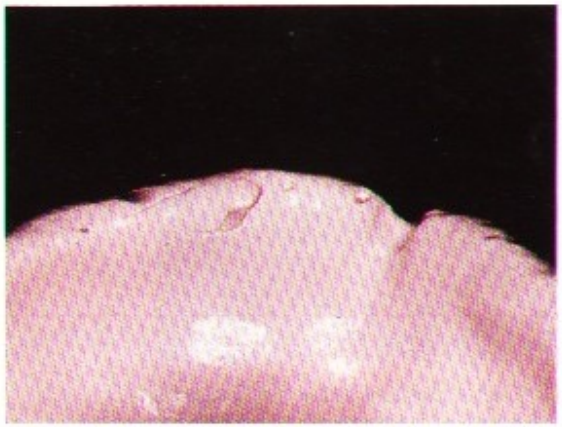


**77** Note the thin layer of impression paste in the post-dam region. Excessive paste indicates failure to seat the impression tray fully, and thus produce the required tissue displacement. (see **83**)

78

**78** Completed upper and lower impressions.

79



80

**79 and 80** Small defects may be corrected by the local addition of pink wax.

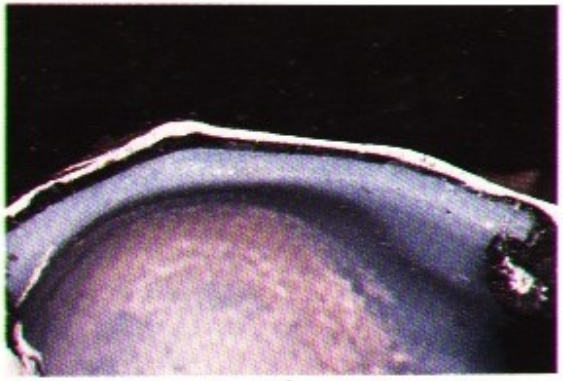
81

**81** Large air bubbles such as this, may be corrected by placing a small amount of zinc oxide-eugenol paste in the deficiency and reseating the impression. It is essential that only enough paste to fill the defect is used, otherwise a large step will be produced in the impression.

82

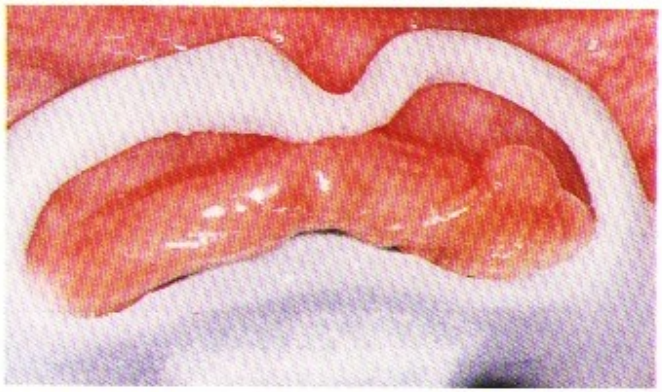
**82** Local penetration of the paste by the impression tray indicates a faulty primary impression, or a tray which has been made without a spacer or incorrectly seated. This defect must be corrected by grinding away the excessive tray material, removing all the zinc oxide-eugenol paste and repeating the impression.

83



**83** Failure to seat the impression tray fully in the post-dam region produces a thick layer of paste in this area. An adequate post-dam seal should then be produced by trimming the master cast at a later stage (see **209**).

84

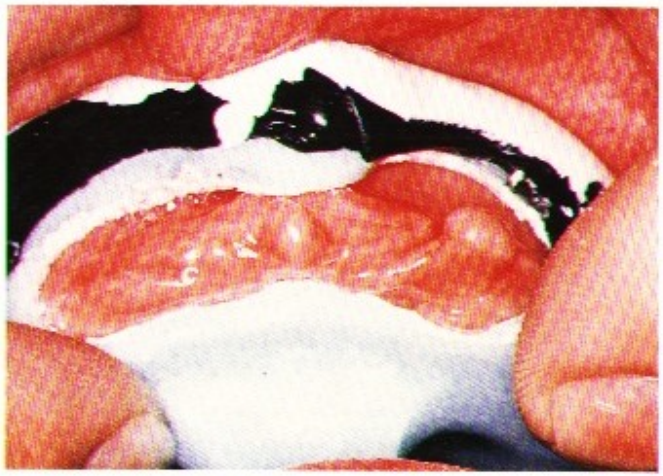


**84** A two-stage impression procedure may be used to deal with the problem of locally displaceable tissue. The plaster splint technique employs a conventional impression tray constructed for use with zinc oxide-eugenol paste. A window is cut in the tray over the displaceable tissue.

85

**85** The periphery is then traced with greenstick compound in the normal fashion, and a zinc oxide-eugenol paste impression recorded.

86



**86** The paste is trimmed clear of the window and the impression tray reseated.

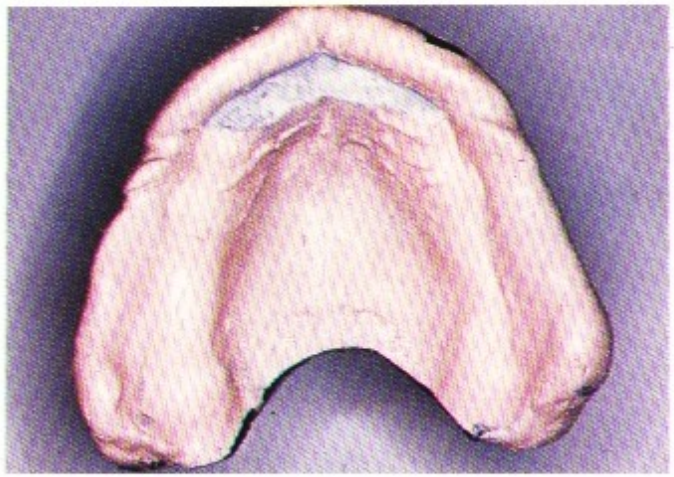
87

**87** Impression plaster is next run over the soft tissues in the window . . .

88

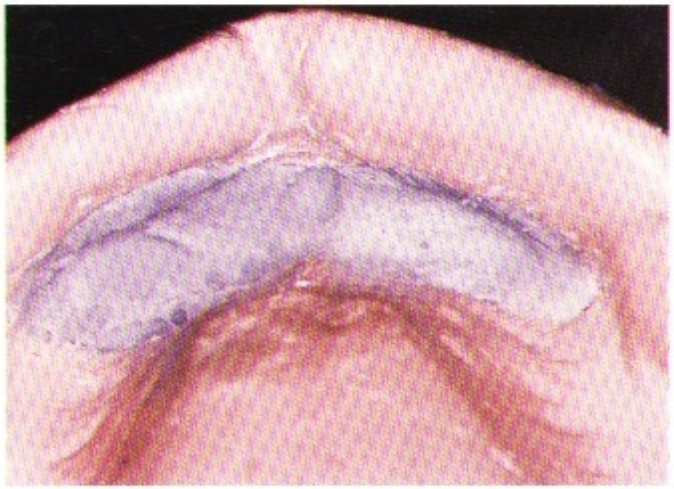
88 . . . until the displaceable tissue is covered.

89



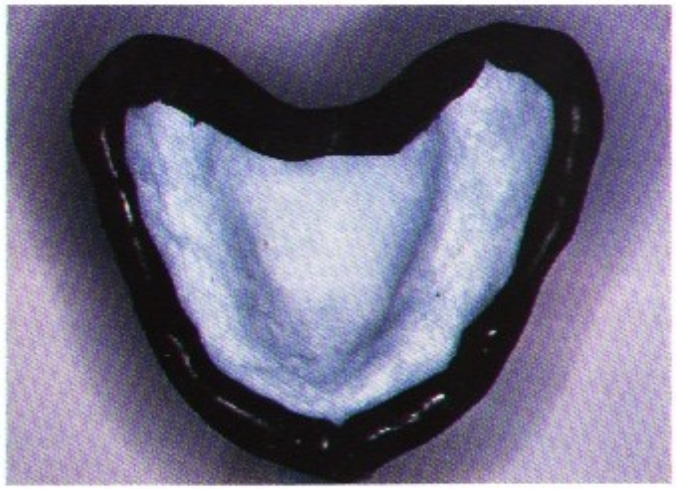
89 The completed composite impression.

90



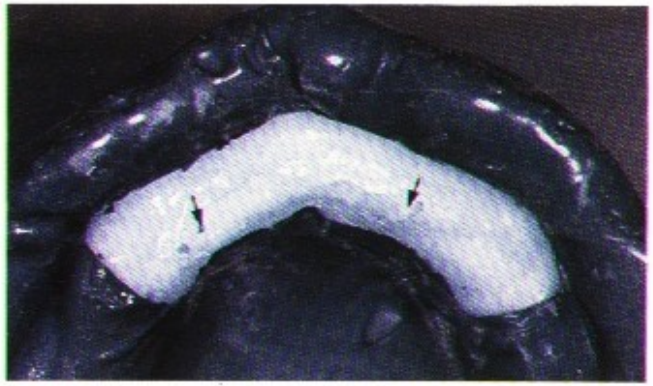
90 The localised addition of plaster has produced a mucostatic impression of the displaceable tissue.

91



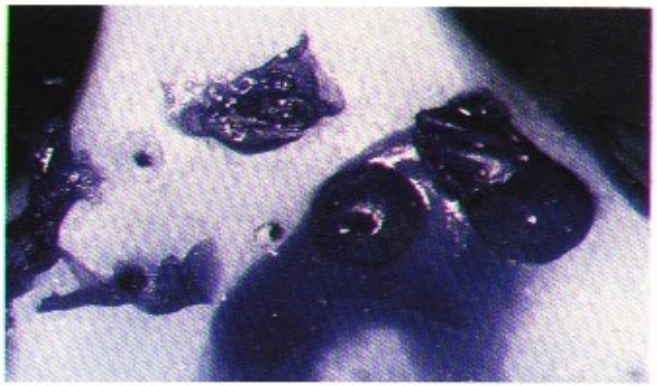
91 A similar procedure may be carried out using an elastomeric impression material. In this case, a window is not cut in the impression tray, which is border-moulded with greenstick compound in the usual fashion.

92



**92** The impression is then completed with a relatively viscous elastomeric impression material. When set, this is removed from the area where it is desired to produce a mucostatic impression. Holes are then drilled through the impression tray in this region (arrowed). The entire impression is next filled with a light-bodied elastomeric impression material, of the same chemical type as the original, and the impression tray reseated.

93

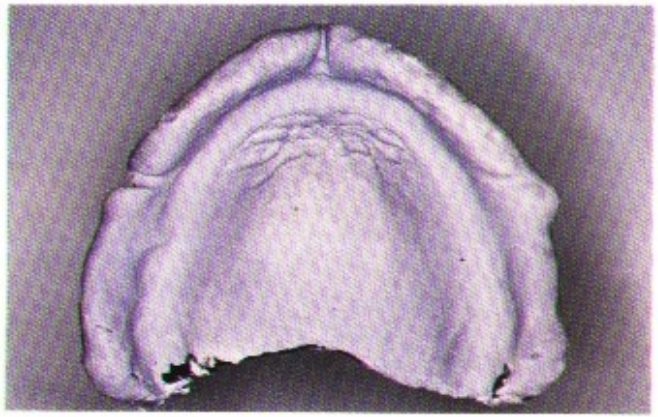


**93** Excessive impression material will escape through the holes in the impression tray, resulting in a mucostatic impression of the 'flabby' tissue, and relative muco-displacement elsewhere.

94

**94** The completed impression.

95



**95** A completed plaster impression. This material is rigid when set but causes minimal tissue displacement (see **84-90**). It is sometimes helpful to use a preloading technique with this material (see **36-39**).

# Recording jaw relationships

At this stage the relationship is recorded of the mandible to the maxilla at the desired occlusal vertical dimension (OVD), with the jaw on the retruded condylar axis (RCA). This is done with record rims, which are also trimmed to prescribe the positions of the denture teeth, which should be selected at this stage. The rims are normally made from modelling wax which should preferably be set on either temporary or 'permanent' acrylic bases.

At the end of this stage the record rims, face bow and prescription for the trial dentures are sent to the technician.

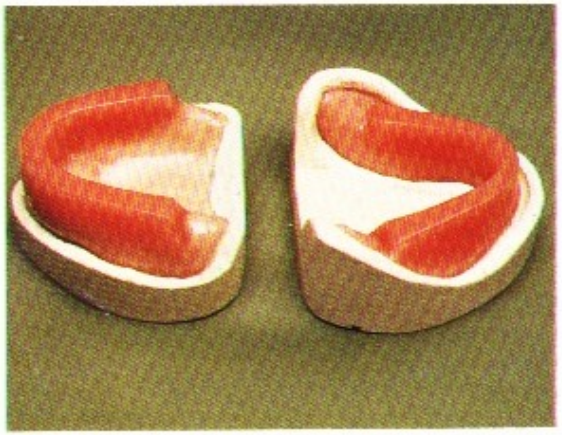
96

**96** Instruments and materials used when recording the jaw relationships.

**Fig. 96**

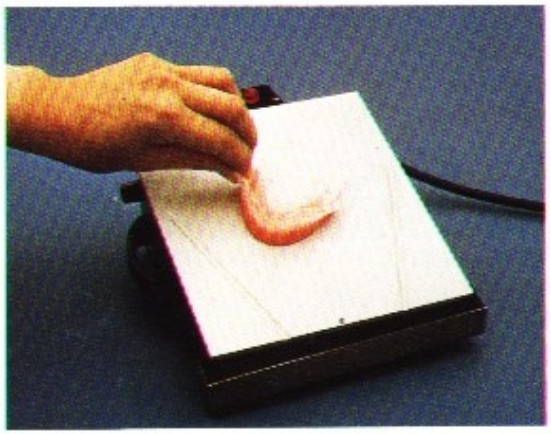
Electrically heated record rim trimmer
Mould and shade guides for artificial teeth
Alcohol torch
Proprietary paste remover
Bunsen burner and matches
Denture bowl, mouthwash, bib and chain
Paint scraper
Laboratory prescription card and plastic denture bag
Record rims on acrylic bases
Master casts
Straight handpiece and burs
Face-bow
Flexible mm ruler and indelible pencil
Staples and Adams' pattern pliers
Dividers
Trimming knife, wax knife and Le Cron carver
Willis gauge
Figure-of-eight callipers
Occlusion registration paste, mixing pad and spatula
Mirror and napkin
Occlusal plane guide

97



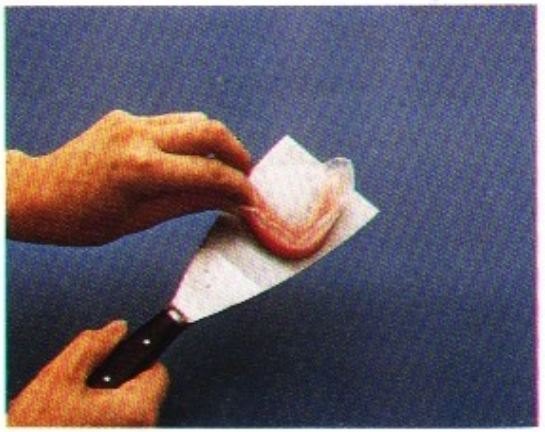
**97** Wax record rims on temporary acrylic bases used for recording jaw relationships. These should be checked in the mouth in turn and any peripheral discrepancies identified and corrected.

98



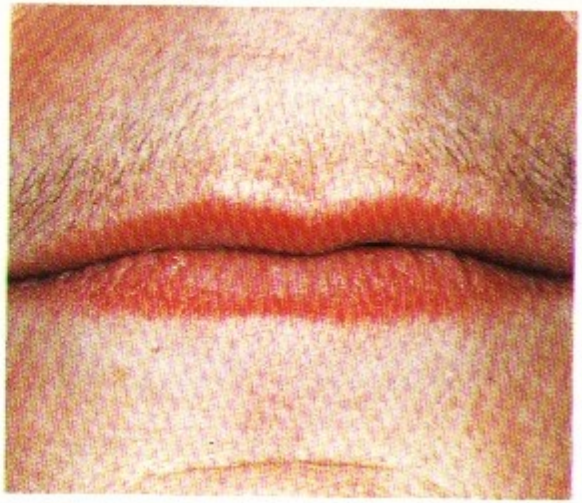
**98 and 99** The occlusal, buccal and labial surfaces of the record rims may be readily adjusted with an electrically heated trimmer, or a hot paint scraper.

99



100

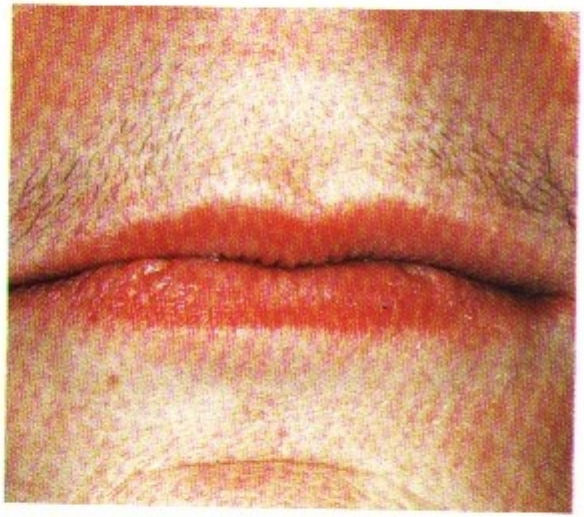
101



**100 and 101** The upper record rim is placed in the patient's mouth, and trimmed so as to provide an appropriate degree of labial support. Where this is inadequate, as here, the patient's face will tend to appear flat and the nasolabial angle obtuse.

