HAND INSTRUMENTS IN OPERATIVE DENTISTRY

Learning outcomes

- Outline the instruments used in operative dentistry
- Describe about each hand instruments and their uses

Introduction

The removal of caries and tooth preparation are essential aspects of restorative dentistry.

Initially, this was a difficult process accomplished entirely by the use of hand instruments.

Later the introduction of rotary, powered cutting equipment was a truly major advance in operative dentistry.

Sturdevant's Art and science 5 th edition page 327

Materials

Hand cutting instruments are manufactured from two main materials:

- Stainless steel
- Carbon steel

- Stainless steel alloys are mainly used
- Stainless steel remains bright under most conditions, but loses a keen edge during use much more quickly than does carbon steel
- Carbon steel is harder than stainless steel, but when unprotected, it will corrode (Rust).

Sturdevant's Art and science 5 th edition page 327

Marzouk's classification of hand instruments

1. Diagnostic instruments
2. Cutting instruments
3. Restoring instruments
4. Finishing and polishing instruments

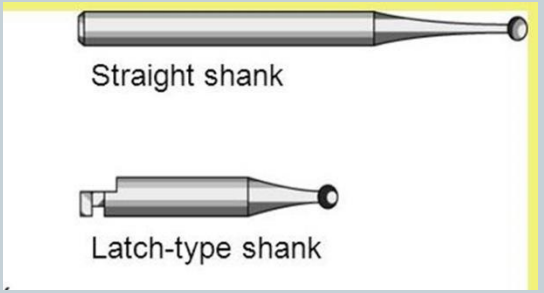
Diagnostic instruments or Exploring instruments

- Mouth mirrors, Explorers, Periodontal probes, Tweezers.

Cutting instruments

(A) Hand cutting instruments - Chisels, excavators.

(B) Rotary cutting instruments - Handpieces, burs, abrasives.

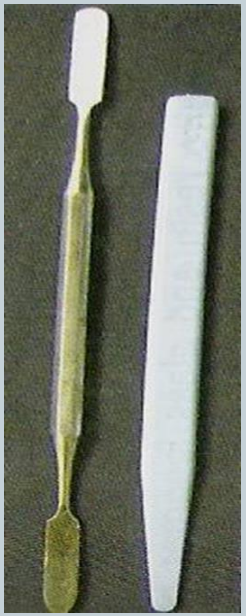


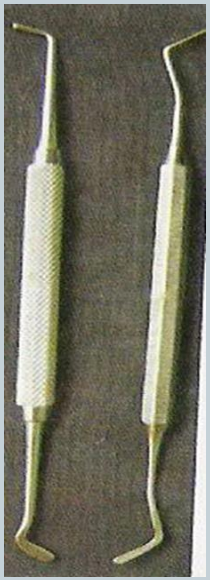
Restoring instruments

Cement spatulas, plastic filling instruments,

- Amalgam carriers, condensers, burnishers, carvers.

Composite Ins. (Teflon Coated)





Finishing and polishing instruments

- Finishing strips, Finishing burs, Brushes, Rubbercups.

strips

burs

Rubber cups

1. Exploring instruments

- **Mouth mirror**
- **Explorer**
- **Periodontal probe**
- **Tweezer**

Mouth mirrors

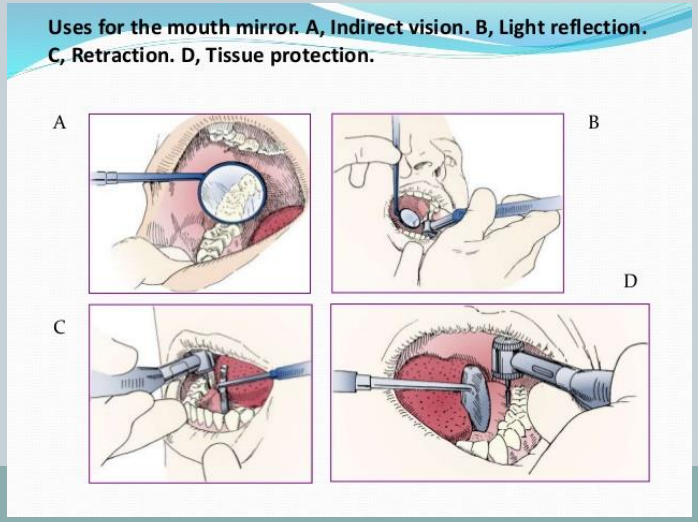
- Mouth mirrors are used to provide a clear and distinct vision of the operating area .

