

orthodontics

Types of clasp assemblies:

They are of two types:-

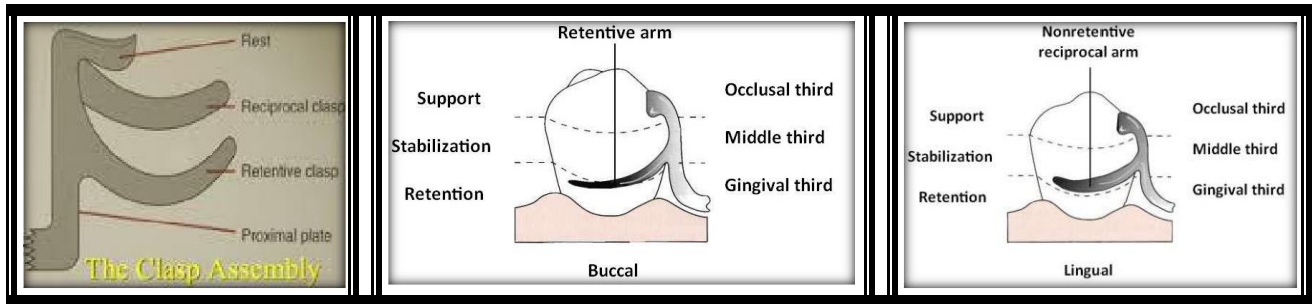
1. Clasps designed **without movement accommodation**.
2. Clasps designed to accommodate distal **extension functional movement**.

Clasps designed without movement accommodation: It is also named **suprabulge** clasp or **occlusally** approach clasp since the clasp approaches the retentive undercut from the **occlusal** direction.

Clasps for tooth-borne partial dentures (Class **III** and **IV**) have one function to **prevent dislodgment** of the prosthesis without damage to the abutment teeth. Since there is little or **no rotation** caused by tissue ward movement of the edentulous area (as happens in distal extension cases) stress releasing properties are usually **not** required. These clasps can also be used in **modification** spaces for tooth and tissue supported removable partial dentures (Class I and II).

Circumferential (Circle or Akers) clasp:

- The circumferential clasp will be considered **first** as an all-cast clasp and it is the **simplest** one.
- The basic form of the circumferential clasp is a **buccal** and **lingual** arm originating from a common body (principle occlusal rest and minor connector).
- The circumferential clasp has only **one retentive** clasp arm, opposed by a nonretentive reciprocal arm on the opposite side.
- It approaches the undercut area from an **occlusal** direction so it is called (**occlusally** approaching clasp) since it is coming to the undercut area from above the **bulge** area so-called (suprabulge clasp) and since it is **pulling** the tooth during action also called **pull** clasp and also called **Aker** clasp.
- The retentive arm begins **above** the height of contour, and curves and tapers to its **terminal** tip, in the gingival **1/3** of the tooth, well away from the gingival.
- The bracing (nonretentive reciprocal) arm is in the **middle 1/3** of the tooth, and is broader **occlusal** – **gingivally**, does **not taper** and is either entirely **above** the height of contour or completely on a **prepared guiding** plane – it should never be designed into an undercut, as it is a **rigid** element.
- Support is provided by occlusal rest; **stabilization** is provided by 1 **-occlusal rest**, proximal **minor** connector, **lingual** clasp arm and **rigid** portion of **buccal** retentive clasp arm occlusal to the height of contour; **retention** is realized by the **retentive terminal** of buccal clasp arm; reciprocation is provided by **nonflexible** lingual clasp arm. Clasp Assembly engages **more** than **180** degrees of abutment tooth's circumferences.



Indications:

- It is a most logical clasp to use with all tooth-supported partial dentures because of its retentive and stabilizing ability.
- On free end extension when minimal undercut is utilized.

Contraindication:

- When the retentive undercut may be approached better with a bar clasp arm.
- When esthetics will be enhanced by using bar clasp arm.

Advantages:

- Excellent bracing qualities.
- Easy to design and construct.
- Less potential for food accumulation below the clasp compared to bar clasps.