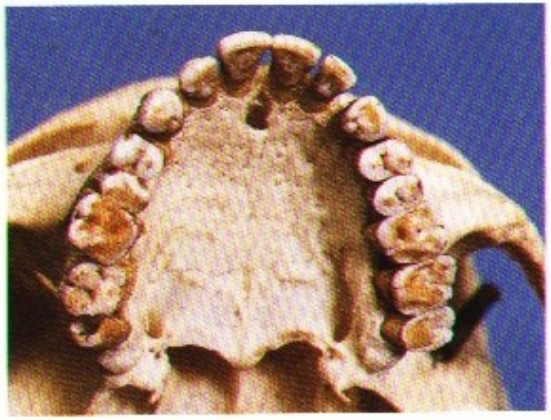
102

103



**102 and 103** An adequate degree of labial support will result in a more pleasing appearance.

104



**104** The incisive papilla lies over the incisive foramen (see **4**), and forms a useful guide to the placing of the labial aspect of the upper anterior teeth, which should be some 10 mm in front of the middle of the incisive papilla.

105

**105** Following alveolar resorption, the incisive foramen comes to lie on the ridge crest, as does the remnant of the palatal gingival margin. Teeth placed in the positions of their natural predecessors will thus lie buccal and labial to the residual alveolar ridge. The record rim should be trimmed to indicate the position of both anterior and posterior teeth.

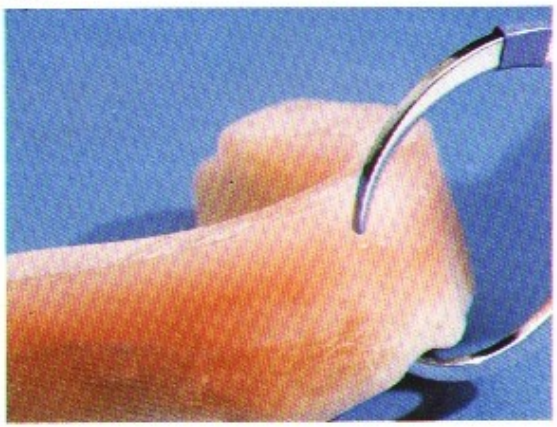
106

**106 to 109** A pair of figure-of-eight callipers provides a useful method of comparing the level of the occlusal plane on the record rim with that on the patient's existing dentures.

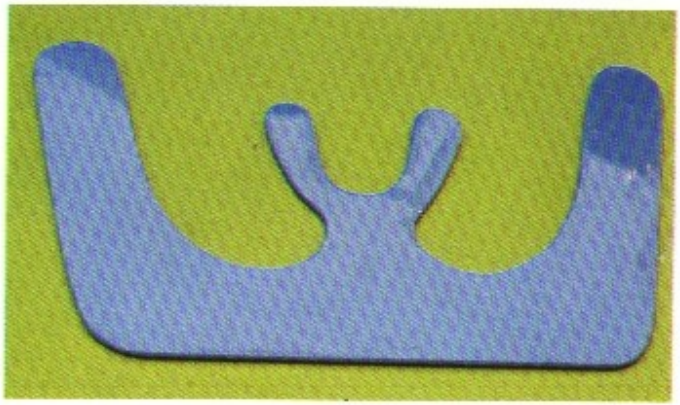
107

108

109



The level of the upper occlusal plane is a matter of judgement, although normally it should lie approximately 1-2 mm below the lower margin of the upper lip when the patient is at rest. A little lower in patients with short lips, a little higher in the elderly and those with long lips.



111

110

112

**110** Having decided upon the level of the upper anterior teeth, the rim should be trimmed so that the occlusal plane is parallel with the ala-tragal line (marked), and with the teeth appearing level in the mouth from side to side. This will usually mean placing them parallel with the inter-pupillary line.

**111 and 112** An occlusal plane guide provides a useful method of assessing the position of the occlusal plane in relation to the face.

113

**113** Having trimmed the upper record rim, it is necessary to trim the lower so that it will meet the upper evenly at the desired OVD. The Willis gauge provides a useful guide to the assessment of the correct vertical jaw relationship. It should be used with the patient upright and with the head in line with the trunk. Note that the sliding arm has been bent to clear the neck.

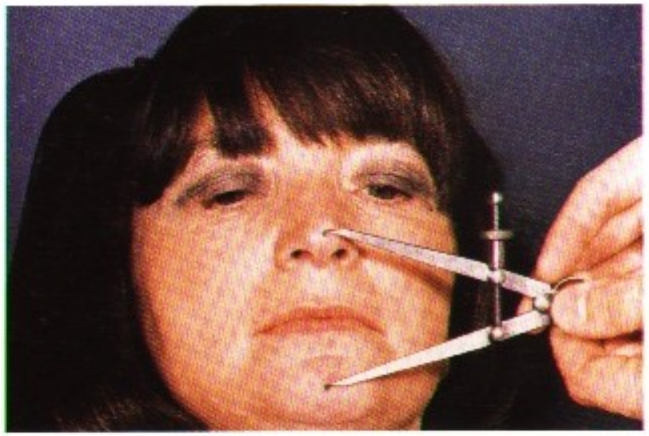
114

**114** If the patient's head is reclined in relation to the body then a faulty reading will be obtained.

115

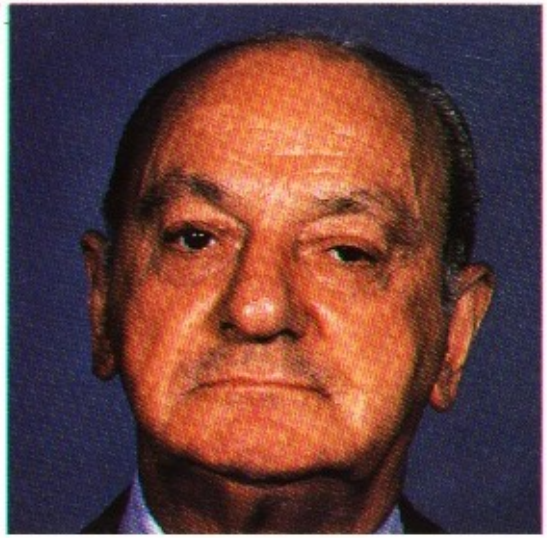
**115** Errors will also occur if the head is tilted forwards excessively.

116



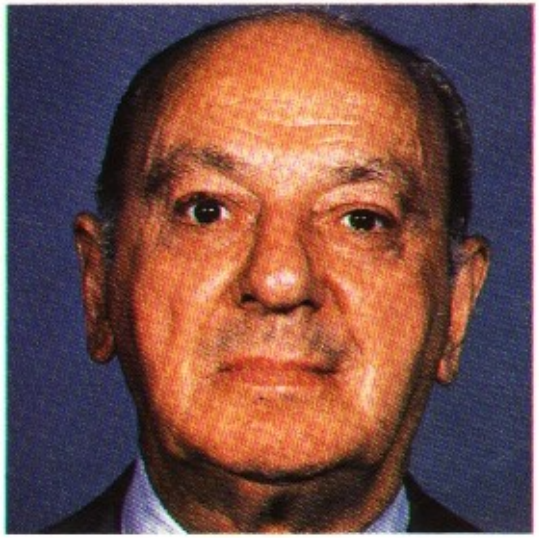
**116** An alternative method of determining the vertical relationship of the mandible to the maxilla, is to employ a pair of dividers to measure the distance between dots marked on the nose and chin.

117



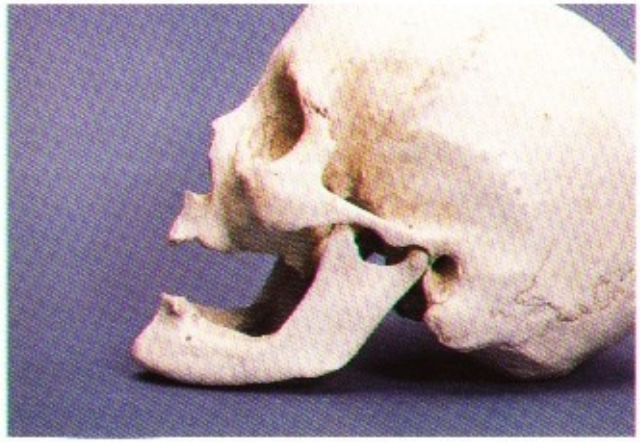
**117** The patient's appearance is also of great assistance in assessing the correct vertical dimension. The patient with excessive freeway space has a crumpled appearance with thin lips, and the chin apparently too close to the nose when the teeth are in occlusion.

118



**118** The effect of providing the correct OVD.

119



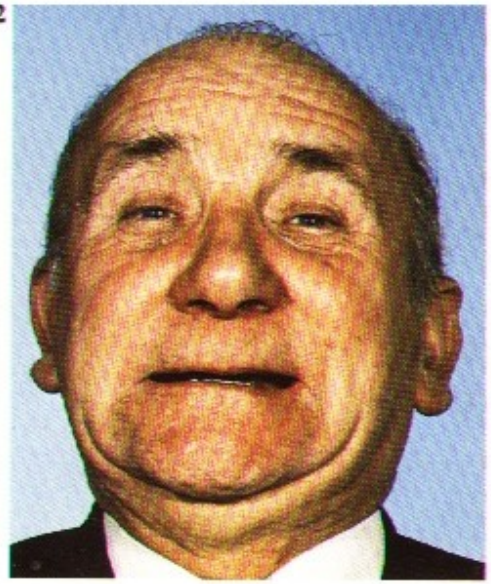
120

**119 and 120** Failure to provide an adequate OVD also results in the anterior mandibular ridge assuming a more labial relationship to the upper ridge.

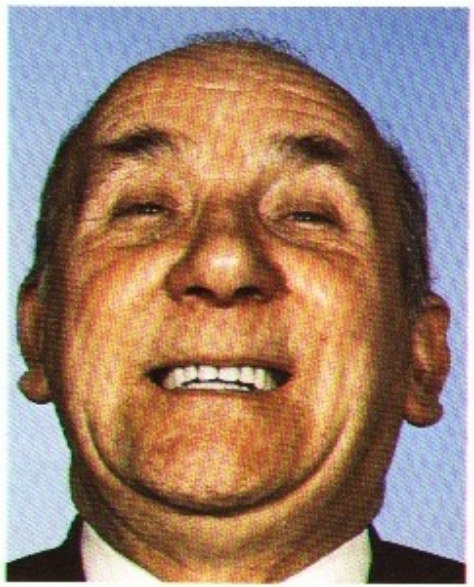
121

**121** Patients with inadequate freeway space also have a characteristic appearance. The face appears lengthened, and the lips can be seen struggling to produce a labial seal.

122



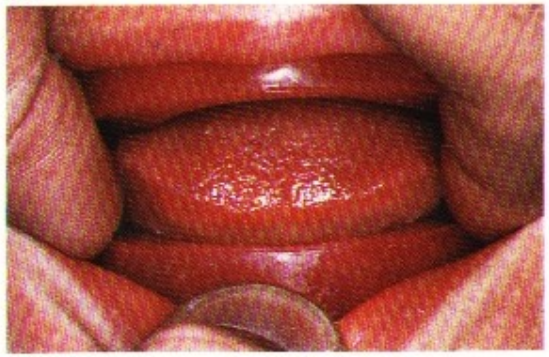
123



**122 to 124** Where patients have become accustomed to a large freeway space over many years, increasing the OVD should be carried out with caution, even though it may be theoretically ideal to do so.

124

125



**125** The lower record rim is then trimmed to ensure that it meets the upper evenly, at the desired OVD. When checking this, the operator's right thumb is used to retract the lower lip, with his first finger supporting the chin.

126

**126** The thumb and first finger of the left hand are used to stabilize the lower record rim, which then slides gently past them, enabling the operator to assess visually, and by touch, whether the rims are meeting evenly. At the same time, the patient is asked to put the tip of the tongue at the back of the mouth, which helps to keep the mandible maximally retruded. In this case there is a posterior premature contact.

127

**127** The rims should meet evenly all the way round the arch. As this can be difficult to achieve, an even three-point contact, anteriorly, and posteriorly on either side of the arch, is acceptable. The lower rim is then trimmed labially, buccally and lingually to indicate the positions of the lower teeth.

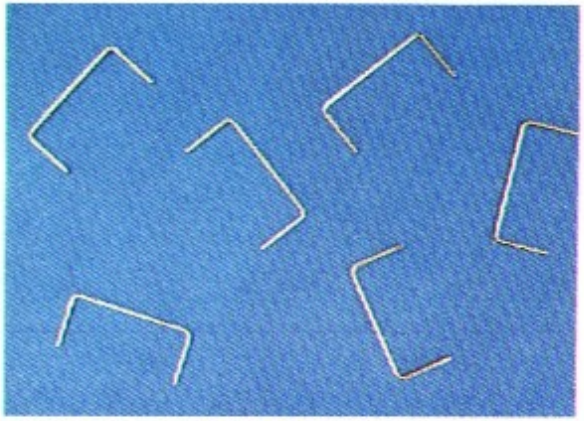
128

**128** The centre line of the upper arch is marked on the labial aspect of the upper record rim, and carried down on to the lower.

129

**129** Marks are also made across the junction between the rims on either side, while they are in contact, and the mandible is maximally retruded. The patient should then be asked to close the rims together several times, to check that the maximally retruded position has been obtained.

130

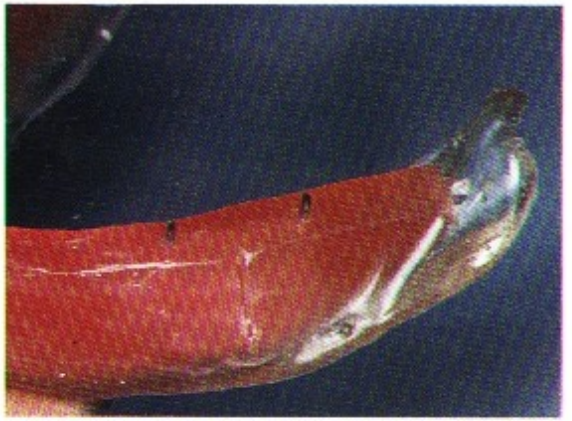


**130** The rims may then be joined together using six office staples, which should be counted out, so as to avoid the possibility of a staple unknowingly being swallowed or inhaled by the patient.

131

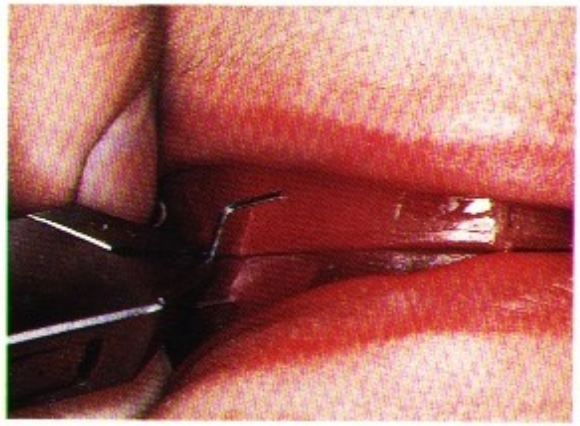
**131** Vertical slots are then cut in the occlusal surface of the lower record rim in the molar region using a hot wax knife.

132

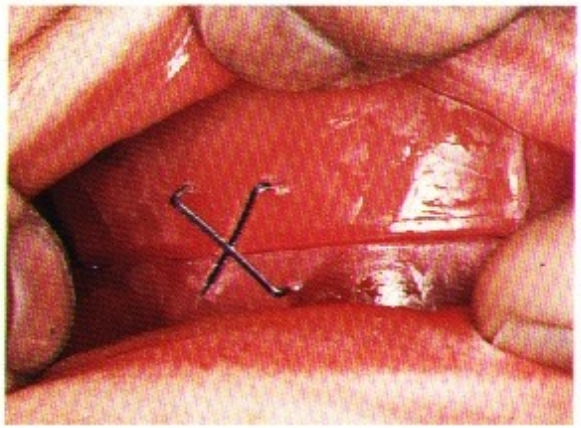


**132** A staple is placed vertically in each slot, and the wax thoroughly chilled to avoid displacement of the staples. Both rims are then placed in the patient's mouth, and brought together with the mandible maximally retruded.

133



134

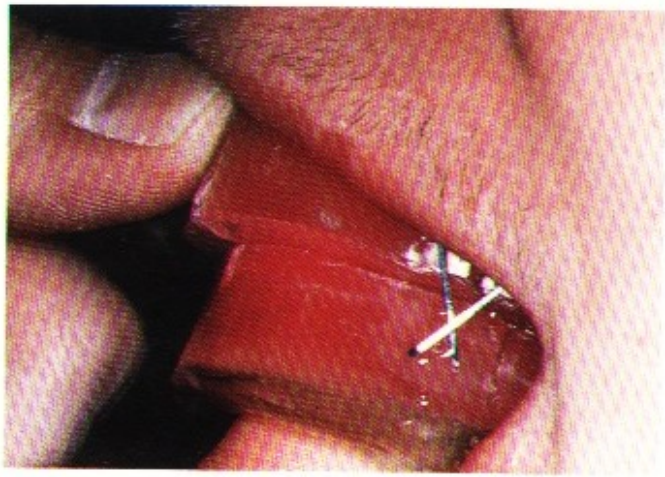


**133 and 134** The relationship of the rims is next checked, allowing for parallax errors, and they are then joined together by pressing two staples across their junction on either side.