Uses

- ✓ Help indirect vision (for upper teeth).

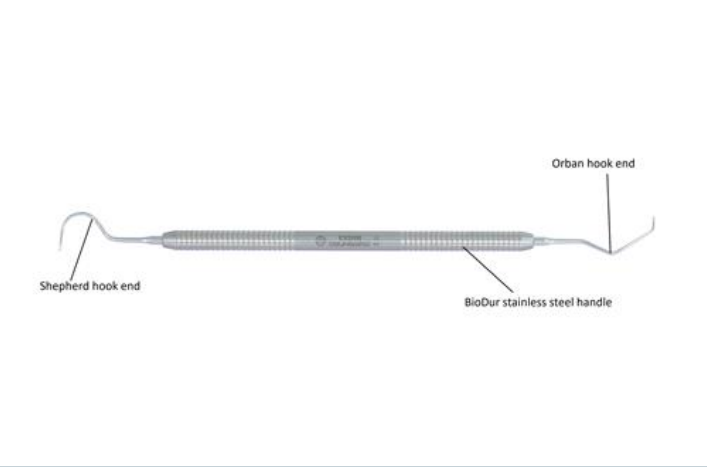
- ✓ Light reflection

- ✓ Retraction of the soft tissues like the tongue ,cheeks or lips thus aiding in better access and visualization of the working area.



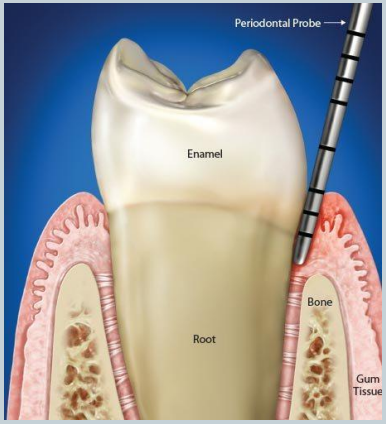
Explorers

- These are delicate, pointed instruments use for tactile examination of tooth surface & restorations to identify any irregularities.
- Tip of explorer is called as Tine



Periodontal probes

- In operative dentistry, they are useful to measure the dimensions of cavity preparations.



Tweezers

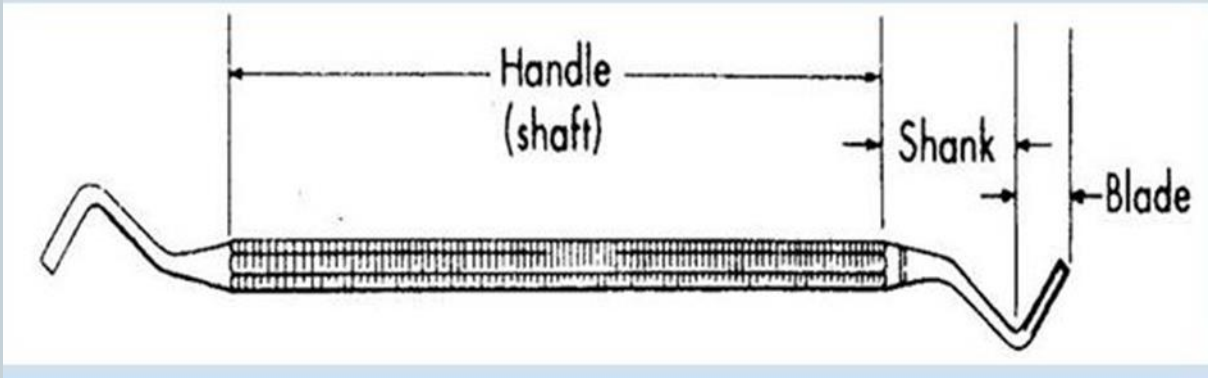
- Cotton tweezers or pliers have angled tips. They are used to place and remove cotton rolls used for isolation of teeth.