Disadvantages:

- More tooth surface is covered than with a bar clasp arm because of its occlusal origin.
- On some tooth surfaces, particularly the buccal surface of mandibular teeth and the lingual surfaces of maxillary teeth, its occlusal approach may increase the width of the occlusal surface of the tooth.
- In the mandibular arch, more metal may be displayed than with the bar clasp arm.
- Its half-round form prevents adjustment to increase or decrease retention. True adjustment is impossible with most cast clasps.

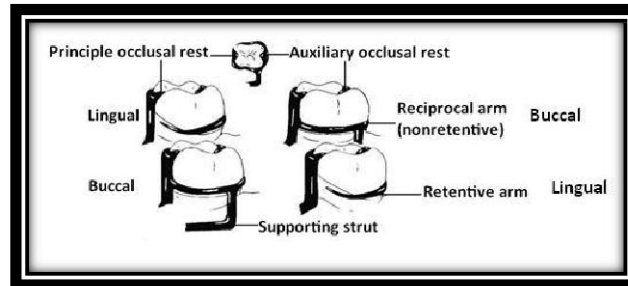
The circumferential type of clasp may be used in several forms:

1. Ring-type clasp:

- Ring clasp, which encircles nearly all of a tooth from its point of origin.
- Usually used with mesially and lingually tilted mandibular molars or the undercut is on the same side as the rest seat (i.e. adjacent to edentulous span).
- The clasp should never be used as an unsupported ring because if it is free to open and close as a ring, it cannot provide either reciprocation or stabilization. Instead, the ring-type clasp should always be used with a supporting strut on the nonretentive side, with or without an auxiliary occlusal rest on the opposite marginal ridge. The advantage of an auxiliary rest is that further movement of a mesially inclined tooth is

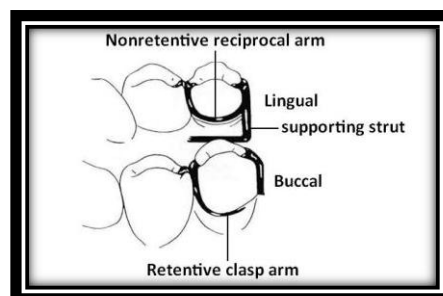
prevented by the presence of a **distal** rest. In any event, the **supporting strut** should be regarded as being a **minor** connector from which the flexible retentive arm originates.

- Reciprocation comes from the **rigid** portion of the clasp lying between the supporting **strut** and the **principal** occlusal rest.
- The ring-type clasp should be used on **protected** abutments whenever possible because it covers such a **large** area of the tooth surface.



Indications:

- It is used when a **proximal** undercut cannot be approached by other means. For example, when a **mesiolingual** undercut on a **lower molar** abutment (**isolated** lower molar such as in **Class II modification** one) cannot be approached directly because of its proximity to the occlusal rest area and cannot be approached with a **bar** clasp arm because of **lingual** inclination of the tooth.
- It may be used in reverse on an abutment located **anterior** to a tooth-bounded edentulous space when a **distobuccal** or **distolingual** undercut cannot be approached directly from the occlusal rest area and/or tissue **undercuts** prevent its approach from a **gingival** direction with a bar clasp arm.

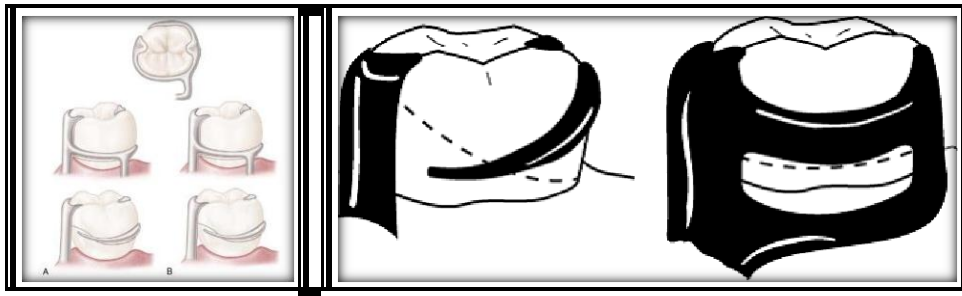


Contraindication:

- **Excessive** tissue undercuts prevent the use of a **supporting strut**.