135

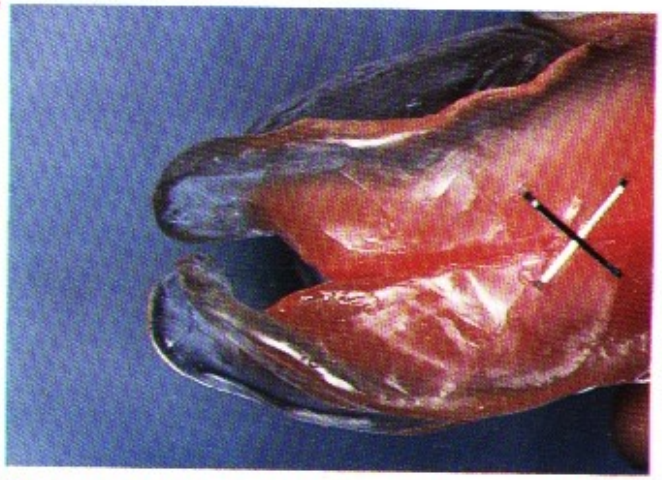
**135** The tips of the first fingers of either hand are next placed below the periphery of the lower rim while the patient opens the mouth. This prevents the rims being pulled apart.

136



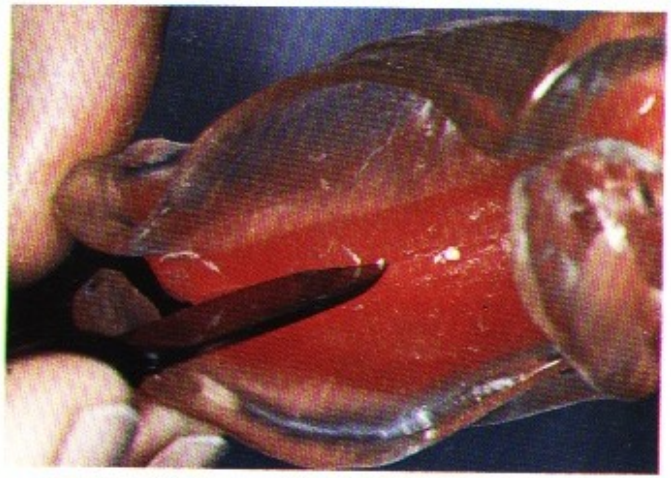
**136** The record is then gently removed from the mouth. Note the prescribed incisal relationship.

137



**137** A check must be made that there is no interference posteriorly. If there is, then the base must be trimmed and the procedure repeated.

138



**138** The record rims are then sealed together lingually with a hot wax knife.

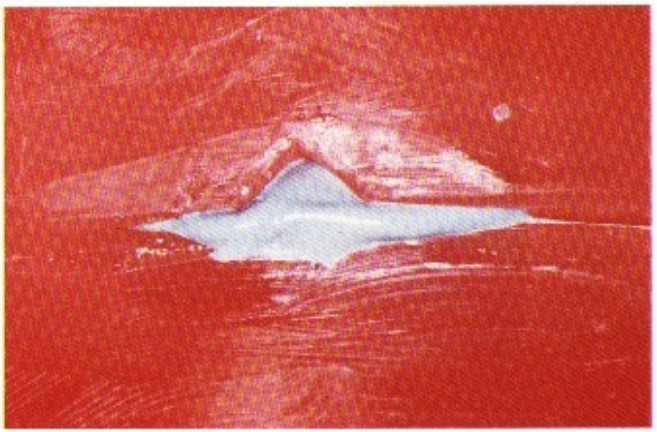
An alternative method of relating the rims is to place a recording medium between them, such as zinc oxide-eugenol registration paste, or softened wax. This has the advantage that the blocks may be separated, making it easier to check the registration, or record a number of different jaw relationships.



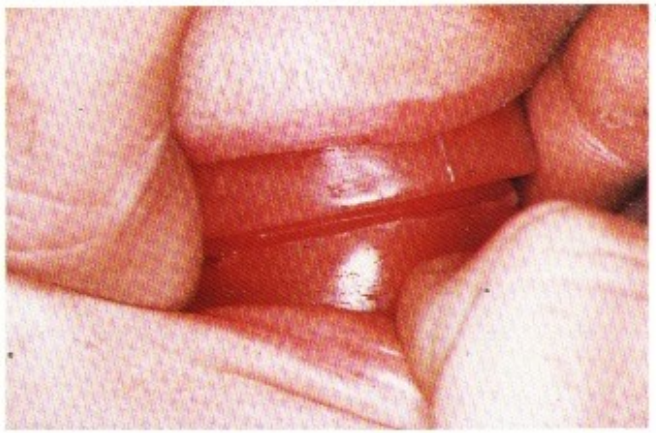
139

**139** Grooves are cut in the rims, and the upper is smeared with a separating medium, such as vaseline.

140



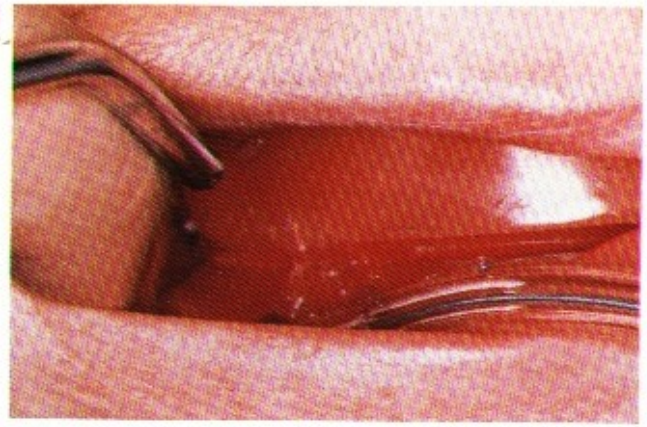
**140** When using paste, this should be smeared on the lower rim, the rims placed in the mouth and the patient asked to bring and hold them together in the retruded position. Care must be taken that the patient does not slide the rims over each other at this stage.



141

**141** The technique is essentially similar when using softened wax, except that the lower rim should be trimmed vertically to allow for the thickness of the wafer.

142

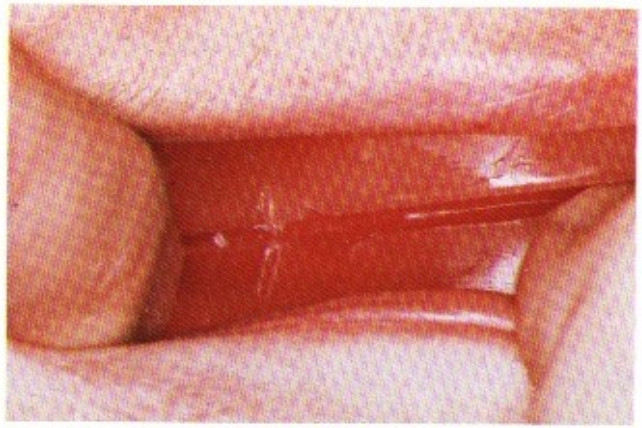


**142** The wax wafer should be chilled with a cold water spray.

143

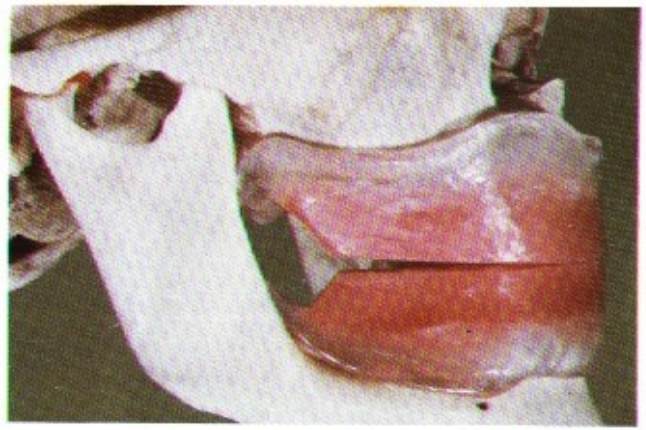
**143** The rims are then removed, and the wafer trimmed. Note the shallow indentations in the wax, and that the wafer has been reduced buccally . . .

144



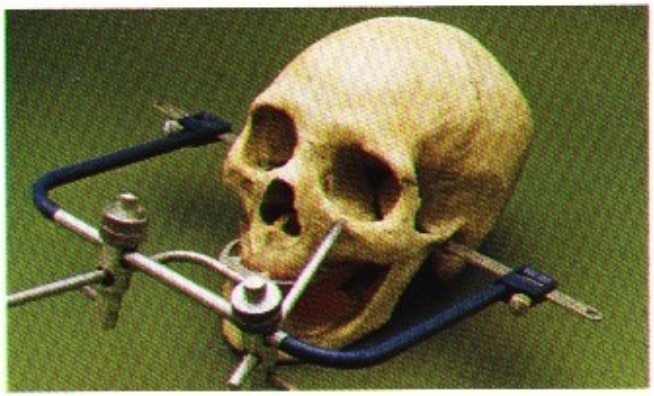
**144** . . . to facilitate checking in the mouth.

145



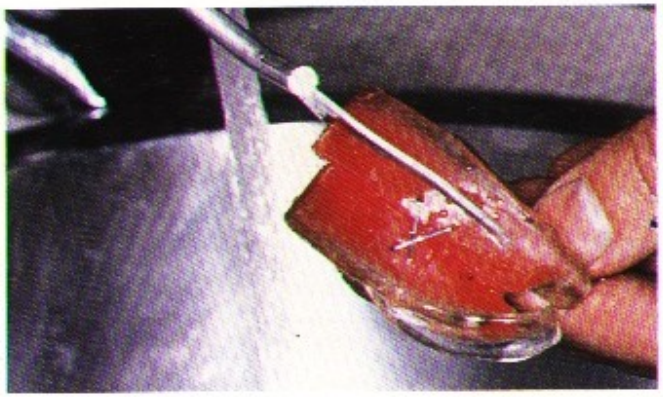
**145** When a patient protrudes the mandible with record rims in the mouth, a gap is created posteriorly which is related to the condylar angle. This effect is known as the Christensen phenomenon, and a wax wafer placed in the gap to record its dimensions may be subsequently used to set the condylar angles on an articulator (see **188**).

146



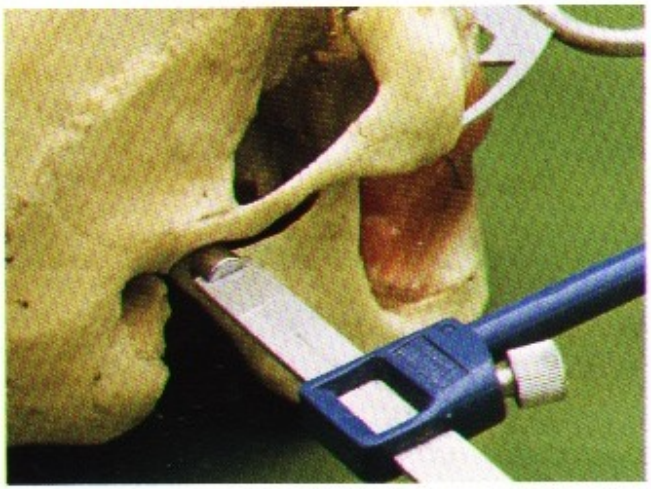
**146** The face-bow is an adjustable calliper, used to record the relationship of the maxilla to the Frankfort plane, and the retruded condylar axis (RCA). The 'bite' fork is located on the upper record rim, and the orbital pointer on the lower border of the left bony orbit.

147



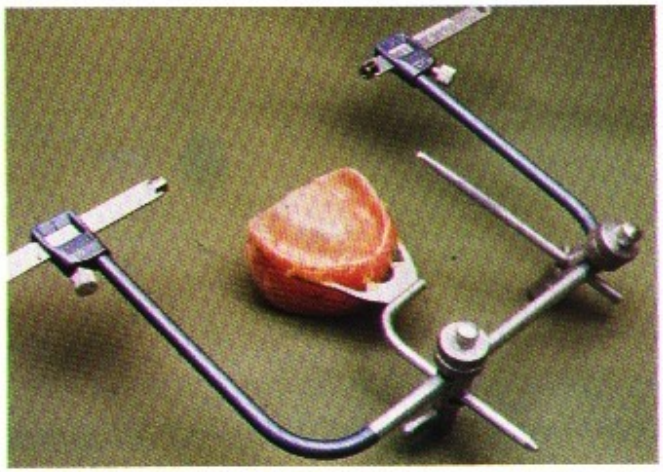
**147** Where the rims have been sealed together, the fork should be warmed in a flame, placed into the upper record rim, and the entire assembly then plunged into cold water to prevent excessive deformation of the wax.

148



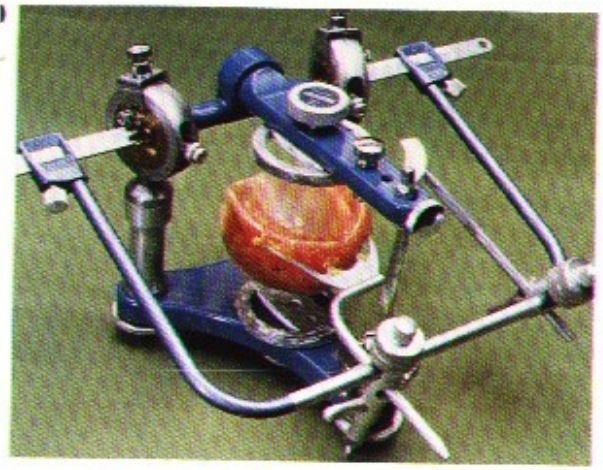
**148** The condylar pointers are placed over the RCA, and adjusted so that the bow is symmetrical about the condyles. Some designs of face-bow use intra-auricular pointers for location.

149



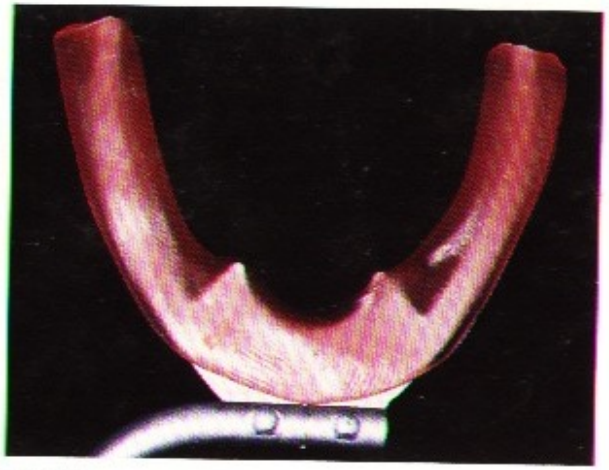
**149** A completed face-bow record.

150



**150** The bow is used to locate accurately the record rims, and thus the casts, on the articulator. The teeth are then set up to produce trial dentures.

151



**151** When the record rims have not been joined together, the fork is covered with softened wax.

152

**152** It is then pressed against the occlusal surface of the upper record rim, which has been coated with a separating medium. V-grooves in the record rim enable the fork to be located accurately.

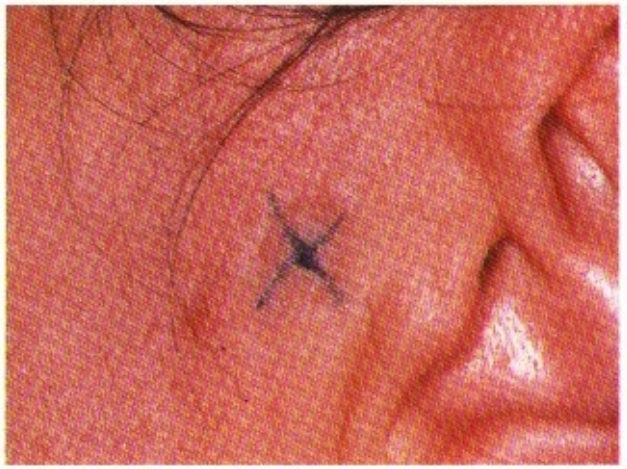
153

**153** If the fork is being used with trial or finished dentures it should be covered with softened compound and pressed against the teeth.

154

**154** Using this procedure, the fork should be held in place by the patient.

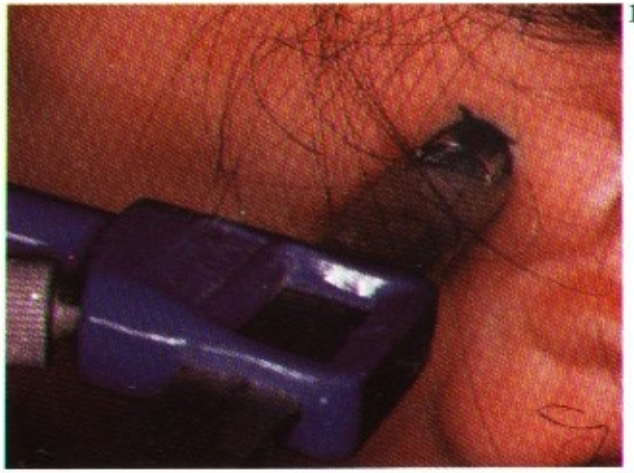
155



**155** The projection of the RCA onto the face may be located by palpation, or the use of a hinge-axis locator. More commonly, a point 12 mm in front of the most posterior part of the tragus on a line from the tragus to the outer canthus of the eye is employed. This is marked with water-based ink.

