



## Orthodontic Instruments and Pliers- A Literature Review

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### ABSTRACT:

Orthodontic instruments are specifically designed to facilitate orthodontic treatment. Like most instruments used in dental specialties, they are usually made from stainless steel, are unique and have a specific design and purpose. The following is a description of commonly used orthodontic instruments.

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### INTRODUCTION:

Orthodontics is the study of the diagnosis, prevention and treatment of irregularities of the teeth and jaws. Orthodontic instruments are used in conjunction with fixed and removable appliances. For orthodontist, it is essential to know that the instruments that have to use routinely. It is expected to increase the working knowledge of the orthodontist and also prevent the misuse of more delicate instruments.

### Classification of Orthodontic instruments.<sup>1234</sup>

Classification of orthodontic instruments was based on the sequential procedures carried out during orthodontic treatment, right from separation of teeth for banding till debonding procedures up to completion of orthodontic treatment.

1. Instrument used for placement of separators
  - Separator placement plier
2. Band forming instruments
  - Band cutting scissor
  - Jhonson band contouring plier
  - Band pinchable plier
  - Peak plier

- Mershon band pusher
- Nylon band seater
- Band crimping plier
- Double beak plier
- Anterior band removing plier
- Posterior band removing plier

### 3. Bracket positioning instruments

- Boone gauge
- Bracket positioning height gauge
- Direct bonding bracket holder
- Orthodontic bracket card

### 5. Bracket removing plier

- Anterior bracket removing plier
- Posterior bracket removing plier
- Kurz lingual bracket removing plier

### 6. Wire cutting instruments

- Pin and ligature cutter
- Distal end wire cutter
- Kurz distal end cutter
- Heavy wire cutter
- Maun's heavy duty wire cutters
- Face bow bending/cutting pliers

### 7. Clasp forming instruments

- Adams plier
- Adams clasp bending plier
- Adams clasp former
- Adams spring forming plier

### 8. Arch forming instruments.

- Turret
- Dela rosa arch contouring plier
- Bird beak plier
- Standard light wire plier
- Jaraback light wire plier

### 9. Loop forming pliers

- Nance loop forming plier
- Loop tie back plier
- Tweed loop forming plier
- Optical loop forming plier
- Young's loop bending plier

## 10. Utility plier

- Howe plier
- Three prong plier
- Utility arch plier
- Rose torquing plier
- Ribbon arch plier

### **1. Separating pliers or separator placing plier:**

- Separating plier is made up of stainless steel with spring back action<sup>1</sup>. It is used for expanding elastic separators or separating rings before positioning them interdentally.<sup>1</sup>
- Barrel-shaped tip prevents slippage of the module, reduces the risk of tissue damage.
- Angled beaks facilitate easier placement of elastic separators in anterior and posterior areas.

### **2. Band forming instruments:**

#### **Band cutting instruments:**

- It is available in either straight or curved pattern and long and short cutting-edge pattern.
- It is made from especially hardened stainless steel with tungsten carbide inert cutting tip
- It is used for cutting thin metal bands or band material.

#### **Mershon band pusher**

- A hollow anatomically formed grip handle makes the band pusher light and the serrated rectangular tip provides for a good transfer of force when positioning bands.<sup>1</sup>
- It is used to push bands so as to seat them and / or adapt them to the exact contour of the teeth.<sup>1</sup>
- Handle is cylindrical and working end is serrated.<sup>3</sup>

#### **Nylon band seater**

- It is used for patient to bite on the surface with the tin inlay tip resting on the lug or the band edge.<sup>1</sup>
- Square tip allows maximum grip and prevent slippage.
- The biting surface is generally tin inlay<sup>1</sup>.
- Its shape is round, square or triangular (allows easy access to interproximal area) with a serrated surface finish.<sup>1</sup>
- Band seater is available in various shapes and are generally made of high impact plastics or wood<sup>1</sup>

#### **Band crimping plier**

- It is used to contour the gingival surface of preformed bands to provide better tooth anatomy

#### **Johnson band contouring plier**

- It can be used to re-contour and adapt band edges that sometimes get bent during band placement.<sup>1</sup>
- Beaks are tapered with a slight bow.<sup>2</sup>
- One beak is concave while the other is convex allowing re-contouring of bands.<sup>2</sup>

### **Band pinchable plier**

- It is used for pinching of bands during band preparation.
- Beaks are in triangular passion with inner surfaces had serrated for better control of band material.
- It has two types curved and straight. Curved (45°) pinchable plier used for lower band preparation, and straight is used for upper band preparation.

