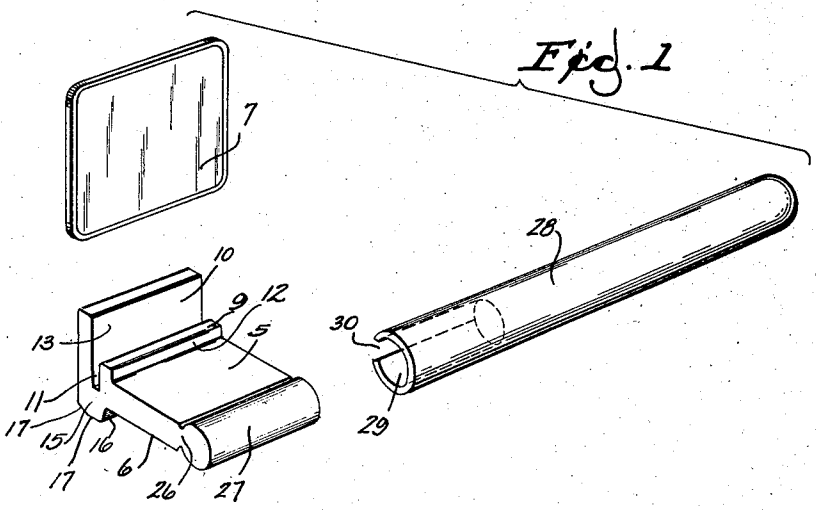
Aug. 11, 1959 E. H. MAURER 2,899,559

DENTAL X-RAY FILM HOLDER

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Fig. 1



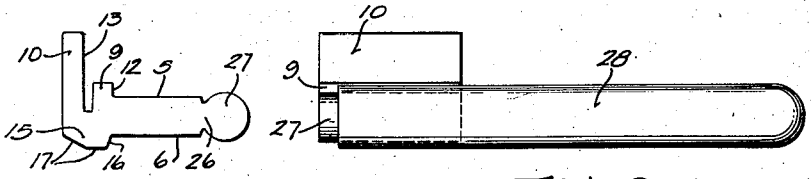


Fig. 3

Fig. 2

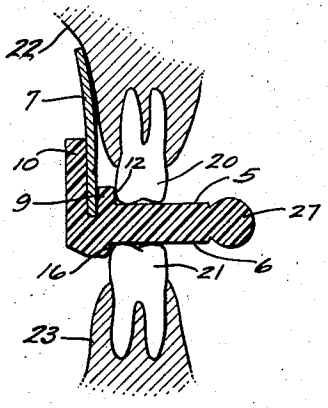


Fig. 4

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DENTAL X-RAY FILM HOLDER

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5 Claims. (Cl. 250—70)

This invention relates to improvements in holders for positioning dental X-ray film in predetermined position in the mouth and for retention of the film in a given position at each placement of the holder by the patient's bite on a portion of the holder.

Particular objects of the present invention are to provide a holder for dental X-ray film with a readily detachable handle for placing the holder and film in a desired position relative to the patient's jaw and teeth, and to provide a holder so shaped as to be held by the teeth in substantially the same relation as when placed and without special attention by the dentist or patient to prevent shifting from the desired position.

One object of the invention is to provide a holder for dental X-ray film in which a film holding portion keeps the film in a substantially constant position for more than the visible length of the teeth and aids in positioning the holder in given relation to the teeth, at each use of the holder and regardless of the particular teeth being X-rayed.

A further object of the invention is to provide a dental X-ray film holder with a neck and head portion for reception in a handle whereby limited movement in one direction is possible between the holder and the handle without detracting from the fixed relationship therebetween in the other directions.

Generally, the present construction provides a dental X-ray holder member providing a body or "bite" portion of generally rectangular shape with a pair of flanges of unequal height adjacent one end and from one side thereof, for partially defining a groove in which an X-ray film is to be placed and held during its exposure. At the other end, the bite portion is provided with a substantially cylindrical head having its longitudinal axis parallel with the groove, which is joined to the bite or body portion by a reduced thickness portion herein called a neck. The head and the neck are engageable by a handle member having a socket from one end for receiving the holder head and a slot in the wall of the socket for receiving the holder neck. The handle socket is an easily sliding fit on the holder head from either end thereof, with the edges of the socket wall engageable with the holder neck to prevent movement of the holder relative to the handle. The holder and handle are preferably made of one of the water white transparent synthetic resins which is permeable to X-rays and can be repeatedly sterilized.

In the drawings:

Fig. 1 is a perspective view of the holder and its handle and of a dental X-ray film in their relative positions for engagement of the several parts;

Fig. 2 is a side elevation of the partially joined holder and handle;

Fig. 3 is an end elevation of the holder; and

Fig. 4 is an end elevation of the holder and a dental X-ray film in position between a patient's upper and lower jaws which are shown in cross-section.