156

157

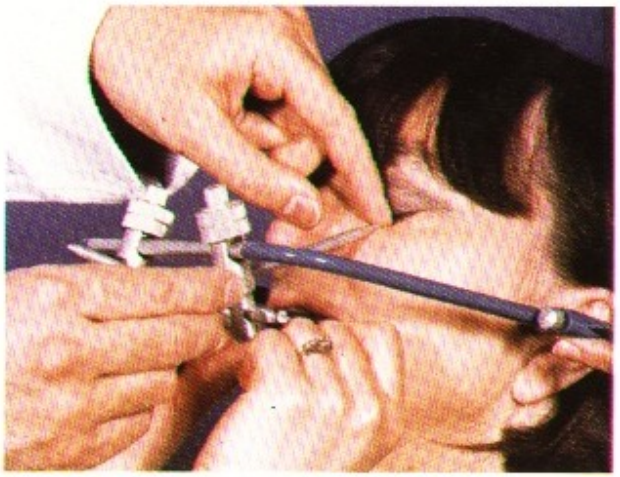


**156 and 157** The condylar pointers are then placed on the marks and the face-bow adjusted until it is symmetrical about the head, as indicated by the scales on each pointer.

158

**158** While an assistant holds the condylar pointers on the RCA, the bow is fixed to the bite fork with one of the universal joints.

159



**159** The lower border of the left bony orbit is then palpated and the orbital pointer positioned over it.

160

**160** The pointer is then fixed with the second universal joint.

161

**161** The completed face-bow record. The tightness of the universal joints should be checked before the patient leaves.

162


**162** Teeth of an appropriate material, mould and shape are then selected.

163

**163** A better estimation of the effect of a particular shade can be gained by holding the tooth in the mouth. Darker teeth tend to look more natural than lighter ones.

164

**164** Artificial teeth tend to be much smaller than their natural predecessors, and a less false appearance is often obtained by using the larger teeth in a manufacturer's range.

165


**165** Large angular teeth tend to look more 'masculine' than small, rounded ones.

# Trial dentures

Trial dentures provide dentist and patient with an opportunity of assessing the probable result of complete denture treatment. The patient will usually be concerned principally with appearance, however, the dentist should use the occasion to check all the features which he plans to incorporate in the dentures.

Each trial denture should be inserted in turn, and a note made of the base extension, the relationship of the teeth to the soft tissues, the position of the occlusal plane, and the mould, shade and arrangement of the teeth. Both trial dentures should then be inserted and the jaw registration and the patient's appearance checked.

At the end of this stage the trial dentures should be returned to the technician with a prescription for their modification, or the construction of the completed dentures.

167

**167** Upper and lower trial dentures on acrylic bases.

166

**166** Instruments and materials required for the trial denture stage.

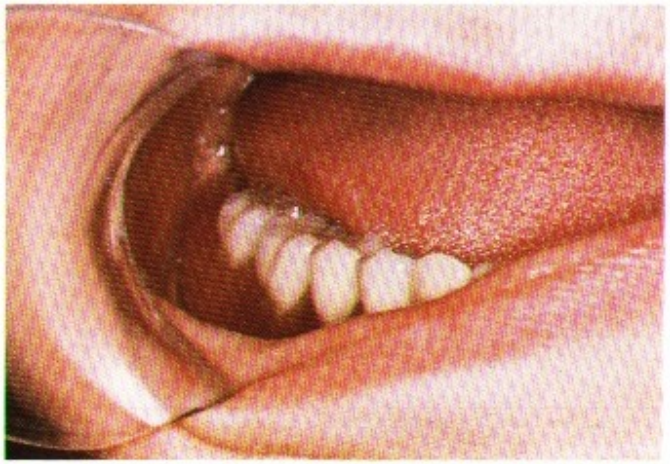
**Fig. 166**

Prescription form and plastic denture bag
Trial dentures, master casts and articulator
Bunsen burner and matches
Denture bowl, mouthwash, bib and chain
Hand mirror
Pink wax
Dividers, wax knife and Le Cron carver
Mouth mirror and napkin
Willis gauge

168

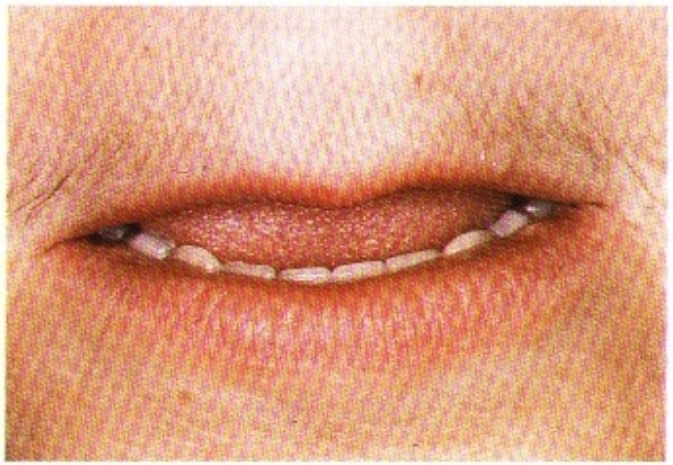
**168** The trial dentures should be mounted on an articulator so that the dynamic relationships of the teeth can be checked, and to facilitate any adjustments which may be necessary.

169



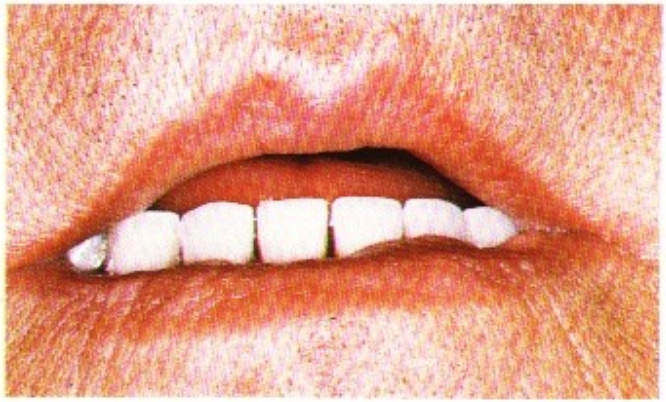
**169** The lower denture should be inserted and its fit, stability and retention checked. Note should be made of the relationship of the teeth to the surrounding soft tissues: they should interfere with neither tongue nor cheeks, and their occlusal surfaces should be just below the lateral margin of the tongue.

170



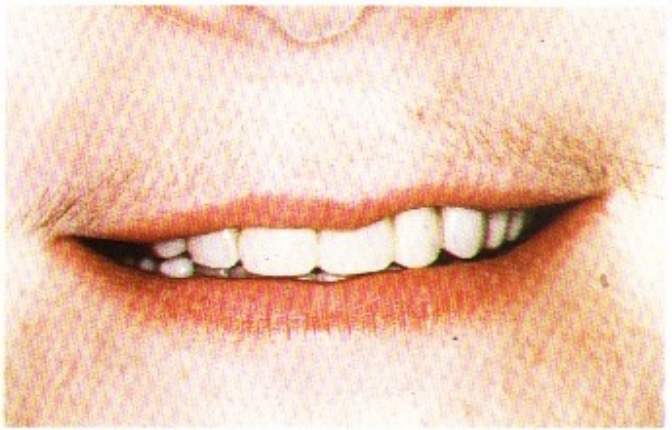
**170** The anterior teeth should similarly provide adequate lip support, and space for the activities of the tongue.

171



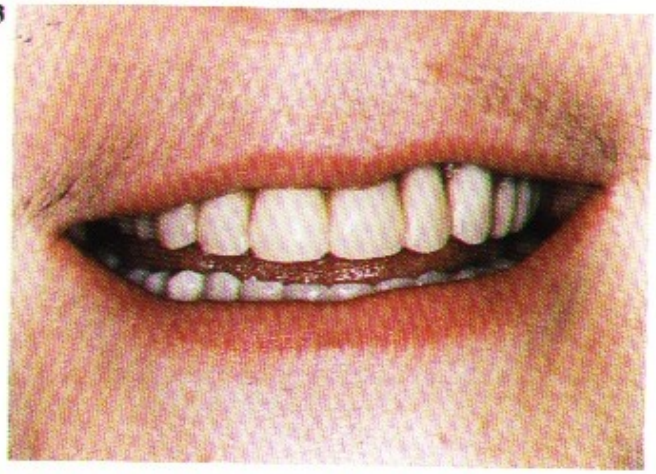
**171** It is unusual for the lower anterior teeth to be much in evidence when the patient is at rest. The lower occlusal plane is too high in this patient.

172

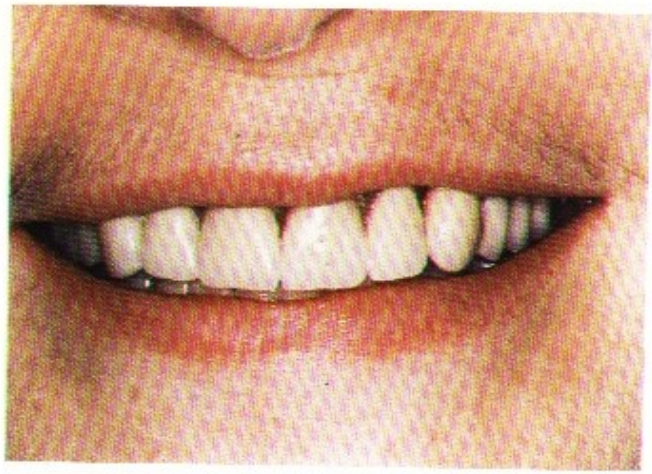


**172** The upper trial denture is then inserted and checked. Here, the level of the occlusal plane is satisfactory, but the teeth have been set too far palatally, the centre line is towards the patient's right and there is inadequate labial support.

173



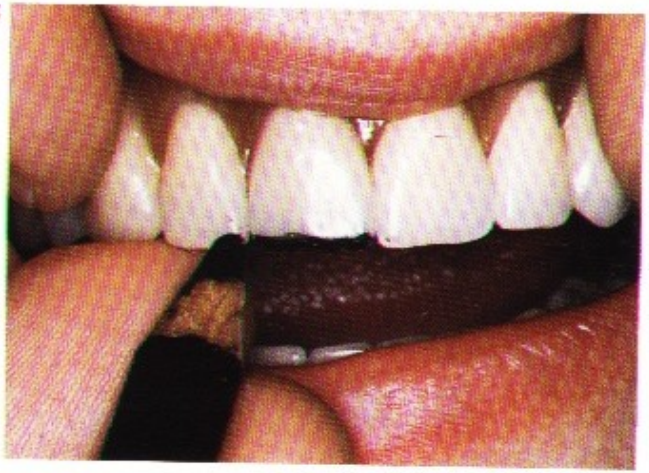
**173** A common error is to set the teeth so that their 'apices' are apparently close to each other. This gives an artificial appearance.



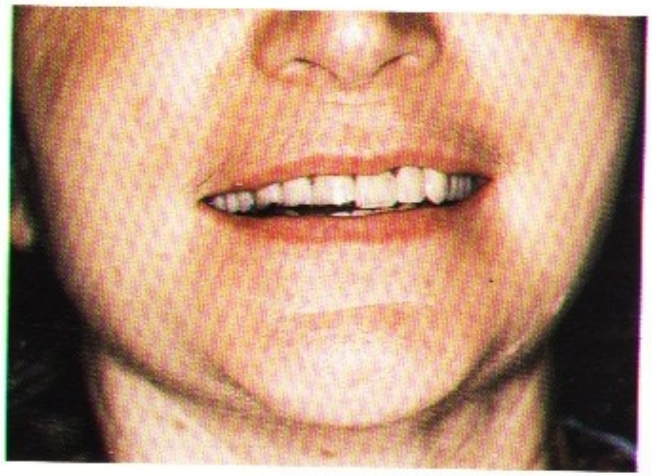
174

**174** A more natural-looking result is achieved with the correct angulation of the teeth.

175



**175 and 176** If it is felt that the upper anterior teeth have been set too low, then their ends may be masked with a black wax pencil. This makes it possible to assess the effect of moving them, without the effort of doing so.



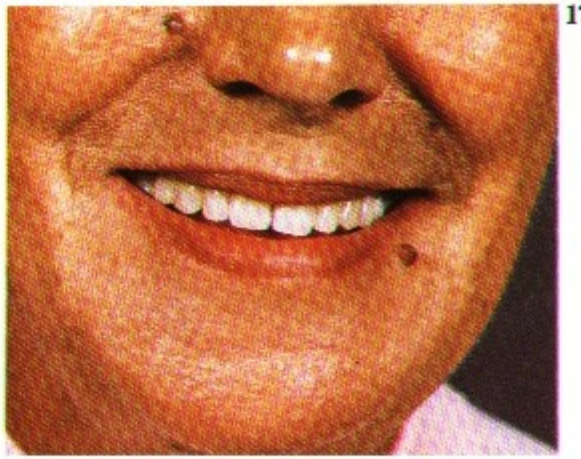
176

## Alternative tooth arrangements

177

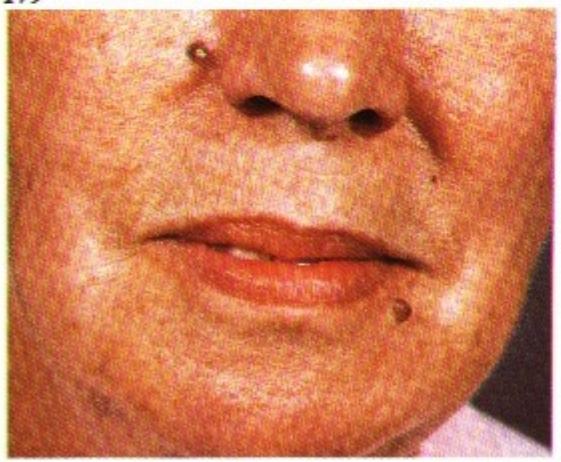
**177** Many patients believe that their own teeth were small, white and set in an even row, producing this unnatural appearance.

178



**178** While the mould of the teeth used on this denture is more satisfactory, failure to provide adequate labial support still leads to an unnatural appearance.

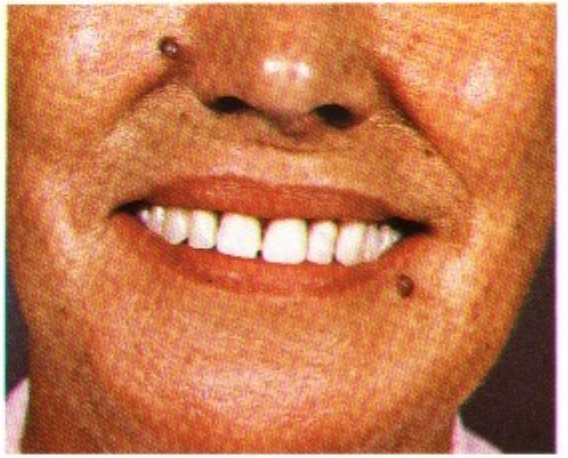
179



180

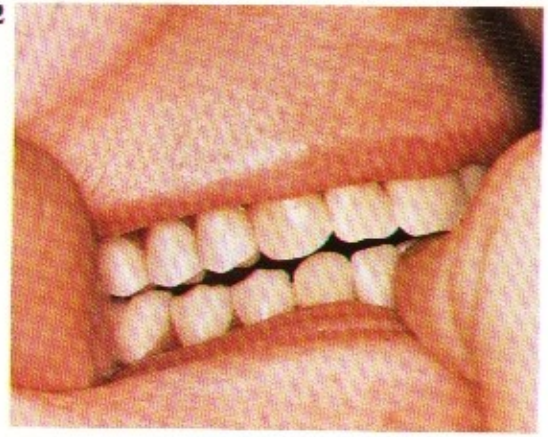
**179 and 180** These dentures replicate the position of the patient's own anterior teeth. At rest, the edges of the upper incisors lie on the junction between the matt and glossy labial mucosa, and a natural effect is achieved when smiling.

181



**181** It is, however, possible to set the upper anterior teeth too far labially!

182



**182** The dentist should check that the teeth meet evenly with the mandible on the RCA, and that the OVD is correct. Here, there is a premature contact in the molar region.

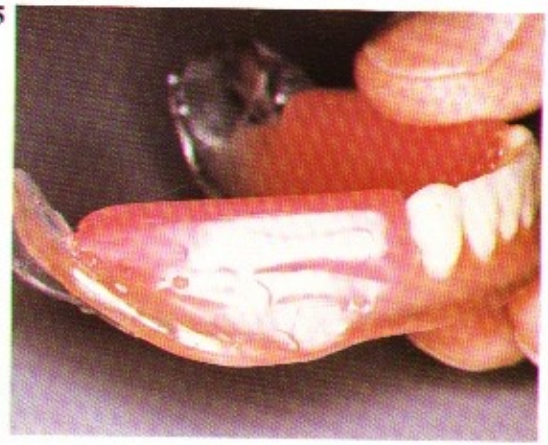
183

**183** This is best dealt with by removing the lower posterior teeth.

184

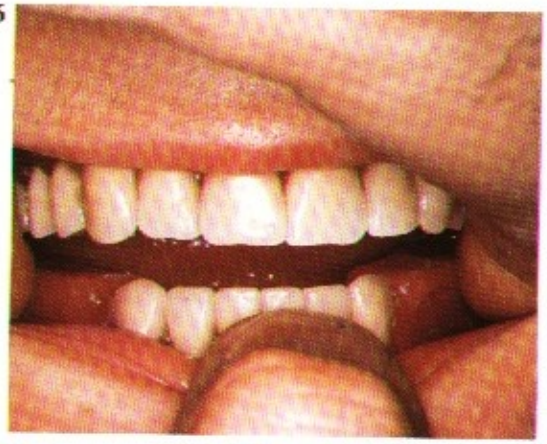
**184** These teeth should be placed on a strip of carding wax for return to the laboratory.