Advantages:

- Excellent **bracing** (with supporting **strut**).
- Allow the use of an available **undercut adjacent** to the **edentulous** area.



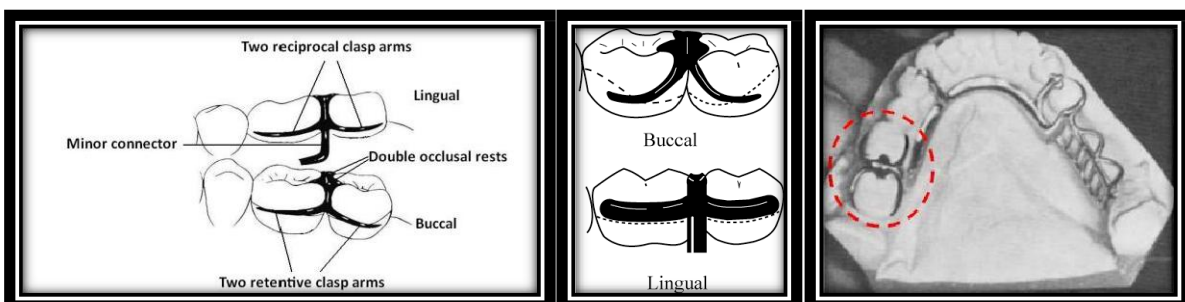
Ring clasp (s) encircling nearly the **entire** tooth from its point of origin. A Clasp originates on the **mesiobuccal** surface and encircles the tooth to engage the **mesiolingual** undercut. B, Clasp originates on the **mesiolingual** surface and encircles the tooth to engage the **mesiobuccal** undercut.

Disadvantages:

- Covers a **large** area of the tooth surface, therefore requiring **meticulous hygiene**.
- Very **difficult** to **adjust** due to the **extreme rigidity** of the reciprocal arms.
- The lower bracing arm should be at least **1mm** from the free gingival margin and relieved to prevent impingement of the gingival tissues.

2. Embrasure (double Akers) clasp:

- The embrasure clasp always should be used with **double occlusal rests**, even when definite **proximal shoulders** can be established. This is done to avoid **interproximal wedging** by the prosthesis, which could cause **separation** of the abutment teeth and result in food **impaction** and clasp displacement.
- In addition to providing **support**, occlusal rests also serve to shunt **food** away from contact areas.
- Embrasure clasps should have two retentive clasp arms and two reciprocal clasp arms, either **bilaterally** or **diagonally** opposed.



Example of use of embrasure clasp for a **Class II** partially edentulous arch: Embrasure clasp on **two left** molar abutments were used in the **absence** of **posterior** modification space.

Indications:

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Used in a **quadrant** where no **edentulous** area exists, In an unmodified Class **II** or Class **III** partial denture, where there are **no edentulous** spaces on the opposite side of the arch to aid in clasping.



Occlusal and **proximal** surfaces of adjacent molar and premolar **prepared** for embrasure clasp. Note that rest seat preparations are extended both **buccally** and **lingually** to accommodate retentive and reciprocal clasp arms.

Disadvantages:

- Extensive **interproximal** reduction is usually required.
- Covers **large** area of tooth surface – **hygiene** considerations.

Other less commonly used modifications of the cast circumferential clasp are:

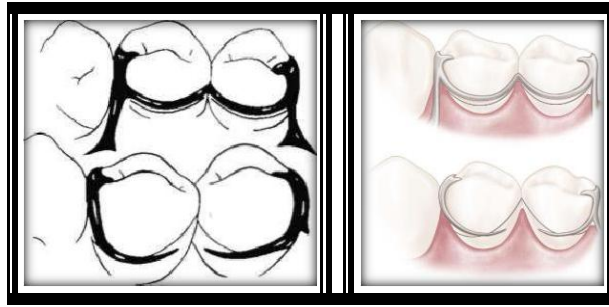
1. Back action clasp:

- The back-action clasp is a modification of the ring clasp.
- It is used on **premolar** abutment **anterior** to edentulous space.
- The undercut can usually be approached just as well using a **conventional** circumferential clasp, with less tooth **coverage** and less display of metal.
- Its use is **difficult** to justify.