- They can also carry small items like cotton pellets ,to dry the teeth and to carry wedges

PARTS OF HAND INSTRUMENTS

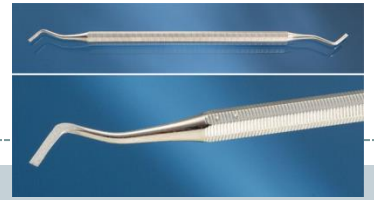
3 parts

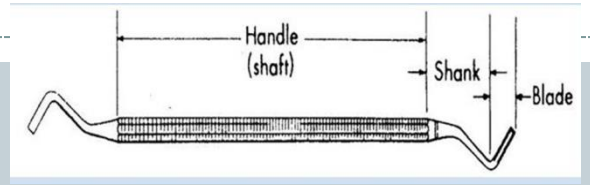
1. Handle
2. Shank
3. Blade



Principles and Practice Charbeneau, 3rd edition page no 133

Blade or Nib





- It is the Functional end or working end of the instrument

- For Cutting instrument is called as Blade or Cutting edge

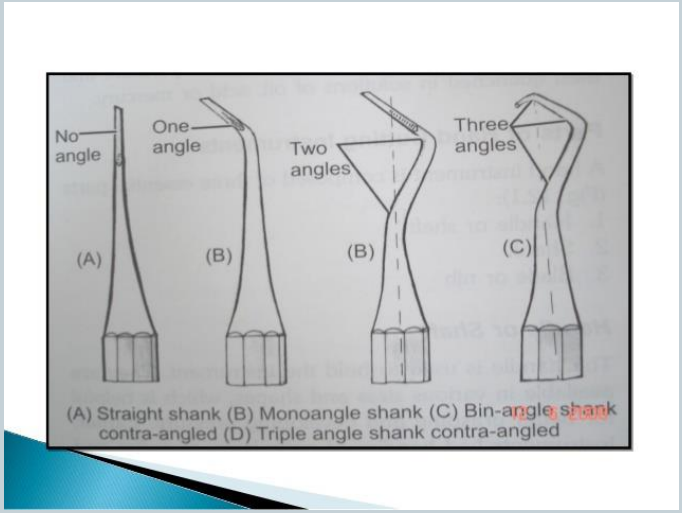
- For Non cutting or restoring instrument is called as Nib

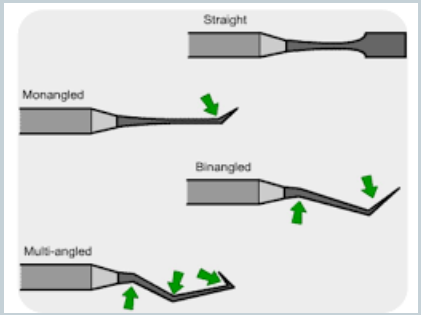
Principles and Practice Charbeneau, 3rd edition page no 133

Different angled instruments

Different angles of Shanks

- ✓ Straight – No angle
- ✓ Monoangled – One angle
- ✓ Binangled- Two angle
- ✓ Triple angled – Three angle