185



**185** The missing teeth are then replaced with wax rims, which may be readily made at the chairside.

186



**186** The jaw relationship is next recorded using the wax rims, which should meet the upper teeth evenly at the desired OVD.

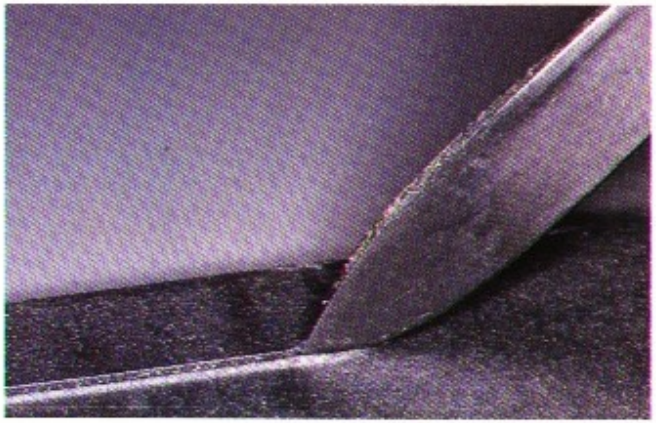
187

**187** The horizontal relationship is recorded with a registration paste, or by softening the surface of the wax. The trial dentures should then be returned to the laboratory for the lower cast to be remounted, and the teeth reset.

## Protrusive records

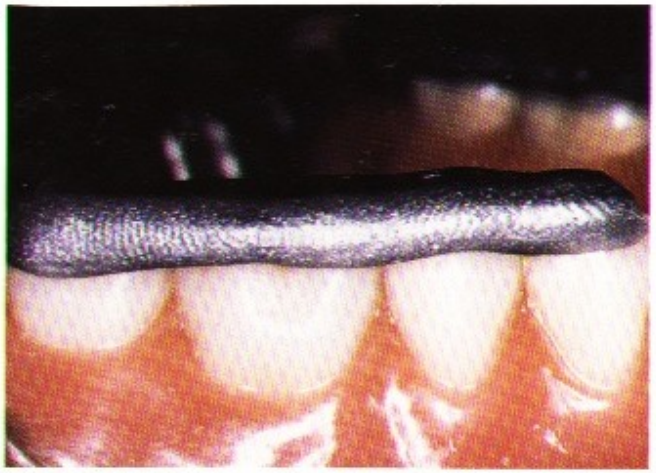
While wax records for setting the condylar angles on an adjustable articulator may be made at the registration stage, this is not feasible if the rims have been joined together. In these circumstances, it will be necessary either to set the angles to average values, or to make the appropriate records at the trial denture stage. This has the disadvantage that the technician may need to slightly re-position the teeth. The procedure is essentially similar to that which is followed when using wax wafers on record rims (see **141-145**).

188

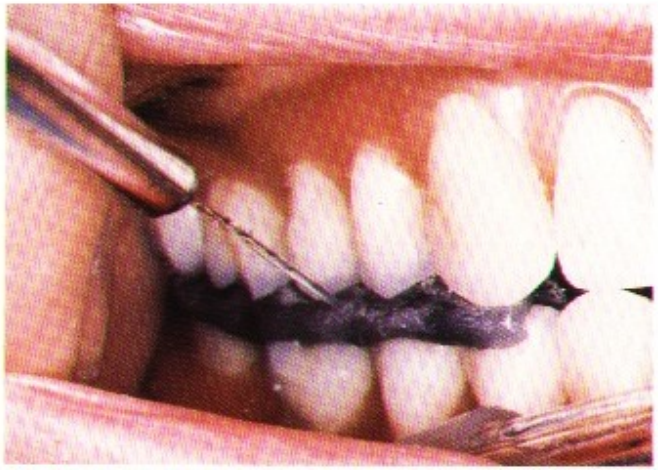


**188 and 189** A strip of aluminised or hard pink wax is cut from a sheet and softened over a flame. The wax is then placed on the occlusal surfaces of the lower posterior teeth, and the trial dentures inserted in the patient's mouth.

189

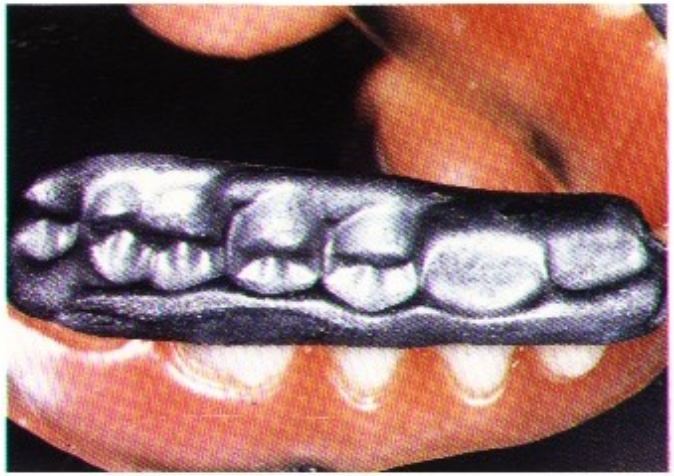


190



**190** The patient then closes the mouth, with the mandible protruded a short distance, until the wax is slightly indented. It is then chilled.

191



**191** The patient should not occlude into the wax so far as to produce tooth to tooth contact; indentations must be shallow.

192

**192** The wafer is then trimmed with a scalpel, so that the inter-digitation of the teeth and wax may be clearly seen.

193

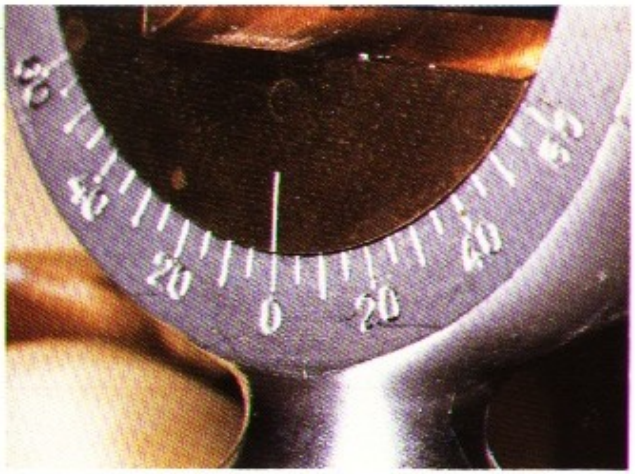
**193** A trimmed wax wafer. Note that the indentations are now very shallow, and that the buccal aspect of the wax has been cut at an angle.

194

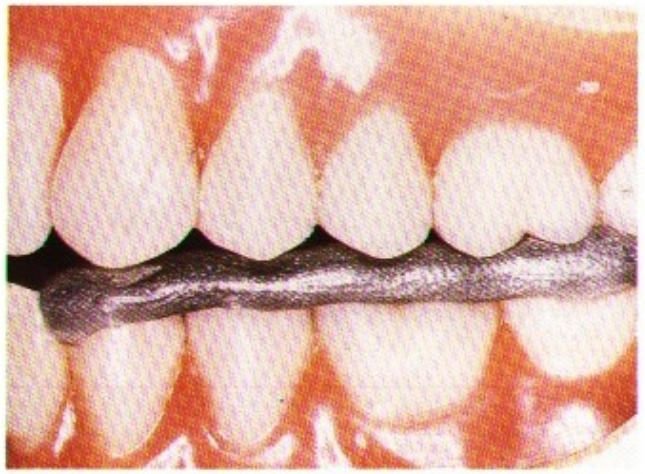
**194** Teeth in occlusion with the wafer.

The trial dentures are then returned to the articulator and the condylar angles adjusted until the teeth meet evenly in the wax.

195

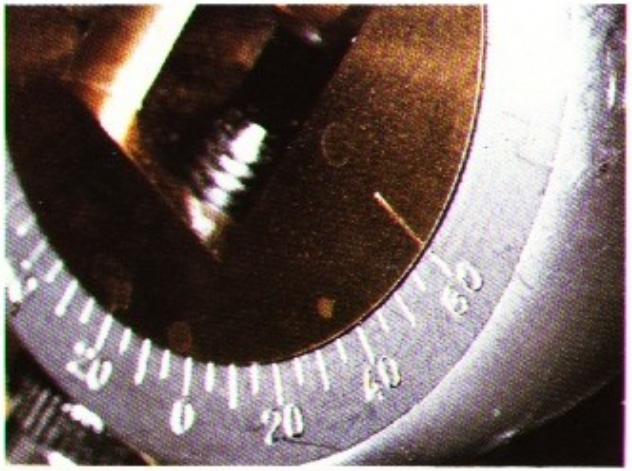



196

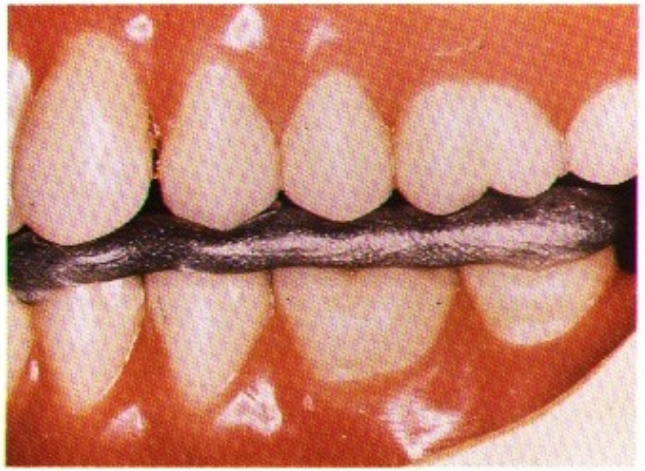


**195 and 196** In this pair of pictures, the condyle angle has been set at 0° and the space between the upper canine and wafer is clearly seen.

197

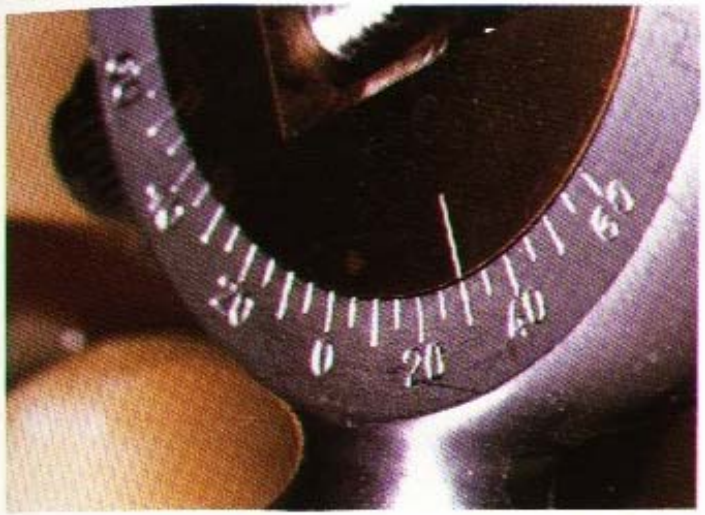



198

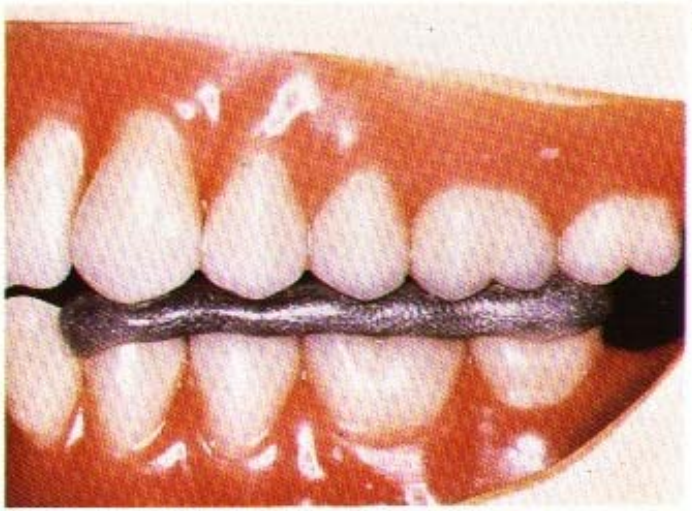


**197 and 198** Setting the condylar angle at 60° results in a space between the wafer and the upper molars.

199




200

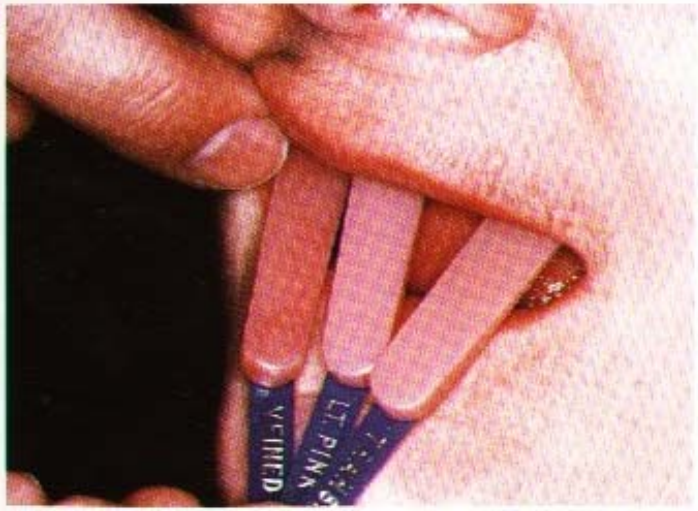


**199 and 200** With the condylar angle set correctly, there is even contact between the wax wafer and upper teeth.

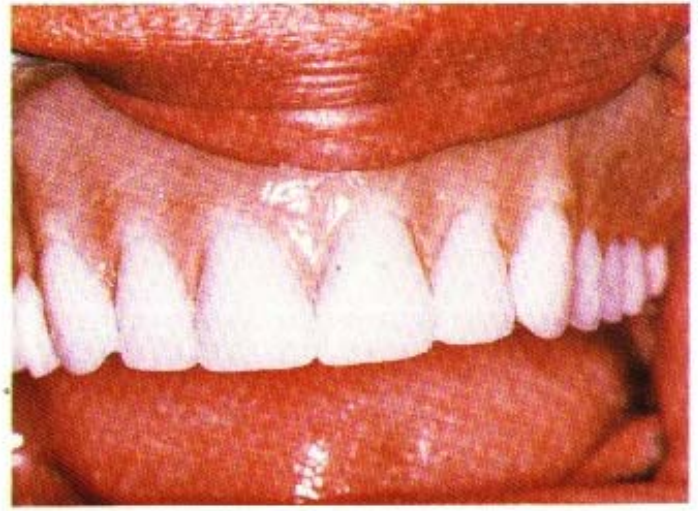
Similar techniques may be used to set the Bennett angle, although many operators prefer to use an average value of 15°.

## Denture base shade

201




202



**201** The most appropriate shade of pink resin for the denture base should be selected.

**202** Dentures for dark-skinned patients frequently have a better appearance if a more heavily pigmented denture base is used.

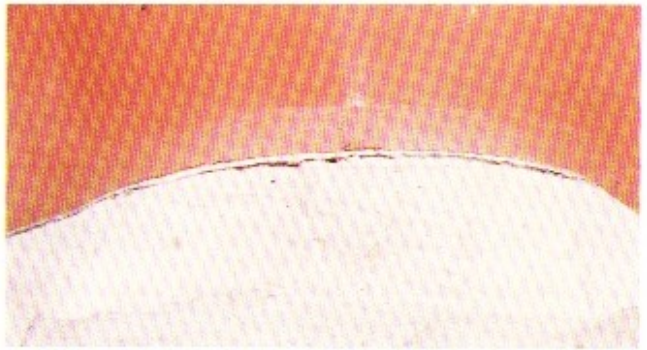
## Cutting a post-dam

If the impression procedure has not involved the selective displacement of the palate in the post-dam region, it will be necessary to trim the cast to produce a seal around the denture in this area. This procedure is required if a mucostatic impression material such as plaster is used.

203

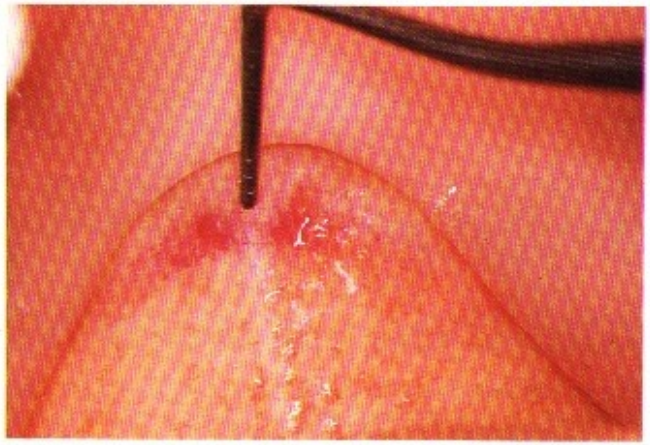
**203** The position of the posterior border of the denture should be marked on the palate with an indelible pencil. The trial denture base should then be trimmed to this line.