2. Multiple clasps:

The multiple clasps are simply **two opposing** circumferential clasps joined at the terminal end of the two **reciprocal** arms.



Indications:

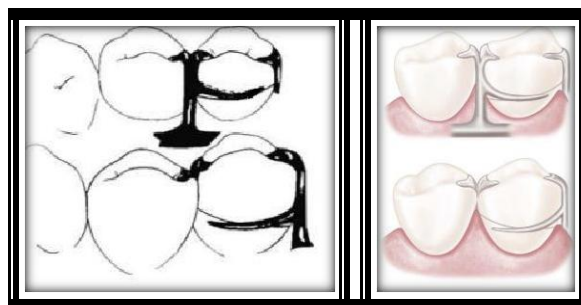
- It is used when additional retention and stabilization are needed, usually on tooth-supported partial dentures.
- It may be used for multiple clasping in instances in which the partial denture replaces an entire half of the dental arch.
- It may be used rather than an embrasure clasp when the only available retentive areas are adjacent to each other.

Disadvantage:

- Its disadvantage is that two embrasure approaches are necessary rather than a single common embrasure for both clasps.

3. Half-and-half Clasp:

- It consists of a circumferential retentive arm arising from one direction and a reciprocal arm arising from another.
- The second arm must arise from a second minor connector, and this arm is used with or without an auxiliary occlusal rest.
- Its design was originally intended to provide dual retention, a principle that should be applied only to unilateral partial denture design.
- Reciprocation arising from a second minor connector usually can be accomplished with a short bar or with an auxiliary occlusal rest, thereby avoiding so much tooth coverage.
- There is little justification for the use of the half-and-half clasp in bilateral extension base partial dentures.

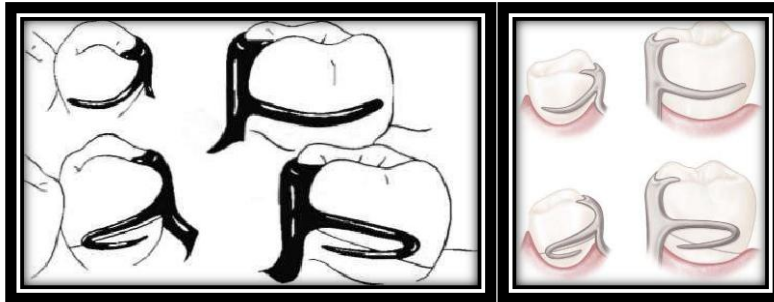


4. Reverse-action clasp (Hairpin):

- Ring clasp or bar clasp originating on the opposite side of the tooth can be used with the same result getting from reverse-action clasp.
- The upper part of the arm of this clasp should be considered a minor connector, giving rise to the tapered lower part of the arm. Therefore only the lower part of the arm should be flexible. With the retentive portion beginning beyond the turn, only the lower part of the arm should flex over the height of the contour to engage a retentive undercut.
- The bend that connects the upper and lower parts of the arm should be rounded to prevent stress accumulation and fracture of the arm at the bend.

Advantage:

- Clasp arm is designed to permit engaging a proximal undercut (undercut adjacent to edentulous space) from an occlusal approach.



Disadvantages:

- Esthetically objectionable when using an anterior abutment.
- The clasp covers a considerable tooth surface and may trap debris.
- Almost impossible to adjust.
- Difficult to fabricate.
- Insufficient flexibility on short crowns due to insufficient clasp arm length.

Indications:

- When a proximal undercut must be used on a posterior abutment and when tissue undercuts, tilted teeth or high tissue attachments prevent the use of a bar clasp arm.
- When lingual undercuts may prevent the placement of a supporting strut (of ring clasp) without tongue interference.
- May be used on abutments of tooth-supported dentures when proximal undercut lies below the point of origin of the clasp.