Referring to the drawings in which the same numerals

designate like parts, the holder comprises a body or "bite" portion of generally rectangular shape having two substantially plane and parallel surfaces 5 and 6 of a width somewhat less than the length of the usual dental X-ray film 7 and a length greater than the transverse dimension of the cutting or grinding surfaces of the teeth of an average person. The width of bite portion 5, 6 is greater than the average width of two molars to bridge a gap of even two adjacent teeth when gripped between the teeth. The length of the bite portion is sufficient to allow setting by the dentist, of the film at any angle to any tooth side surface after the holder is lightly gripped by the teeth. Such length allows for gripping of the holder by even malaligned or offset teeth and also permits the holder to extend beyond the teeth for indicating the position of the film after the holder is firmly gripped by the teeth and the handle is removed, and without opening of the lips which is a condition precedent to gagging. The dentist can exactly determine the position of the holder by touch on the patient's face or lips and can therefore secure an exact right angle positioning of the holder and X-ray tube with the result that the X-rays are always uniform and comparable.

A first flange 9 extends from the body portion surface 5 and is of less height than the erupted length of the average tooth or teeth (the length protruding from the gum) while a second flange 10 extends parallel to the first flange at a spacing to define a groove 11 of substantially the thickness of the dental X-ray film and with the lower portion of its walls converging to allow wedging thereinto of either a double or single pack film to hold the film firmly before the holder is placed in position in the patient's mouth. Flange 9 is of such height that the lingual side surfaces of the teeth cannot come in contact with and bend or otherwise disturb the film in its position relative to the holder portions determining such position. The second flange 10 is of greater width than the length of tooth exposed or erupted from the gum and can therefore support a portion of the film vertically and as substantially a plane when the holder body 5, 6 is gripped between the teeth. The groove 11 is of a depth to bring the bottom thereof intermediate the surfaces 5, 6 of the holder bite portion so that approximately one-half of the width of the film is supported by the second flange. The bottom of the groove 11 thus brings the film beyond the "biting" surface of a tooth to a position which guarantees a full X-ray view of the entire tooth or teeth in question.

The relationship of the bite portions 5, 6 and of the film holding flange 10 and the groove 11 is such that the film is flexed in only one direction and by nearly the same amount at all positions, and is otherwise in a given position relative to the holder and the jaw whether or not all the teeth are present or one or more teeth or all of the teeth are missing. Because the film is not bent or otherwise disturbed or displaced by the teeth, the presence or absence of erupted tooth portions has no effect on the uniformity and comparability of X-rays taken at different positions. The relationship of the jaws and root particles, unerupted teeth or foreign bodies is therefore always shown in the same way and the position of such non-visible particles, etc. is known without probing. The present X-ray pictures permit the dentist to determine the length of a tooth root and the position of the apical end thereof by measurement of the film, which minimizes the surgical work necessary when such work must be done at the apical end of a root.

The film is held by only wedging groove 11 and friction of its central portion bearing on flange 10 when the film is arched by bearing at another edge on the gums. Thus substantially a given (and proper) arching of the film is obtained even if adjacent teeth are missing or if

there are no teeth whatever. The film will show roots, unerupted teeth and foreign matter in the jaw in the same relationship so long as the holder is set at even approximately the same angle and the holder thus, in effect, compensates for jaw abnormalities. There are no film fastening means whatever to adjust and there are no possibilities of injury to the mouth tissues.

It will be noted that the surface **12** of the flange **9** which is adjacent to the holder body surface **5**, is at right angles to and provides a vertical surface to bear only on the lingual tooth side surfaces. Thus the present holder automatically places the film at a given distance from the tooth in question, which eliminates one variable of the usual dental X-rays. A portion **15** of the holder body extends from the holder body surface **6** and is generally of approximately the same thickness as the pair of flanges **9**, **10** and the groove **11** but of only sufficient height to provide adequate strength for the holder in the portion otherwise weakened by the groove. The surface **16** of the flange **15** is at an angle to the holder surface **6** and is slightly offset from the vertical surfaces of the flange **9**, while flange surfaces **17** are at any convenient angle to the surface **16**. Hence, when the holder and film are held between the upper teeth **20** and the lower teeth **21** as shown in Fig. 4, only the vertical surface **12** of flange **9** seats against side surfaces of the teeth. A free edge of the film bears on gums **22** or **23** to arch the film beyond the edge of flange **10** on which the film bears.

The vertical surface of flange **9** determines the holder area in one direction which may be gripped by the teeth. When such surface of flange **9** is brought into contact with the teeth, the film planar portion is parallel to the side tooth surface insofar as is possible. The thickness of the flange, however, avoids contact of the occlusial or the incisal side surfaces of the teeth on the film. The arching of the film by the gums and the relationship of the film to the teeth otherwise, is therefore approximately the same in spite of the usual differences in the size and shape of teeth of different persons and of particularly persons at different states of physical maturity.