204



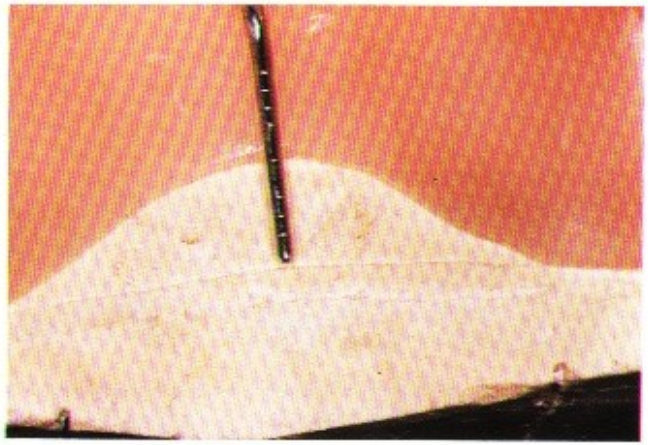
**204** The trial denture is replaced on the master cast, and the posterior border of the palate used as a template for marking the post-dam.

205



**205** If the base is underextended a periodontal pocket-measuring probe may be used to measure the deficiency.

206

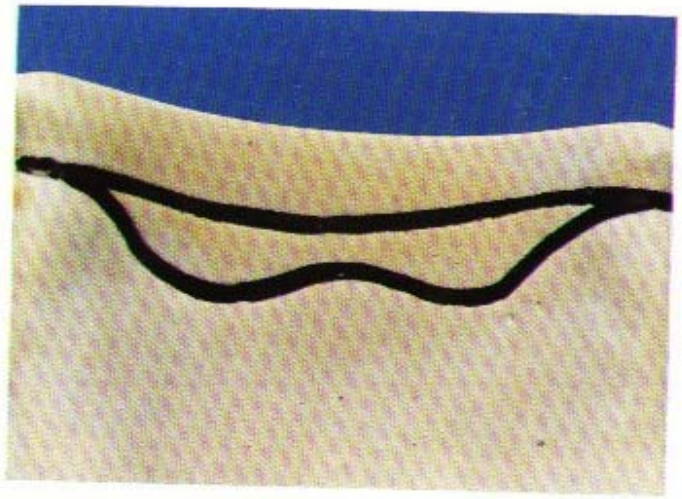


**206** This information is transferred to the master cast.

207

**207** The palate is then felt with a ball-ended burnisher to assess the amount of potential tissue displacement in the post-dam region, and to delineate its extent.

208

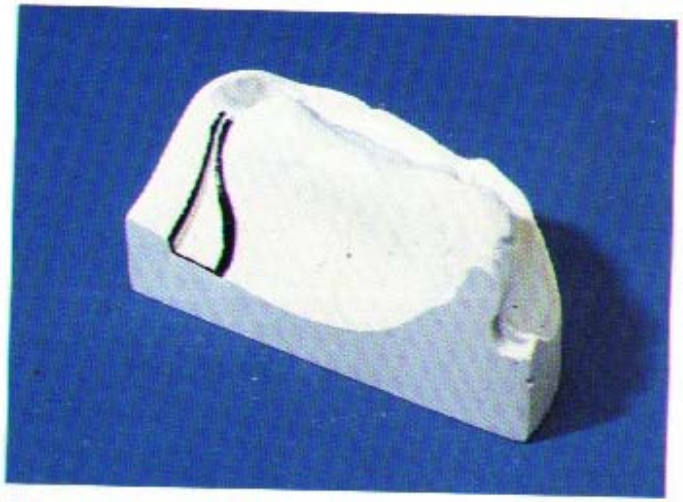


**208** This area usually has the shape of a cupid's bow.

209

**209** A line is scribed into the cast to the depth of the posterior part of the post-dam.

210



**210** The cast is then gently scraped so as to bevel its surface from the anterior limit of the post-dam to the depth of the scribed line.

# Denture insertion

The completed dentures should be inspected to ensure that they have been made satisfactorily, and any sharp spikes on their fitting surfaces identified by palpation and carefully ground away.

All aspects of the dentures must be assessed, including base extension, fit and retention, together with the occlusion, and the patient's appearance when wearing them. Usually, small errors may be readily corrected, but the scope for change is limited at this stage.

Occlusal adjustment is nearly always necessary when inserting new dentures, and may be carried out either at the chairside, or in the laboratory after the dentures have been mounted on an articulator. The latter procedure is potentially more time-consuming and error-prone, but also makes adjustment easier. It is to be preferred if the alterations are other than minor.

On completing this stage the patient must be discharged with instructions on the use and care of the new prostheses.

211

**211** Instruments and materials required for the denture insertion stage.

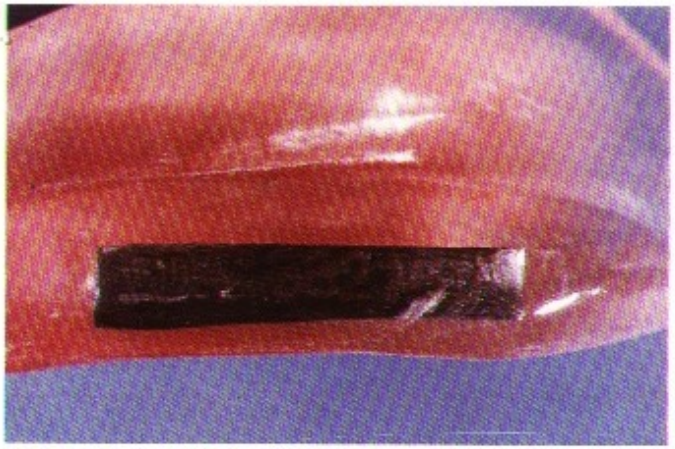
212

**212** A completed upper denture with a clear palate. This enables areas of high pressure under the denture to be more readily seen, and is preferred by some patients because of its lighter appearance.

**Fig. 211**

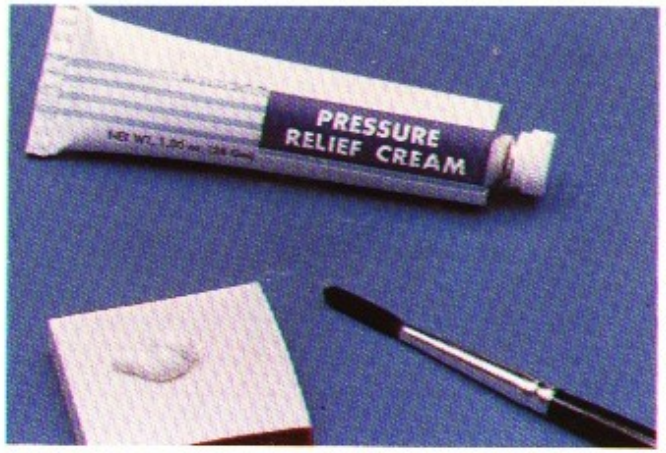
Prescription form and denture bag
Articulator
Pressure indicating paste
Denture bowl, mouthwash, bib and chain
Hand mirror
Completed dentures and study casts
Straight handpiece and burs
Occlusal indicator wax
Articulating paper
Mouth mirror and napkin

213



**213** An etched stainless steel identity tag embedded in a denture. These can provide valuable forensic evidence and are highly heat-resistant. Tags may also be constructed by typing the identity number on a piece of lightweight paper.

214




**214** Pressure indicating paste may be used to identify areas on the fitting surfaces of the dentures, which exert heavier pressures on the underlying tissues.

215

**215** A thin layer of paste is painted on the fitting surface of the denture.

216

**216** The denture is then seated in the mouth and removed, whereupon areas where heavier pressures were exerted may be readily identified.

217

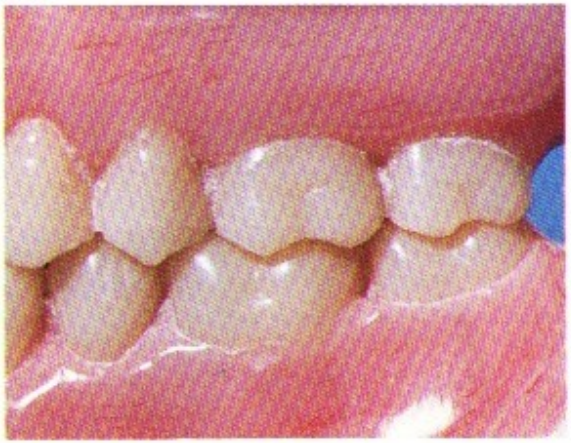
**217** Provided that there are no major errors, the first stage in occlusal adjustment should be to ensure that the antero-posterior relationship of the teeth is correct, when they are brought together with the mandible maximally retruded. Here the lower denture is tending to slide forwards as the teeth are brought together.

218

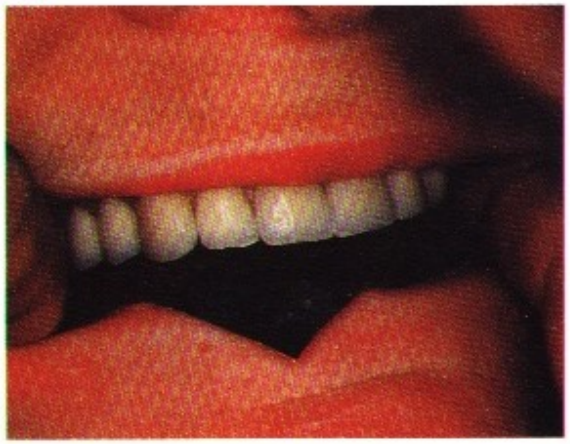
219

**218 to 220** This error should be corrected by grinding the sides of the cusps so as to effectively move their tips in opposite directions.

220

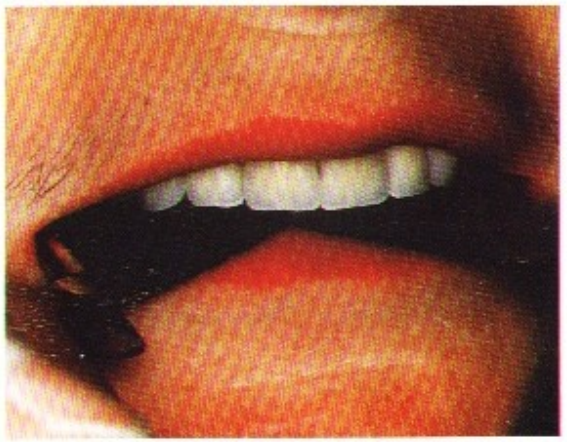


221



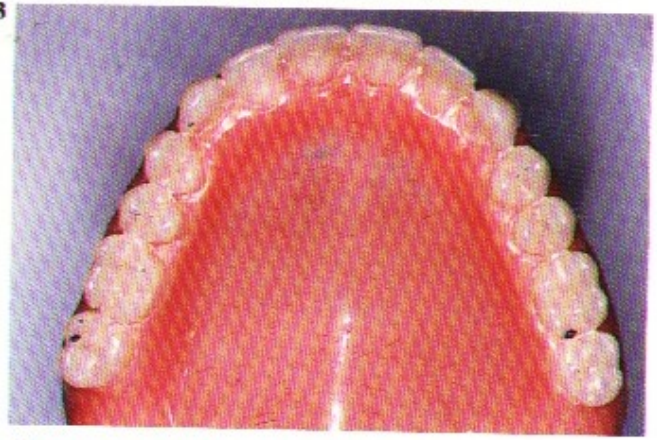
**221** The static relationship of the teeth in the intercuspal position is then checked using thin articulating paper or tape.

222



**222** This can be conveniently used in special holders.

223

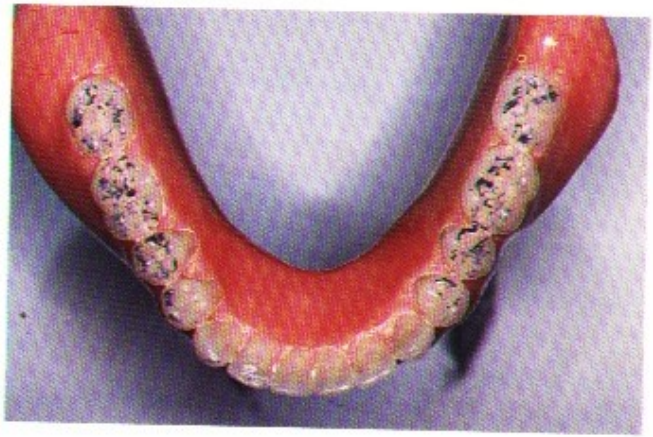


224

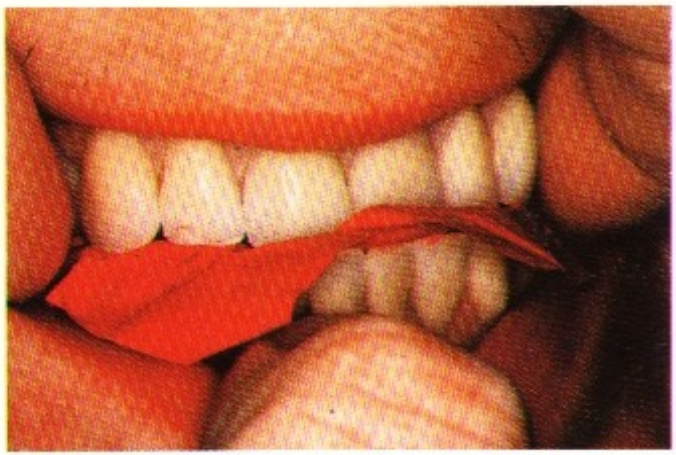
**223 and 224** There is very little occlusal contact between these dentures in the intercuspal position. This should be corrected by grinding the fossae and sides of the cusps.

225

226



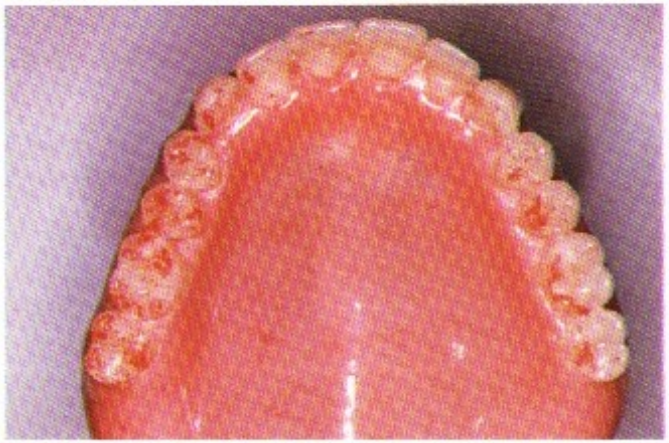
**225 and 226** Marks produced on the occlusal surfaces of the dentures, following adjustment to produce widespread contacts in the intercuspal position.

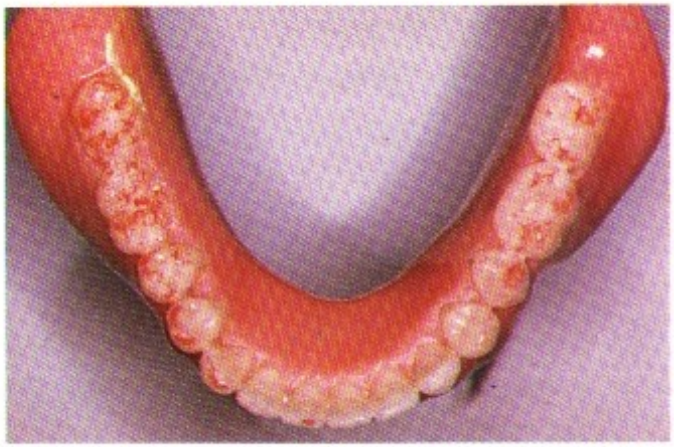


227

**227** The dynamic relationships of the teeth when the jaw is moved to the left and right, and when protruded, should be checked with articulating paper or ribbon of a different colour.

228

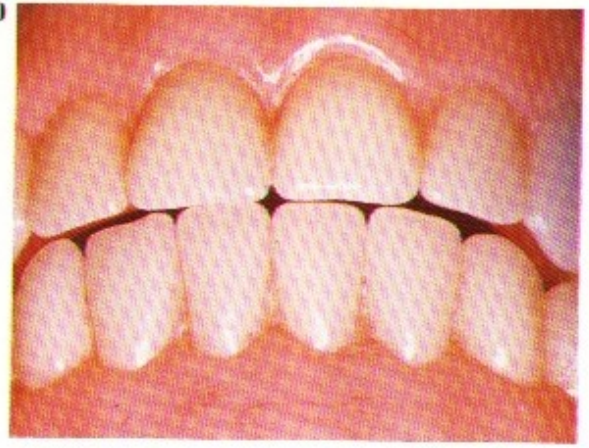




229

**228 and 229** The pattern of occlusal contacts produced by sliding the mandible to the right. In this situation this is often described as the working side, and the left as the balancing side. Even occlusal contacts, such as these, are produced by grinding the cusps. On the working side the buccal upper and lingual lower should be adjusted; on the balancing side the palatal upper and the buccal lower.