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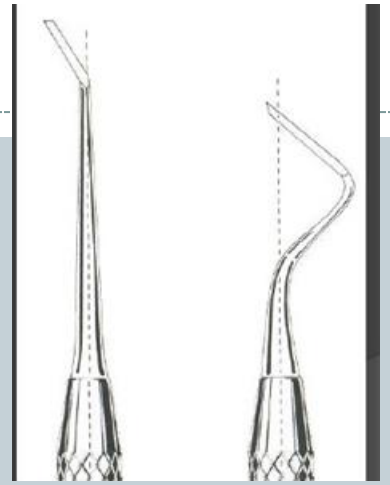
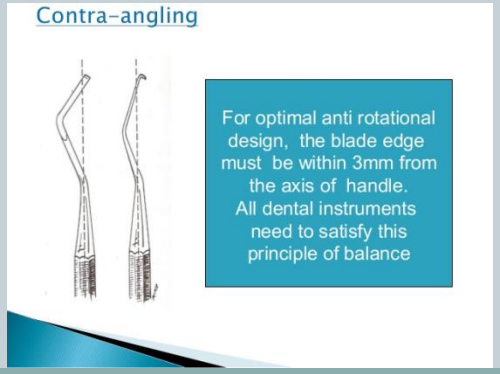
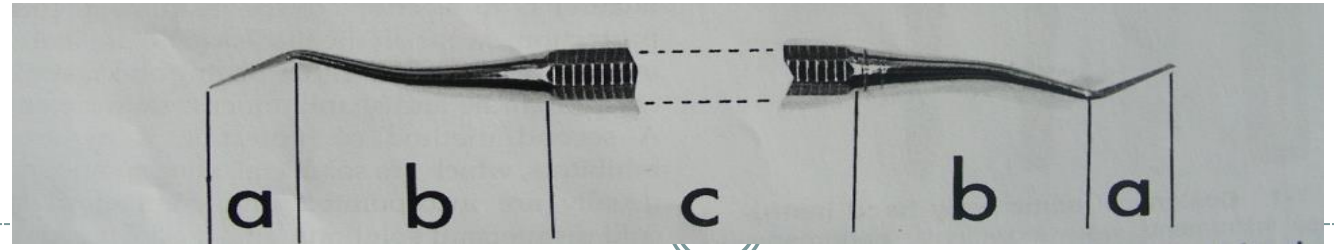
Contrangled



Contraangled – Angling of the shank in a design to bring the cutting edge close to the handle

- ✓ Eg: Biangle and triple angled
- ✓ For optimal antirotational design, the cutting edge must be within 3 mm from axis of the handle





SINGLE OR DOUBLE ENDED INSTRUMENTS:

Most Instruments are available with Shank ,Blades & Cutting Edge on both sides of the handle , such instruments are called **Double-Ended Instruments .**

Sturdevant's Art and science 5 th edition page 328

Most hand cutting instruments have a Cutting edge(Bevel) at the end of the blade .

Depending on the number of Bevels , the instruments are classified as

1) Single beveled.

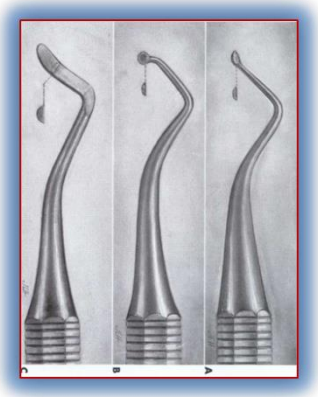
e.g: Chisel

2) Bi-Beveled

e.g: Hatchet Excavators

3) Circumferentially Beveled.

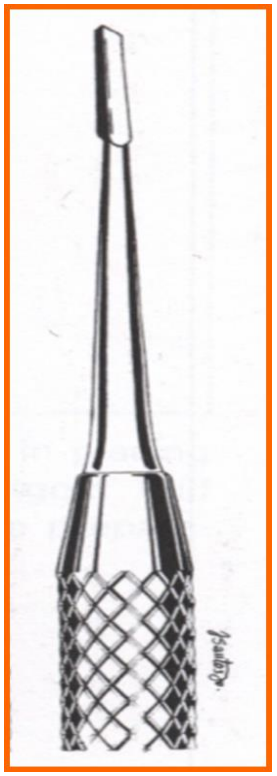
e.g: Spoon Excavators.

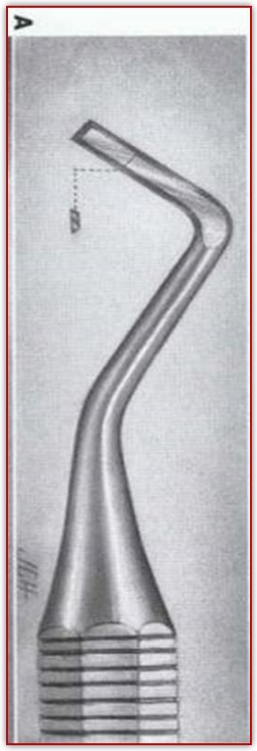


Sturdevant's Art and science 5 th edition page 329

Hand Cutting Instruments

Straight Chisel Enamel Hatchet Gingival Marginal Trimmer Spoon Excavator





Chisels

Straight Chisel – A chisel is an hand cutting instrument primarily used for removal of unsupported enamel