### **Peak plier**

- It is used for preparation of band to tooth.
- Contour fitting to the side of a tooth is aided by the concave surface.
- The purpose of the elevated edge is to provide a friction contact with a portion of the material of the strip to prevent it from slipping in the use of the plier in the operation of forming a band around a tooth.

### **Double beak pliers**

- These were of immense importance when all teeth used to be banded.<sup>1</sup>
- These are available separately for anterior and posterior band fabrications.<sup>1</sup>
- It is made of stainless steel, the double beak pliers are used for forming bands in the mouth.<sup>1</sup>

### **Band removing pliers**

- Anterior band remover plier have a narrow groove into which the incisal edge of the anterior tooth is placed and the sharp end is inserted gingival to the gingival extension of the anterior band.<sup>1</sup>

### **Oliver Jones Posterior band removing plier**

- It is used to remove posterior metal bands with maximum patient comfort. The tip is postured in middle of the pad for easy removal of bands. A plastic/nylon padded tip and sharp removing beak with a slight pressure allow easy band removal.<sup>2</sup>

## **3. Bracket positioning instruments**

### **Boons Gauge**

- Flat surface rests on incisal/occlusal surface of tooth. Simplifies seating the bracket on the teeth with exactly the right distance between bracket slot and incisal edge with pencil lid or metal tips
- It is the most frequently used bracket positioning aid which is made of stainless steel.<sup>2</sup>
- It accurately measures height of bracket placement from the incisal edge at 3.5, 4, 4.5 and 5mm.<sup>1</sup>

### **Bracket positioning height gauge**

- This device simplifies the seating of brackets on the teeth with exactly the right distance between the bracket slot and incisal edge.<sup>1</sup>
- It is generally made of aluminum or stainless steel.<sup>1</sup>
- It accurately measures height of bracket placement from the incisal edge at 2, 2.5, 3, 3.5, 4, 4.5, 5 and 5.5mm.

### **Bracket holder**

- It holds any type of bracket from a wide twin to a single one.

- Reverse action type handle which on pressing the handle open up the beaks.<sup>3</sup>
- Beaks are diamond shaped with serrations to grip the bracket.
- Flat end of the handle used to press the bracket into position for bonding.

#### **Orthodontic bracket card**

- Tape on the back of the card helps to keep brackets in place.<sup>2</sup>
- Brackets are placed corresponding to the tooth to be bonded.<sup>2</sup>
- Each circle on the card corresponds to a particular tooth in the mouth.<sup>2</sup>
- It is used to organise and hold orthodontic brackets to facilitate quick bracket placement.<sup>2</sup>

#### **4.Bracket removing pliers**

- Bracket removing pliers are used for removing bonded brackets.<sup>1</sup>
- The wide tips wedge between both the edges of the base of the bracket and the tooth surface (incisal-gingival direction), easily lifting off the bracket.<sup>1</sup>
- Available in two forms as straight (for **anterior** debonding) and with a 60° angled tip (which allows better access to **posterior** areas).<sup>1</sup>
- Anterior debonding plier is also used for removal of adhesive remnant on enamel surface after bracket debonding

#### **Kurz lingual bracket removing plier**

- This instrument incorporates a state of the art spring mechanism to improve durability and has an increased arm radius to allow for better movement.
- It is used to removal of lingual brackets and bite turbos.
- It is designed to fit the design of lingual brackets under the lingual hooks and bite turbos.

#### **5. Wire cutting instruments**

##### **Pin and ligature cutter (PLC) Wire cutting instruments**

- The Cutting edge is made from stainless steel or Tungsten carbide which is placed mesial to the beaks.<sup>1</sup>
- They are especially designed for accuracy right to the tip, for smooth cutting of soft ligature wires and lock pins and elastomerics<sup>1</sup>. It cannot be used on ligatures more than 0.015mm in diameter as it damages the cutting edge.<sup>3</sup>

##### **Pin and Ligature cutter - Angulated**

- PLC with 45 ° and 90° angled cutting tips for easy cutting of ligatures especially in the posterior areas in the lingual technique.

##### **Distal end cutter**

- It had a 'safety' mechanism to hold the cut archwire so it does not fall into the patients mouth.
- It is used exclusively for cutting the distal end of wire protruding out of the molar tubes<sup>1</sup>.
- The distal end cutter is capable of cutting archwires up to 0.56 x 0.70 mm/ .022" x.028 " both intraoral and extraoral method<sup>1</sup>.