230

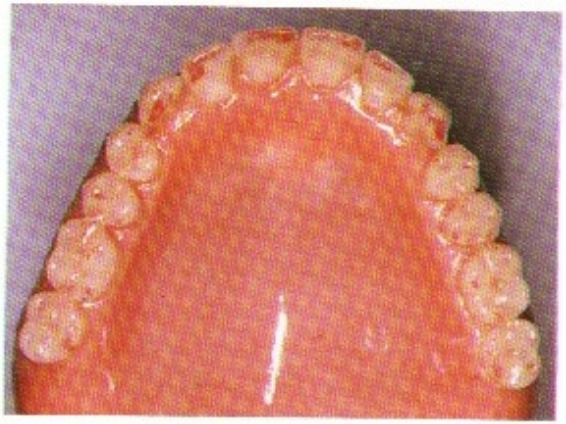


**230** Poor incisal contacts with the mandible protruded.

231

**231** Adjustment should be carried out by grinding the palatal aspects of the upper incisal edges and the labial aspects of the lower incisal edges. Note the angle at which the lower incisal edges have been ground. It may also be necessary to grind the cusps of the posterior teeth so as to improve incisal contact.

232



233

**232 and 233** Occlusal and incisal contacts following adjustment to provide balanced contacts with the mandible protruded.

234

**234** The improved pattern of incisal contacts in protrusion.

235


**235** Occlusal indicator wax may be used instead of articulating paper to indicate the location and extent of occlusal contacts, or near contacts.

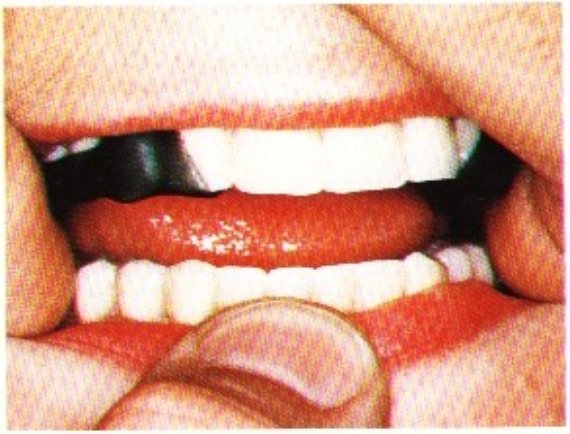
236

**236** The wax has a shiny, mildly adhesive coating on one side. The pencil is used to mark the teeth where the opposing arch has penetrated the wax.

237

**237** The wax should be carefully adapted to the occlusal surfaces of the teeth.

238



**238** The mandible is gently guided so that the teeth make contact with the lower jaw maximally retruded.

239

**239** Areas of heavy tooth contact will cause penetration of the wax, which also allows the identification of near contacts. The teeth should be marked where the wax has been penetrated.

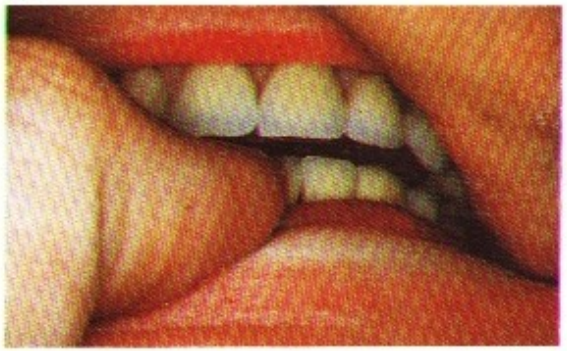
240

**240** This clearly demonstrates the areas of heavy occlusal contact.

## Incisal stop technique

When occlusal adjustment is to be carried out on an articulator, it is necessary to record the relationship of the dentures at the first tooth contact. Where the patient can hold the teeth in this position long enough for a recording medium to set, this may be done using occlusion registration paste or wax. When the patient has difficulty maintaining the desired jaw relationship, an incisal stop can be helpful. This is made by placing a small amount of softened compound on the palatal aspect of the upper denture behind the incisors.

241

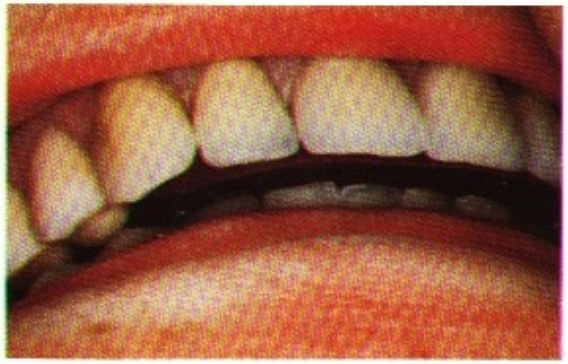


**241** The mandible is gently guided until the first occlusal contact is noted. The operator's thumbnail should act as an additional stop, and the lower incisor teeth should slightly indent the compound. The patient is then asked to open the mouth and the compound is chilled.

242

**242** The stop should be trimmed so that the indentations caused by the lower incisors are barely evident. This assists the checking of the record.

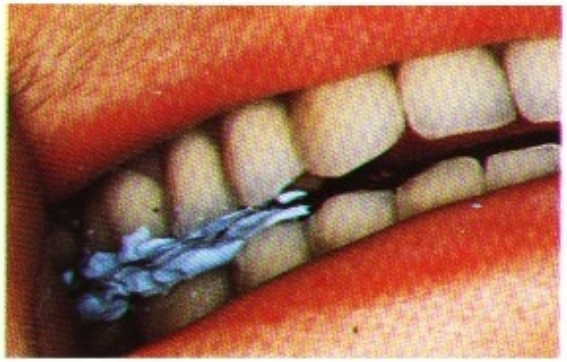
243



**243** The relationship of the teeth with the stop in place.

Note that the intercuspal position provided by the dentures lies in front of the first occlusal contact with the mandible maximally retruded.

244



**244** A separating medium is then placed on the upper teeth, and the relationship of the dentures recorded using an occlusion registration paste. A face-bow record will also be required if the dentures are to be mounted on an adjustable articulator.

245

**245** When all adjustments have been completed the patient should be advised on the proper care and use of her new dentures, and arrangements made for a review appointment.

# The review appointment

The patient's comments on the performance of the dentures, coupled with a thorough clinical examination, will usually indicate the nature, location, and probable cause of any problems which they might be experiencing. The management of many of these is beyond the scope of this book, but traumatically-induced ulcers are one of the most common.

The instruments and materials required will vary with the procedures.

246

**246** The relationship between the denture flange and a large ulcer, such as this, may be readily identified and treated by trimming the prosthesis. It should be noted, nevertheless, that problems related to the denture base are often caused by occlusal errors.

247

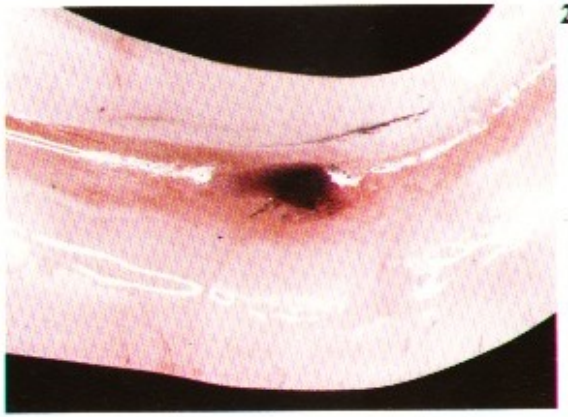
**247** The relationship between a small ulcer (arrowed) on the denture-bearing area, and the fitting surface of the denture may be more difficult to establish. On occasions, pressure indicating paste is valuable for this purpose.



248

**248** An alternative technique is to mark the ulcer with an indelible pencil.

249

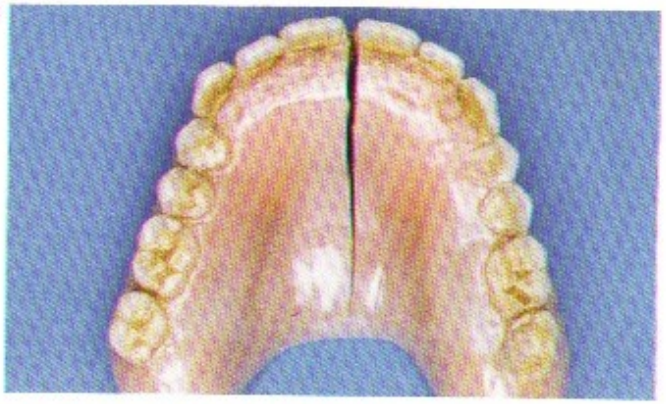


**249** The ink can then be transferred to the fitting surface of the prosthesis, greatly facilitating correct adjustment.

# Additional techniques

## Alternative denture bases

250

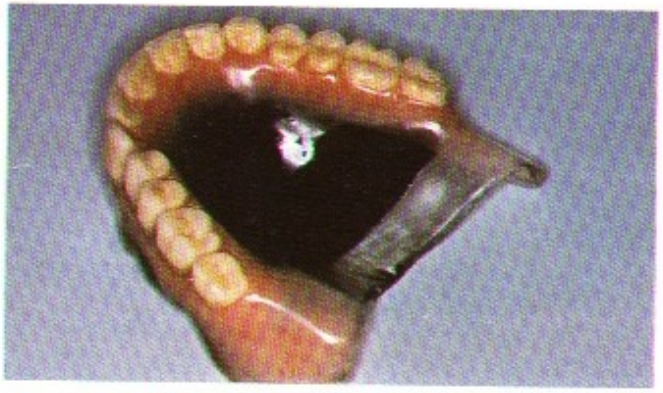


**250** Acrylic resin denture bases frequently fracture in the mid-line as a result of fatigue failure. The problem is exacerbated by the use of ill-fitting or poorly-designed dentures. However, it is sometimes necessary to overcome the difficulty by the use of a denture with a stronger base, such as one made from metal, or reinforced with carbon fibres.

251

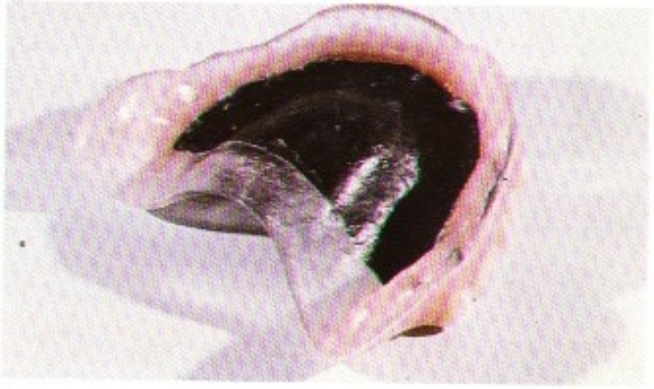
**251** A cast cobalt-chromium palate is much stronger than one made of acrylic resin. However, retention tends to be poorer, particularly as it is difficult to achieve an effective post-dam seal. One method of overcoming this is to place a border of acrylic resin on the posterior edge of the metal. Unfortunately, this design makes the palate of the denture thicker in an area where it is very noticeable to the patient.

252



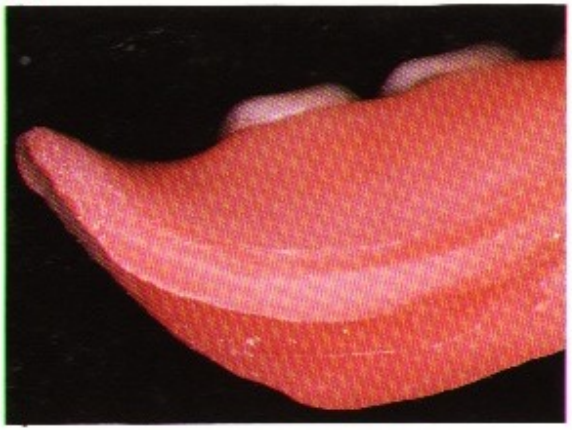
**252 and 253** Carbon fibres may be incorporated into acrylic resin, and will tend to increase its strength, rigidity and fatigue resistance. It is not easy to incorporate them into the

253



base without making it excessively thick, or having fibres protruding from its surface.

254



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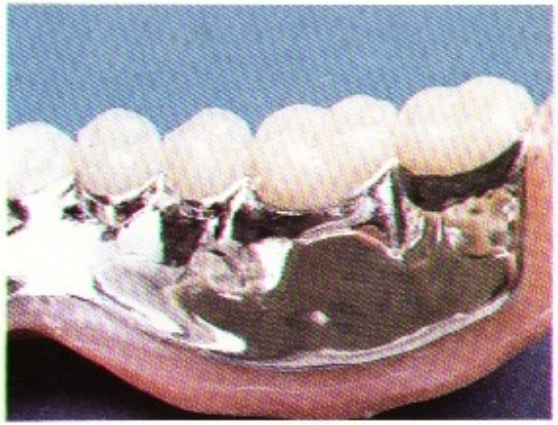


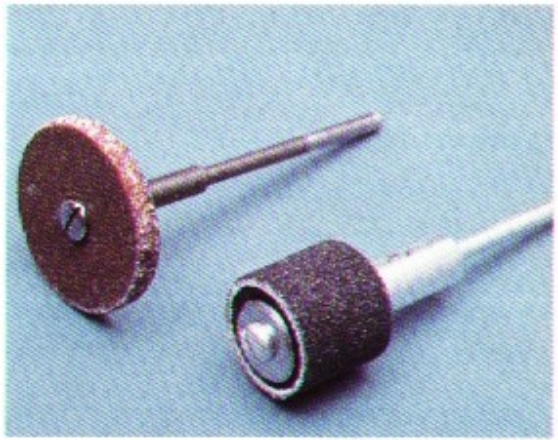
256

**254 to 256** A soft lining will modify the rate of loading of the tissues, and act as a cushion. The material must be used in a thickness of at least 3 mm, which can result in weakening of the denture base. This problem may be overcome by the incorporation of a custom-made, cast metal strengthener, so that the denture effectively becomes a metal casting with an acrylic facing. A window has been cut in this denture to show the retention beads on the surface of the metal.

Soft linings tend to abrade the tissues, separate from the denture base, and have poor dimensional stability.

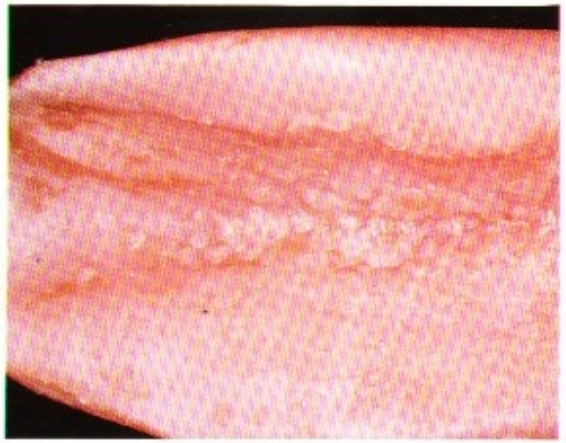


257



**257** Special tools are necessary for adjusting soft linings, and it is difficult to achieve a good finish.

258



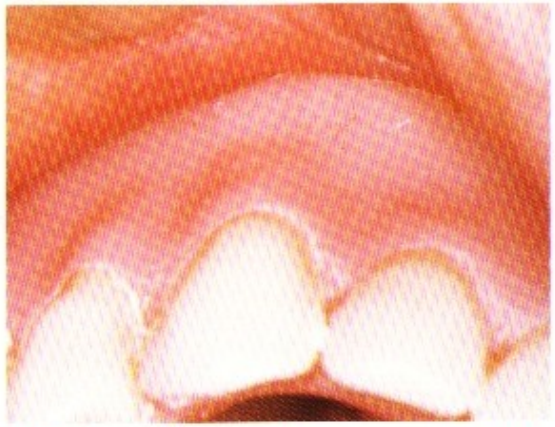
**258** Soft linings tend to abrade the tissues, have poor dimensional stability and are frequently colonised by oral fungi, as seen here.

## Rebasing a complete denture

Dentures are rebased so as to improve the fit and retention of an otherwise satisfactory prosthesis. The procedure must be carried out with great care, both at the chairside and in the laboratory, as it is very easy to spoil the appearance and occlusion of the dentures.

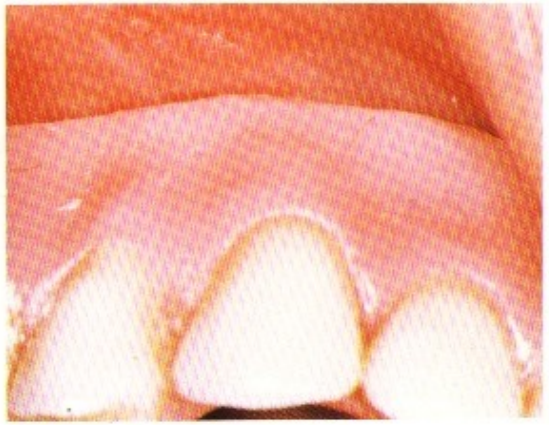


259



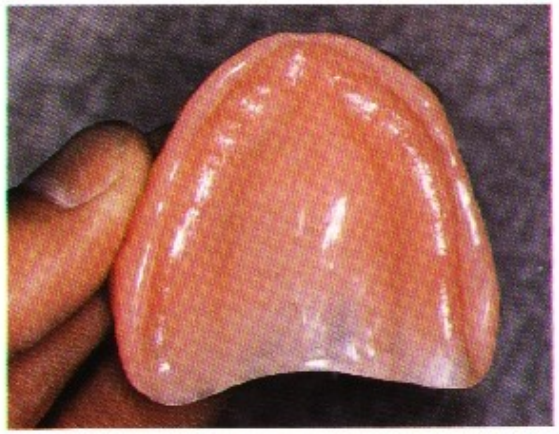
**259** The periphery of the denture should be checked, and overextension such as this reduced.