Disadvantages of circumferential clasps in summary:

- A large amount of tooth surface is covered by clasp assembly.
- It alters the gross morphology of the clinical crown.

Clasps designed to accommodate distal extension functional movement:

Two strategies are adapted to either:

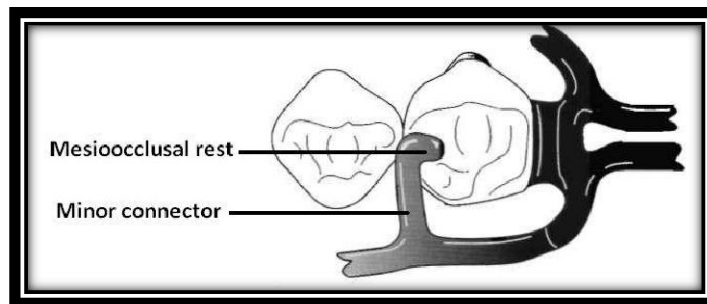
- Change the **fulcrum location** and subsequently the "resistance arm" engaging effect (**mesial rest** concept clasp assemblies).
- Minimize the effect of the lever by use of a **flexible arm** (**wrought-wire** retentive arm).

Change the fulcrum location and subsequently the "resistance arm" engaging effect: Mesial rest concept clasps assemblies (RPI, RPA, and Bar clasp): These are proposed to accomplish movement accommodation by changing the **fulcrum** location to prevent harmful **tipping** or **torquing** of the abutment tooth and prevent more denture base movement. This is concept includes **RPI** and **RPA** clasps.

RPI clasp:

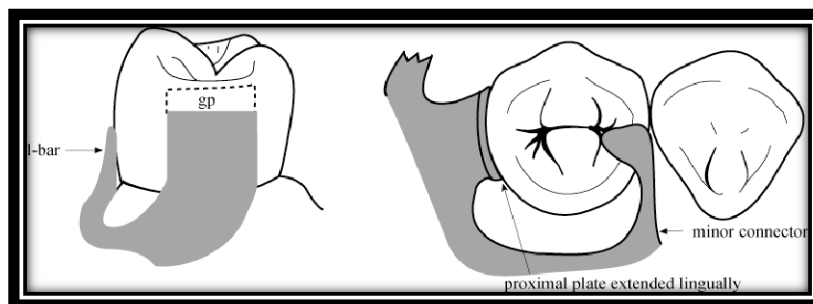
RPI clasps are referring to the: R = Rest always mesial, P = Proximal plate, and I = I-bar. These are component parts of the clasp assembly. Basically, this clasp assembly consists of:

- A **mesioocclusal** rest of a **premolar** or **mesiolingual** surface of a canine with the minor connector placed into the **mesiolingual** embrasure, but not contacting the adjacent tooth (prevents **wedging**).



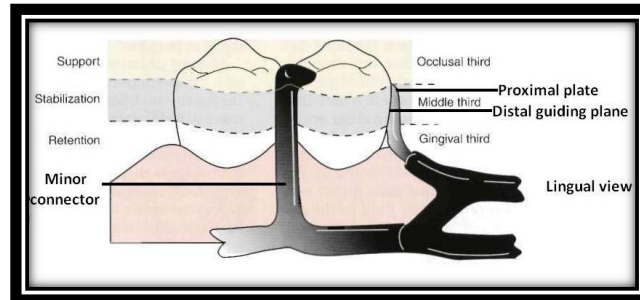
Occlusal view

- A **distal** guiding plane, extending from the **marginal** ridge to the junction of the middle and **gingival** thirds of the abutment tooth, is prepared to receive a proximal plate. The **buccolingual** width of the guiding plane is determined by the proximal contour of the tooth.