### **Kurz distal end cutter**

- It is similar to distal end cutter, but difference is it was designed with long body so it can reach back into depth of mouth.

### **Hard wire cutters**

- Hard wire cutters have hard metal tips or tungsten carbide tips which are used to cut all wires up to 0.020" round<sup>1</sup>.
- These are heavier and larger than the pin and ligature cutters<sup>1</sup>

### **Maun's Heavy duty wire cutter**

- Heavy wire cutters are also called heavy gauge side cutters. They are capable of cutting wires of up to 1.3 mm diameter. These are used mainly to cut heavy archwire or appliance wire<sup>2</sup>

### **Face bow bending/cutting pliers**

- The face bow bending pliers are ideal for bending and cutting the outer bows of a facebow. These can be used to bend wires up to a diameter of 1.8 mm.<sup>1</sup>

## **6. Clasp forming instruments:**

### **Adam's plier:**

- Made of a hard stainless steel with or without TC tip, that is harder than the wires that they will be used to form. When the beaks are closed, the tips should be a gap at the hinge tapering evenly to contact at the tips.
- Adam's plier is used in the fabrication of the Adam's clasp and has two smooth rectangular beaks<sup>1</sup>
- It is also used for adjustment of headgear and facebow.
- The gap at the hinge should be 0.6 mm. This ensures that a 1.0mm wire can be held firmly, the surfaces of the beaks then being parallel.

### **Adam's clasp bending pliers:**

- It can be used for wires up to the diameter of 1 mm. Adams' clasp bending pliers are special pliers for easy forming of Adams' clasps in one step.<sup>1</sup>
- It is used for wires up to the diameter of 0.7 mm.<sup>1</sup>

### **Arrow clasp former**

- Arrow clasp bending pliers are used to bend the arrow clasp, so that the arrow head can engage the retentive under cut.
- Arrow clasp former is used for hard wires up to 0.7 mm/0.028".<sup>1</sup>

### **Adams spring forming plier**

- It has two beaks, One beak is rounded, the other is square/flat ended.
- It can be used to smooth and contour archwires.
- It is used to adjust springs on orthodontic removable appliances.

**7.Arch forming instruments****Turret**

The wire slotted body is made of stainless steel. It is available in six different versions and colors – Blue, Black, Gold, Silver, Purple, Green. It is used for preparation of arch wires with or without torque adjustment.

- **Turret – Blue**

It is used for forming rectangular arch wires .016" up to .0215".

- **Turret – Black**

It is used for forming rectangular arch wires with torque adjustments: 0° - 10° - 16° - 23°. For use only with wire: .016"x.022".

- **Turret – Gold**

It is used for forming rectangular arch wires with torque adjustments: 0° - 7° - 10° - 13° - 16°. It is used for use only with wire: .018".

- **Turret - Silver**

It is used for forming rectangular arch wires with torque adjustments: 0° - 7° - 10° - 13° - 16°. It is used for use only with wire: .022".

- **Turret - Purple**

It is used for forming rectangular arch wires with torque adjustments: 0° - 10° - 16° - 23°. It is used for use only with wire: .016"x.016".

- **Turret - Green**

It is used for forming round arch wires: .014" - .016" - .018" - .020".

**De la rosa contouring pliers**

- The De La Rosa as it is frequently called, has guiding grooves for forming round and square arches 0.016", 0.018", 0.020" and 0.022".<sup>1</sup>
- It helps to accentuate the curvature in the arch wire.<sup>1</sup>

**Bird beak plier**

- An extremely popular and versatile utility plier designed for working round wire up to 0.030" (0.76mm) in diameter.
- The round beak is precision ground to a perfect cone (.025 at the tip).
- The pyramid beak is exactly<sup>4</sup> .025mm wide at the tip and a 90° angle is ground on the sides to allow for wire. Beaks are parallel at 0.020 inch opening.
- Working edges are carefully beveled and diamond honed to prevent scoring.

**Standard light wire plier**

- It is used for hard wires up to 0.5 mm or 0.020" diameter. It can be used for arch form and spring preparation. It comes with and without serrations on its flat beak.<sup>1</sup>
- Slender beaks make it easier to bend small diameter loops.
- The working edges are carefully beveled to prevent wire scoring.
- A round beak with a cone tip of .025 and a pyramid tip with 9° angle ground on the sides to allow for wire springback. Longer, more gradually tapered beaks than bird beak pliers.