260



**260** Correctly extended denture.

261

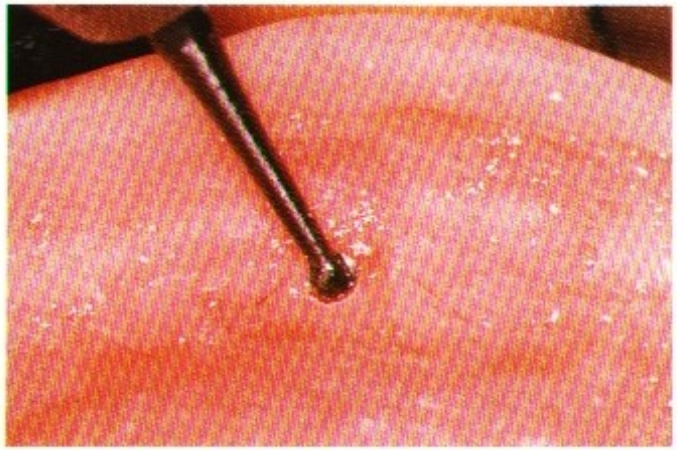


**261** Any undercuts present on the fitting surface of the denture should be noted.

262

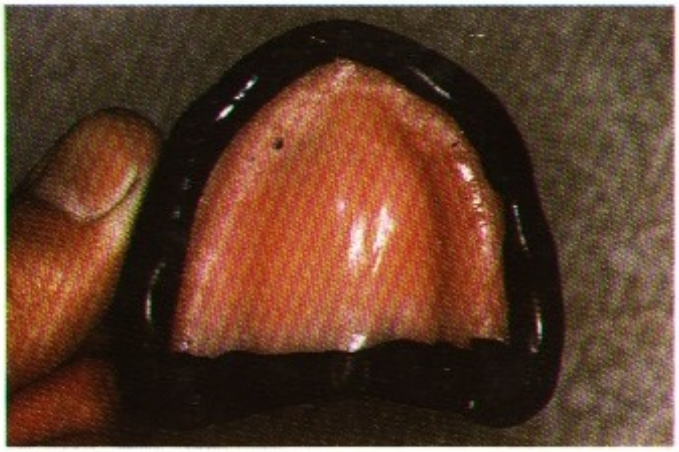
**262** They must be ground away, so that the denture may ultimately be readily removed from the cast which will be poured inside it.

263



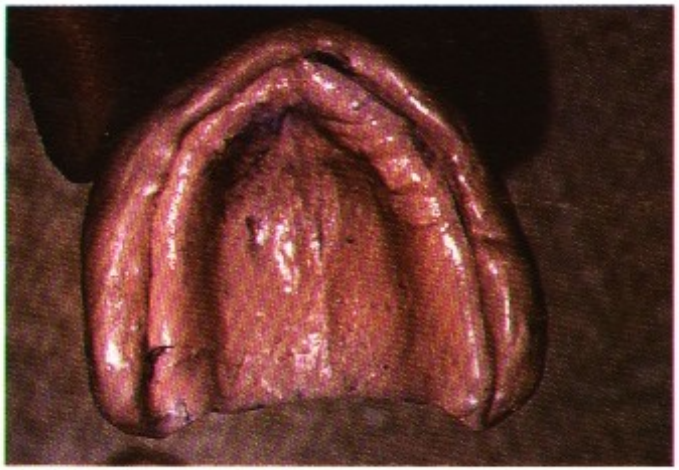
**263** Holes should then be drilled through the denture on either side in the canine region, so as to allow the impression material to escape. It this is not done, it is possible to trap a considerable amount in the front of the denture, which will result in the upper occlusal plane being much lower than it was before.

264



**264** Greenstick compound is then traced around the periphery of the denture where it is deficient, and an overall impression made in a low viscosity material, usually zinc oxide-eugenol paste.

265



**265** The completed impression.



The procedure for rebasing a lower denture is essentially similar, although it is not necessary to drill holes through the base. When upper and lower dentures are to be rebased at the same visit, impressions should not be recorded concurrently. After rebasing it is necessary to check and adjust the occlusion.

# Temporary modifications to dentures

## Tissue conditioning materials

Tissue conditioning materials exhibit elasticity and plasticity. They are used temporarily on the fitting surfaces of dentures to improve their fit, act as a cushion for the underlying denture-bearing area, and allow inflamed tissues to recover their normal shape.

266


**266** Tissue conditioning materials are supplied in the form of a powder and a liquid which are mixed together to produce a low viscosity material which rapidly assumes a rubbery consistency. Before this is placed in the denture any obvious errors such as peripheral overextension and occlusal imbalance should be corrected.
(**S**: separating medium; **M**: measures; **C**: mixing cup).

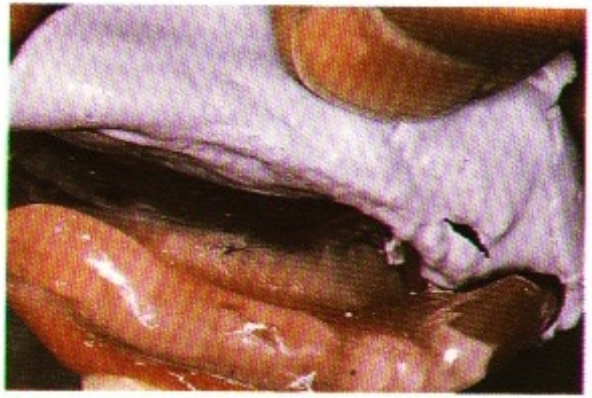
267

**267** The predominant contact areas between the mucosa and the fitting surface of the denture may be readily identified by placing a thin layer of alginate impression material in the denture, and seating it in the mouth. No adhesive should be used.

268

**268** When set, the denture may be removed from the mouth and any premature contacts adjusted, so that there will be a more even layer of tissue conditioning material on the fitting surface.

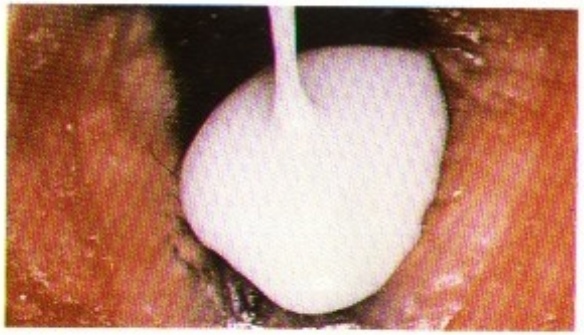
269



**269** Once adjustments have been completed, the alginate may readily be peeled away.

**270** The fitting surface of the denture should then be thoroughly cleaned and dried, the polished surfaces coated with the separating medium, and a

270

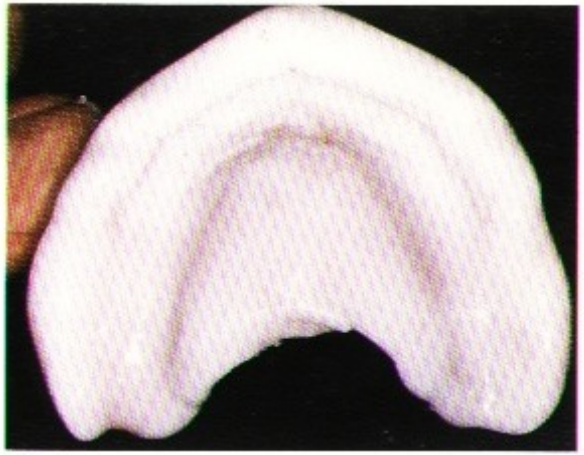


thin layer of freshly mixed tissue conditioner spread over the fitting surface. At this stage the material has a low viscosity, and readily wets the denture. The bulk of the tissue conditioning material may be placed on the fitting surface when it has acquired a greater viscosity, and may thus be more easily controlled.

271

**271** The denture, loaded with the tissue conditioning material, should then be inserted into the mouth in a similar manner to that used when making an impression. The patient should be encouraged to move the lips, cheeks, tongue and jaw so as to mould the tissue conditioner peripherally.

272



**272** The denture should then be removed from the mouth and the 'impression' inspected.

273

**273 and 274** Surplus material may be trimmed using a hot wax knife held at an angle so that the peripheral roll merges into the polished surfaces of the denture.

274

275

**275** After the denture has been worn for 24 hours it will be possible to see places where the tissue conditioner has flowed away in areas of heavy pressure. The denture should be adjusted and the tissue conditioner replaced.

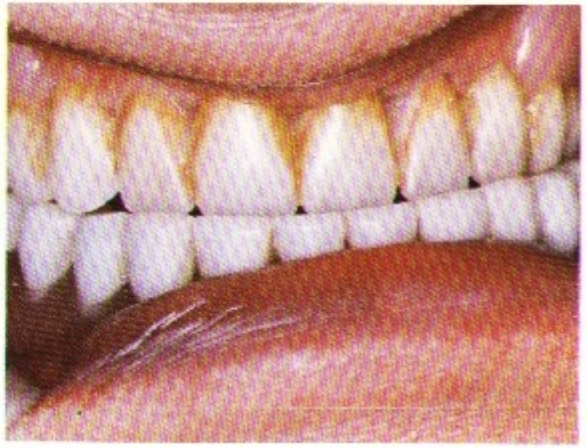
## Occlusal stops

As a result of faulty construction or occlusal wear, some patients have dentures which occlude predominantly in the incisor region when the patient brings the teeth together, with the jaw maximally retruded. Temporary correction of the fault with self-curing acrylic resin, prior to construction of new dentures, often makes the patient more comfortable, and greatly facilitates the recording of jaw relationships with the mandible maximally retruded.

276

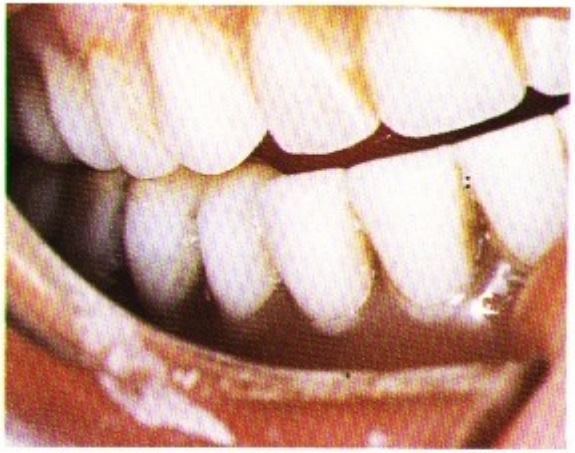
**276** Occlusal wear has resulted in this patient's dentures having little contact posteriorly when he occludes with the mandible maximally retruded.

277



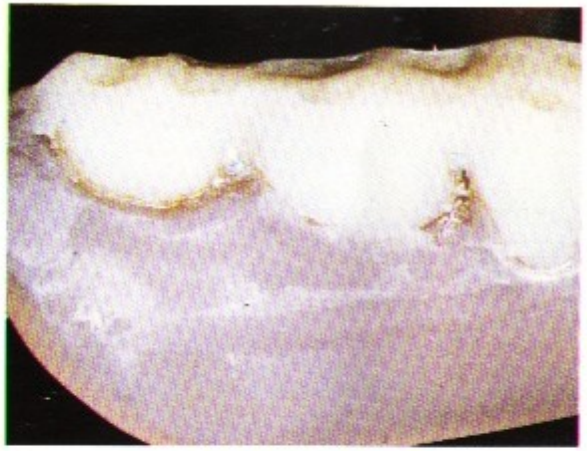
**277** To obtain even occlusal contact the patient protrudes the mandible.

278



**278** The posterior teeth have been built up with self-curing acrylic resin. This is done by placing a small amount of resin at the dough stage on the occlusal surfaces of the lower teeth, coating the occlusal surfaces of the upper teeth with a separating medium such as vaseline, and asking the patient to bring his teeth gently together. Care must be taken that jaw movement is stopped when the first tooth contact occurs.

279



**279** The acrylic resin is then trimmed to merge with the contours of the teeth and provide even occlusal contacts.

## Denture copying

Replicas of a patient's existing dentures may be used in the construction of new prostheses. They are often employed to ensure that the new dentures will incorporate the successful features of the old ones. They may also be used to assess a patient's reactions to possible modifications to their existing dentures, without the risks of altering the originals. Many techniques exist for copying dentures; that shown is one of the simpler methods which may be carried out without laboratory facilities.

**280**

**280** Impressions of the dentures are recorded in alginate, using a suitable container, such as a duplicating flask. This is half-filled with the impression material.

**281**

**281** The denture is then half submerged in the alginate, taking care to avoid trapping air bubbles, and the impression material smoothed with a wet finger.

**282**

**282** Once set, any flash is trimmed with a sharp knife and washed off with water.

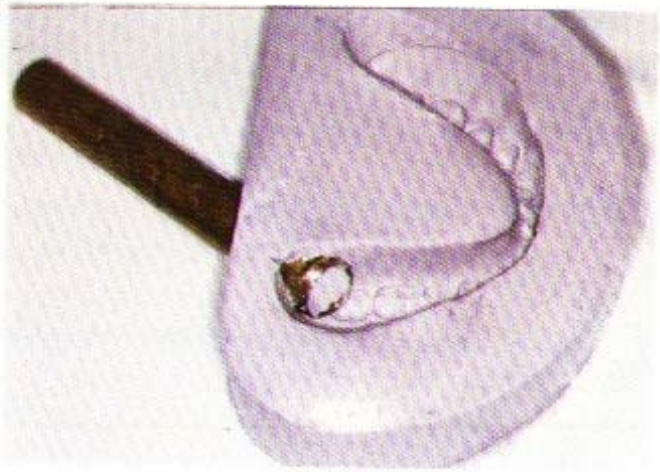
**283**

**283** A second mix of alginate is then placed in the flask and the lid seated. No separating medium is required.

**284**

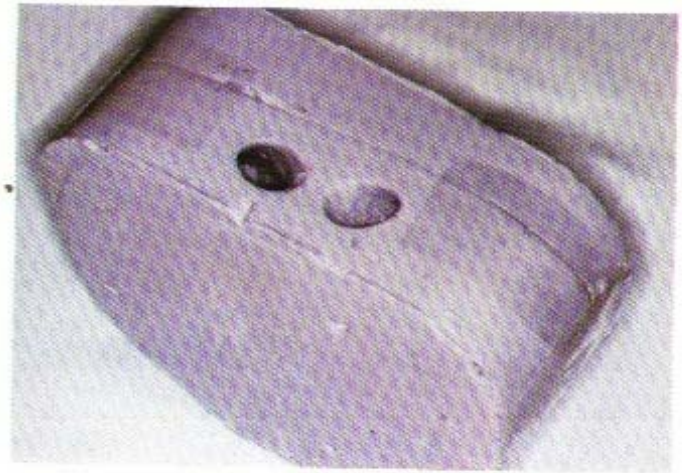
**284** The alginate may be removed from the flask when the second mix has set, the two halves separated and the denture retrieved.

285



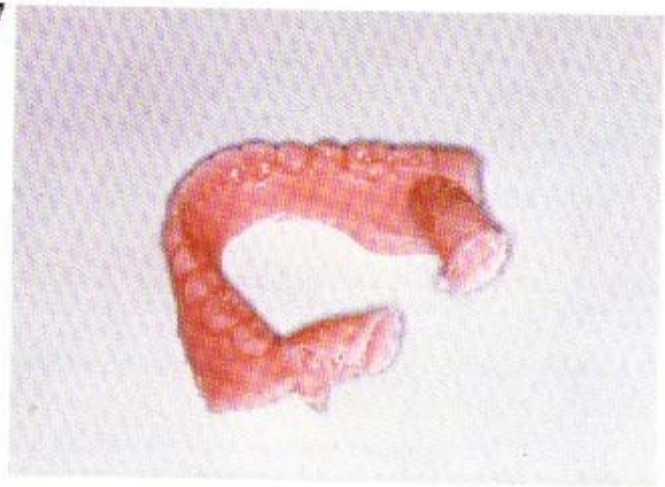
**285** Sprue holes are then cut into the impression at its posterior border.

286



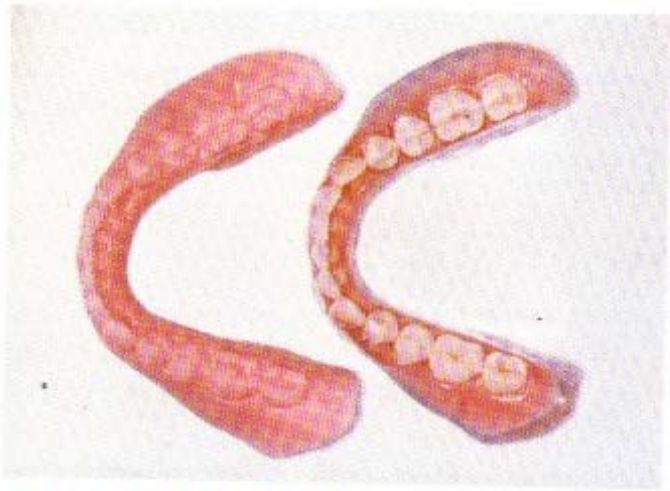
**286** The impression is then reassembled and held together with adhesive tape. Self curing acrylic resin of the 'pour and cure' type is then run into one sprue hole until the impression is filled.

287



**287** The replica denture after removal from the impression.

288



**288** Replica and original dentures.

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