One end of holder body **5**, **6** is formed as a reduced thickness neck portion **26** and an enlarged cylindrical head portion **27** to engage with and be disengageable from a handle. The handle is preferably a solid rod **28** with a socket **29** in one end and of an internal diameter for receiving the cylindrical head **27** easily. A slot **30** is formed in the socket wall to receive and hold the neck **26** easily but with a sliding fit of the edges of the slot wall on the sides of the neck. Even though the handle is an easily sliding fit on the holder, there can be little relative movement between such holder and handle so that the holder and film can be placed exactly as desired by the dentist. The axis of the holder head **27** is parallel to the center line of groove **11** and the plane of the surface **13** of flange **10** and the socket **29** is centered in the handle **28**. So long as the handle engages the holder, the handle is an indicator of the exact position of the film so that the dentist can easily bring the X-ray tube to approximately a right angle with the film. The handle is easily removed to allow closing of the jaws for retaining the holder and film in the same relative position at any location around the horizontal arch formed by the teeth of one jaw. Before actually energizing the tube, the dentist can reassure himself as to the relative positions of the film and X-ray tube, by feeling the holder head through the patient's cheeks or lips.

The handle may be used from either end of the holder head so that the holder can be placed from either side of the teeth and on the upper or lower jaw and on the right or left side of the jaw which includes all of the positions in which useful X-rays can be obtained. The edges of the handle slot seat below the bite surfaces **5**, **6** so that such edges do not present sharp corners. The depth of the socket in the handle may be equal to or less than the length of the head thereby avoiding projection of any socket corners or edges beyond the holder and which might injure mouth tissues. The only "stop" surface involved in the present holder is the bottom of the socket which allows for the greatest flexibility in the use of the complete instrument.

It will be seen that the present structure provides a positioning flange above the body of the holder, which is shaped to engage only particular tooth surfaces when the holder is gripped between the teeth. Hence. the holder is more readily placed than heretofore and retained in given position with respect to the sides of the teeth and reduces variations which are confusing when dental X-ray photographs are examined. The position of the film is positively fixed for a portion of its width and the film flexes in one direction only for the remainder of its width. Hence, there is no confusion due to flexure in several directions for at least the erupted length of teeth. Differences in the X-ray photographs due to differences in flexure are limited to the portion of the jaw enclosing the roots of the teeth where differences in film arching are least disturbing and where the differences in flexure of the film are relatively small in the average persons. The flanges protect the film from mouth secretions, which eliminates the need for a siphon and further contributes to the patient's comfort and to avoiding shifting of the holder by the patient.

The present construction avoids overhanging weight due to the handle and the tendency of the patient to shift his bite which may shift the position of the X-ray film. Upon removal of the handle, there are no obstructions to placing the X-ray tube at exactly the desired angle. The lips can be completely closed and held by the patient's normal bite, which avoids gagging and aids in keeping the patient comfortable and relaxed. The holder can be pripped comfortably between the teeth whether or not adjacent teeth are missing or by the bare gums alone. Hence, the holder is especially useful in taking X-rays of children and aged persons. The holder is made in several sizes to obtain all its advantages when used by different patients, excepting that one handle fits all sizes of holders. There are no sharp corners, edges or projections which might injure mouth tissues and no apertures or crevices which are not readily cleaned and kept sterile. Every holder and handle are of course sterilized before each use and thus provide a sterile instrument which can be used as a cheek and lip retractor for initially determining the angle at which the film is to be placed for any given patient.

Although but one embodiment of the present invention has been illustrated and described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. A holder comprising a "bite" portion of substantially rectangular shape and having at one end thereof a pair of flanges spaced to receive a dental X-ray film and extending from one side of the bite portion, and a third flange extending from the opposite side of the bite portion and having a reduced thickness neck and a substantially cylindrical head at the other end of the bite portion, and a handle having a socket of a depth substantially equal to the length of and detachably receiving the holder head portion from either end thereof, and a slot in the socket wall for receiving the holder neck portion, the slot being wider than the thickness of the neck and the edges of the slot being engageable with the end of the bite portion adjacent the neck for limiting rotational movement of the bite portion about the center line of the handle.

2. The holder for dental X-ray film of claim 1 in which the pair of flanges extend at right angles to the holder body portion and have their adjacent surfaces

planar for holding one portion of the film planar and restricting flexing of another portion of the film to an arc of a given radius.

3. The holder for dental X-ray film of claim 1 in which the pair of flanges are of different width, the flange adjacent the side of the tooth to be X-rayed being of a width approximately one-half the length of the erupted portion of the tooth and the flange remote from the side of the tooth to be X-rayed being of greater width than the erupted length of the tooth, the adjacent surfaces of the flanges being planar for holding one portion of the film planar and restricting flexing of another portion of the film to an arc of a given radius.

4. The holder for dental X-ray film of claim 1 in which one of the pair of flanges has a planar surface vertical to the body portion of the holder and which is in contact with the side of a tooth when the holder is in use and the third flange has a side at an angle to said planar surface whereby the teeth of only one of the jaws contact with a flange surface of opposite flanges and a surface of the third flange controls parallelism of the planar film portion to the tooth being X-rayed.

5. The holder for dental X-ray film of claim 1 in which one of the pair of flanges has a planar surface vertical to the body portion of the holder and which is in contact with the side of a tooth when the holder is in use and the third flange has a side at an angle to and offset toward the end of the holder from said planar surface by approximately one-half the thickness of the flange in contact with a tooth whereby the teeth of only one of the jaws contact with a flange surface of opposite flanges and a surface of the third flange controls parallelism of the planar film portion to the tooth being X-rayed.

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