**Jarabak light wire plier**

- The Jarabak light wire plier has a shape, which is slightly different from the original light wire plier.<sup>1</sup>

- It had 3 sets of precision grooves assure accurate bending and closing loops. Flat tip is serrated for firm gripping.
- Serves the same function and can be used to bend spring hard wires upto 0.5 mm or 0.020" diameter.<sup>1</sup>

#### **Angle wire bending pliers**

- It is available in two beak lengths – short and long.<sup>1</sup>
- This sturdily constructed plier, has hard tips and the beaks are cone and pyramid shaped<sup>1</sup>

### **8. Loop forming instruments**

#### **Nance loop forming pliers**

- This plier can bend wires up to a diameter of 0.7 mm or 0.028".<sup>1</sup>
- Both edges of thin blades are fully radiused and stepped-in 3 mm, 4 mm, 5 mm and 6 mm for various size loop forming.
- All working edges are carefully beveled to avoid wire damage. It has four step beaks which are ideal for bending loops of different sizes in both round and rectangular wires.<sup>2</sup>
- It is ideally suited for fanning different loops and adjusting pre-shaped arches for the fixed appliance technique.<sup>1</sup>

#### **Loop tie back plier**

Closing loops are easily made to desired height. It is a Four-step plier (2mm,3mm,4mm,5mm step lengths) automatically forms loops on wire up to .020" with one motion.

#### **Tweed loop forming plier**

- Maximum wire capacity .021 x .028 Tweed .<sup>1</sup>
- Replacement tips with Allen wrench available.
- Concave beak has slight parallel serrations to hold wire at 90° angle while forming loops. Cylindrical beak is electro-etched to prevent wire slippage. Round beak has three step sections of 0.045, 0.060, and 0.075 inch diameter.
- Multiple loops of the same dimension and omega loop can be easily bent with this plier.<sup>1</sup>

#### **Optical plier**

- It had one round and one concave beak for bending round and edgewise wire up to .028" without nicking.
- It forms stops in any type of wire.
- It is also useful for loop tie back and Gable bends.

#### **Young loop bending pliers**

- It is used for hardwires up to 0.7 mm or 28 inches. It provides a uniform dimension to the loops. Young loop bending plier is a universal pliers for different size loops.<sup>1</sup>

#### **Weingart universal pliers**

- The Weingart plier is used to guide and move the archwire in and out of placement and bending the archwire ends<sup>2</sup>.
- It is capable of bending hard wires up to a diameter of 0.5 mm / 0.020".<sup>1</sup>
- It has accurately closed serrated tips. The bend in the beak facilitates easy grasping of the archwire and guiding into buccal tubes.<sup>1</sup>



### **Universal Pliers**

- Universal Pliers for bending wires up to 0.9 mm (035") or cutting up to 0.7 mm (028").

### **9.Utility pliers**

#### **Howe pliers**

- These are mainly of two types: straight howe and curved howe.<sup>1</sup>
- Straight Howe pliers are utility pliers have long, slender lip-safe tips.<sup>1</sup>
- They are used to hold arch wires. The special tip design makes these pliers also suited to seating individual anterior band<sup>1</sup>

#### **Curved Howe pliers**

- Curved Howe pliers are also utility pliers with long, slender, curved lip-safe tips, which increase its efficiency in posterior areas.<sup>1</sup>
- The tips are bent at 40° for better access.<sup>1</sup>

#### **Three Prong pliers Bending of facebow wires**

- It is also used for the activation of the quad - helix appliance.<sup>1</sup>
- It is capable of bending wires up to a diameter of .030".<sup>1</sup>
- The three-prong plier has three precision aligned tips, which ensures consistent bends in lingual bars and wires<sup>1</sup>.

#### **Utility arch plier**

- The notches in the plier beaks crimp the preformed arch wires into proper position. Special design with 3mm step for accurate utility arch construction.

#### **Rose torquing plier**

- These pliers are generally used in pairs for applying labial or lingual torque (Single or Multiple) to archwires.
- Parallel grip prevents crushing of wires.
- They can be used for wires up to the diameter of 0.56-0.70mm or 0.022-0.028".

#### **Ribbon arch plier**

- Maximum wire capacity: .022 x .028.<sup>1</sup>
- Blades are parallel when opened to .020, to ensure accurate 90° bends.
- Ideal for bending square and rectangular wire up to .022 x .028. Edges are radiused and hardened, to prevent wire scoring and to preserve a smooth contact area with the wire.

### **CONCLUSION:**

Knowledge of these instruments and its uses is important for all dental students before achieving orthodontic treatment on patients.

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