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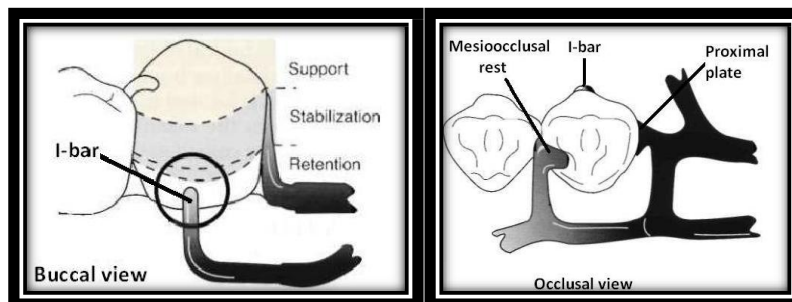
- The proximal plate (essentially a wide minor connector) is located on a guide plane on the distal surface of the tooth. The plate is approximately 1 mm thick and joins the framework at a right angle.
- The I-bar in conjunction with the minor connector supporting the rest provides the stabilizing and reciprocal aspects of the clasp assembly.



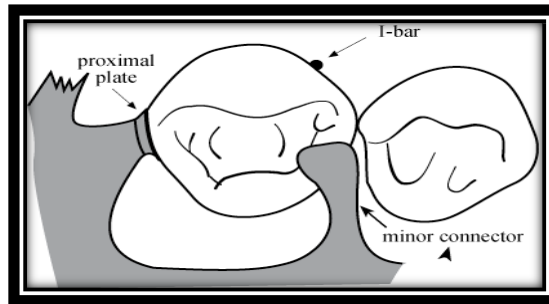
- I-bar should be located in the gingival third of the buccal or labial surface of the abutment in a 0.01-inch (0.25mm) undercut. The whole arm of the I-bar should be tapered to its terminus, with no more than 2 mm of its tip contacting the abutment. The retentive tip contacts the tooth from the undercut to the height of the contour. This area of contact along with the rest and proximal plate contact provides stabilization through the encirclement. The bend in the I-bar should be located at least 3 mm from the gingival margin. This distance will prevent food entrapment and provide the length for the necessary flexibility in the clasp arm.



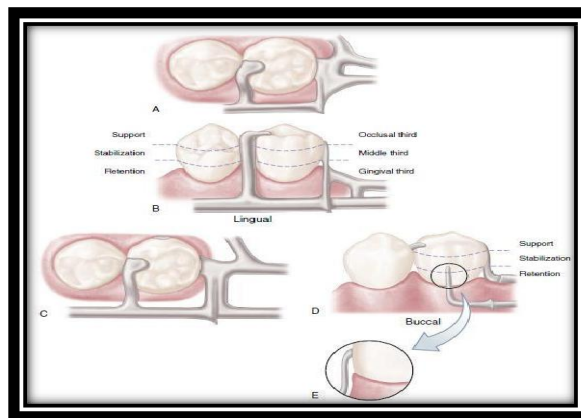
- The clasp is usually cast and is placed just below the height of the contour line.



- On the canine, the I-bar is located in the mesiobuccal undercut and is reciprocated directly by the proximal plate.

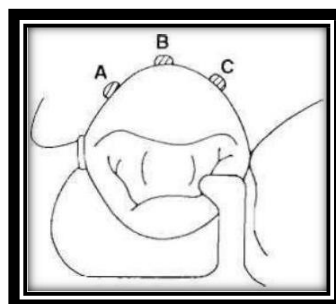


The horizontal portion of the approach arm must be located at least **4 mm** from the gingival margin and even farther if possible.



Bar-type clasp assembly:

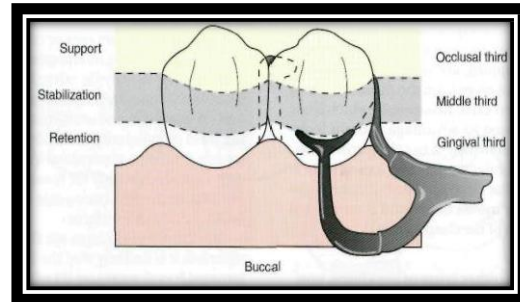
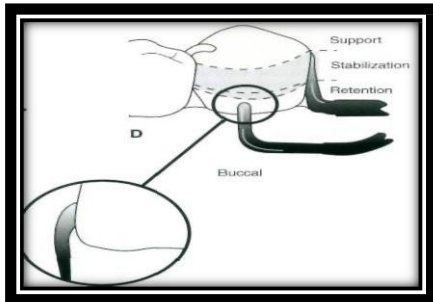
شرح للصورة A: **Occlusal** view. Component parts : (**proximal** plate minor connector, **rest** with minor connector, and **retentive** arm) tripod the abutment to prevent its **migration**. B: The proximal plate minor connector extends just far enough lingually so that it combines with the mesial minor connector to prevent the **lingual** migration of the abutment. C: On narrow or tapered abutments (mandibular first premolars), the proximal plate should be designed to be as narrow as possible but still **sufficiently** wide to **prevent** lingual migration. D: I-bar retainer located at the **greatest prominence** of the tooth in the gingival third. E: Mesial view of I-bar illustrating the **retentive** tip relationship to the undercut and a region superior to the height of contour, which serves **stabilization** function in the encirclement.



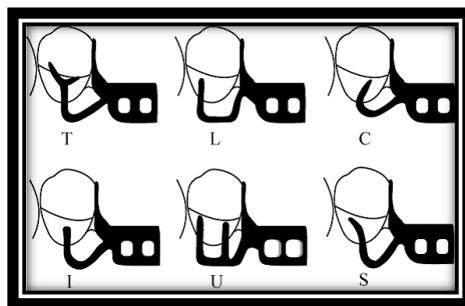
Occlusal view of RPI bar clasp assembly. Placement of I-bar which is depending on the position of **proximal** plate in relation to guiding plan on proximal tooth surface: (A) On the **distobuccal** surface. (B) At greatest **mesiodistal** prominence. (C) On the **mesiobuccal** surface.

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The bar clasp arm arises from the denture framework or a metal base and approaches the retentive undercut from a **gingival** direction.



The bar clasp arm has been classified by the shape of the retentive terminal. Thus it has been identified as **T, Y, L, I, U** and **S**. **I** shape bar is preferred than other shapes because this shape being biologically and mechanically sound.



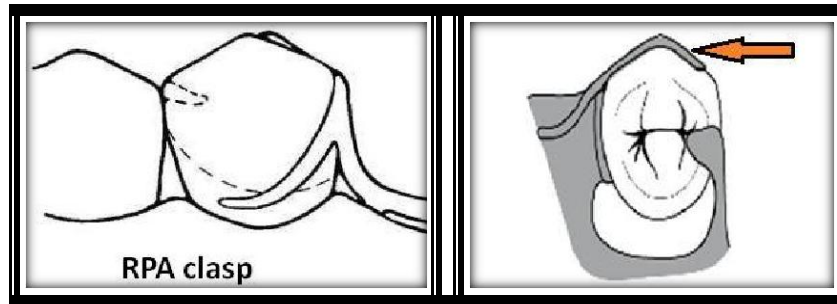
If the abutment teeth demonstrate contraindications for a **bar-type** clasp a modification should be considered for the **RPI** system (the **RPA** clasp; **Akers** clasp).

Contraindications:

- Deep **cervical** undercuts - **food** trap or **impingements** result.
- Severe **soft** tissue or bony undercuts - food trap or impingements result.
- Insufficient vestibular depth for approach arm, because this reduces the advantageous length of the arm and made the clasp too close to the gingival margin it (**requires 4 - 3** mm from the free gingival margin, 1 mm for the thickness of the approach arm).
- Pronounced frenal attachments area – impingement.
- The excessive **buccal** or lingual tilt of the abutment tooth.