Wedelstadet chisel(if it is slightly curved)

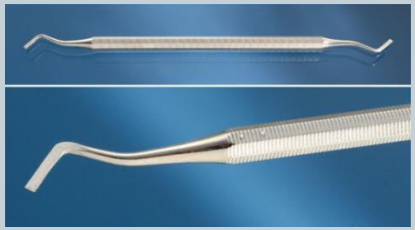
Principles and Practice Charbeneau, 3rd edition page no 133

Enamel hatchet

- Similar to a form of chisel, blade is single beveled
- Bevel(cutting edge) is only on one side)
- Straight blade

- The primary cutting edge is in a plane parallel with long axis of the handle

- Most commonly Double ended instrument

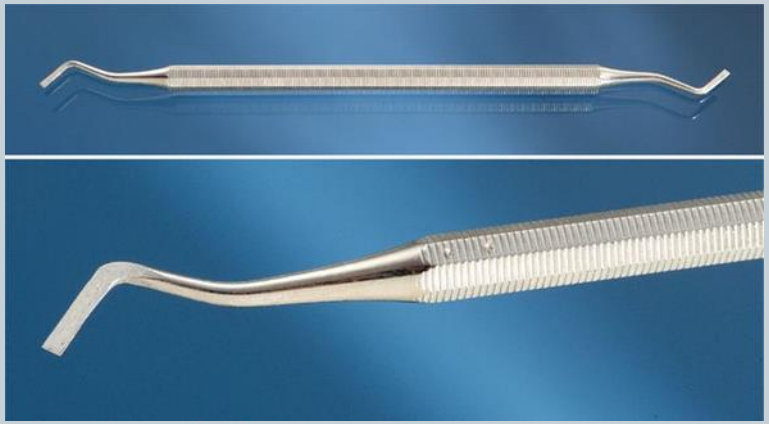


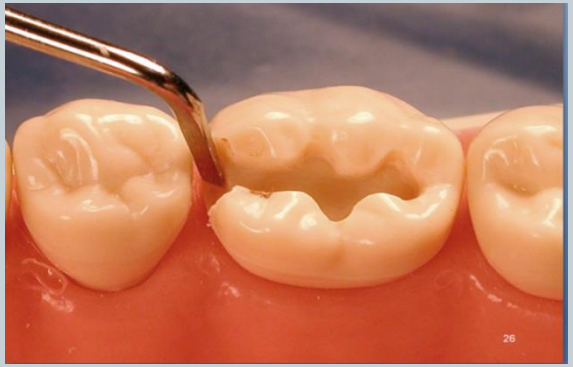
Sturdevant's Art and science 5 th edition page 330

Enamel hatchet:

Use:

- To remove unsupported enamel from proximal area in a Class II Cavity preparation





Gingival Marginal trimmer (GMT)

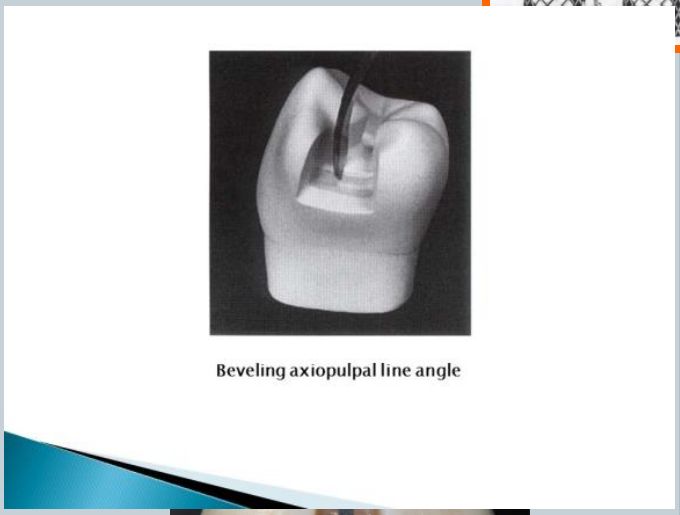
- It is similar in design to the Enamel Hatchet , except the blade is curved
- Cutting edge is at an angle other than right angle to the blade .
- GMT comes in pairs of Mesial & Distal.