RPA clasp; Akers clasp:

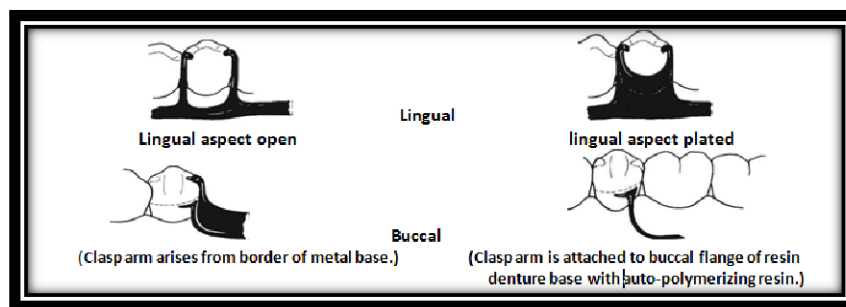
This clasp assembly is similar to the RPI design (consists of a mesial occlusal rest, proximal plate, except a **wrought** wire **circumferential** clasp (Akers) is used instead of the I-bar. This clasp arises from the proximal plate and terminates in the mesiobuccal undercut. It is used when there is insufficient **vestibule** depth or when a severe **tissue** undercut exists.



There are several other types of bar clasps; for example:

Infrabulge clasp:

It is designed so that the **bar** arm arises from the border of the denture base, either as an extension of a **cast base** or attached to the **border** of a resin base. It is made more **flexible** than the usual bar clasp arm.



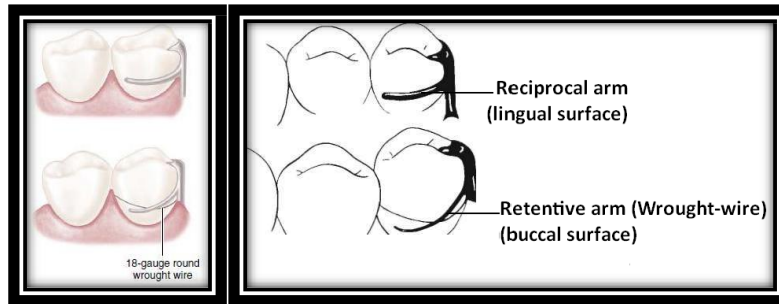
Advantages:

- Its **interproximal** location, which may be used to **esthetic** advantage. And Increased retention without **tipping** action on the abutment.
- Less chance of **accidental distortion** resulting from its **proximity** to the denture border.
- Minimize the effect of the **lever** by use of a **flexible** arm (**wrought-** wire retentive arm).

Combination clasp:

- Another strategy to reduce the effect of the **Class I** lever in distal extension situations is to use a flexible component in the "resistance arm," which is the strategy employed in the combination clasp. The combination clasp consists of a **wrought-** wire retentive clasp arm (**round, uniformly** tapered **18-gauge** platinum-gold-palladium alloy or chrome- **cobalt** alloy **wrought-** wire) and a **cast reciprocal** clasp arm.
- The retentive arm (wrought-wire) is almost always **circumferential**, but it also may be used in the manner of a bar, originating **gingivally** from the denture base.
- The cast reciprocal arm may be in the form of a **bar clasp** arm, it is usually a **circumferential** arm.

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Advantages:

- The flexibility.
- The adjustability.
- The esthetic appearance of the wrought-wire retentive arm over other retentive circumferential clasp arms).
- Minimum of tooth surface covered because of its line contact with the tooth, rather than having the surface contact of a cast clasp arm.
- A less likely occurrence of fatigue failures.

Disadvantages:

- It involves extra steps in fabrication, particularly when high-fusing chromium alloys are used.
- It may be distorted by careless handling on the part of the patient.
- Because it is bent by hand, it may be less accurately adapted to the tooth and therefore provide less stabilization in the suprabulge portion.
- It may distort with function and not engage the tooth.

Indications:

- When maximum flexibility is desirable, such as on an abutment tooth adjacent to a distal extension base where only a mesial undercut exists on the abutment or a weak abutment or where a large tissue undercut, contraindicates a bar-type direct retainer.
- It may be used for its adjustability when precise retentive requirements are unpredictable and later adjustment to increase or decrease retention may be necessary.
- When esthetic required overcast clasps, because wrought-wire is round, light is reflected in such a manner that the display of metal is less noticeable than with the broader surfaces of a cast clasp.

The various types of cast circumferential clasps may be used in combination with bar clasp arms. Circumferential and bar clasp arms may be made either flexible (retentive) or rigid (reciprocal) in any combination as long as each retentive clasp arm is opposed by a rigid reciprocal component.