Sturdevant's Art and science 5 th edition page 332

Gingival Marginal trimmer (GMT) :

Uses:

- For rounding or beveling of the axiopulpal line angles.
- For gingival wall beveling in class II cavity prepartion.



Spoon Excavators:

- As the name suggests, the working end of the instrument is in the shape of the spoon
- The blade is slightly curved & circumferentially beveled .
- Spoon excavators are Double ended & the cutting action for removal of soft caries is Lateral cutting Action .

Sturdevant's Art and science 5 th edition page 332

Spoon Excavators:

Use:

- For removal of soft caries.

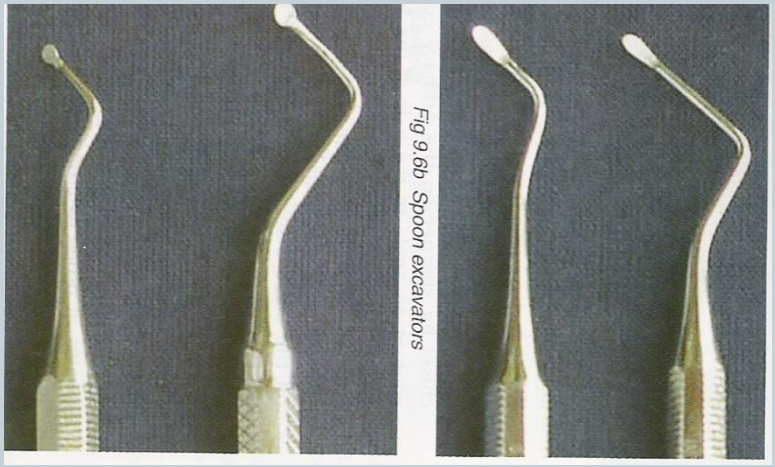
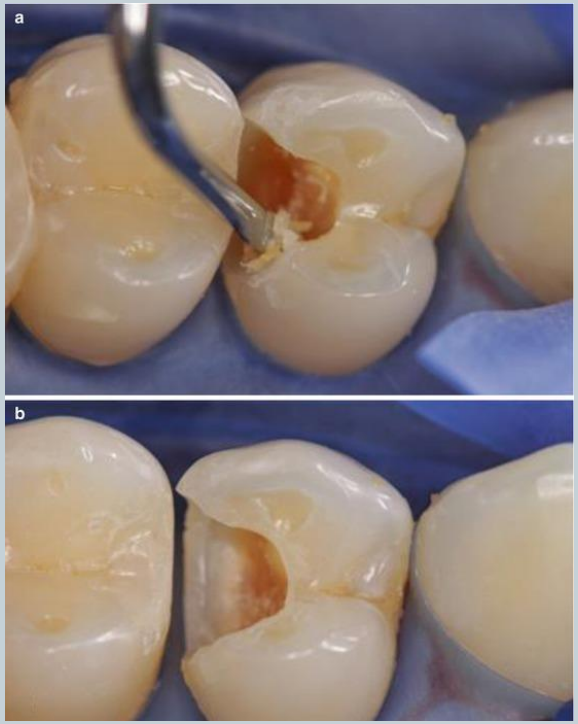


Fig 9.6b Spoon excavators



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Part -2

HAND INSTRUMENTS IN OPERATIVE DENTISTRY

Learning outcomes

1. Summarize instrument formula
2. Differentiate cutting and non cutting instruments
3. List the types of grasps and rests in operative dentistry

Learning Resources :

1. Sturdevant's art and science of operative dentistry 5 th edition Page no ;320 – 333

2. Charbeneau 's Principles and practice of operative dentistry 3rd edition Page no ; 132 - 137

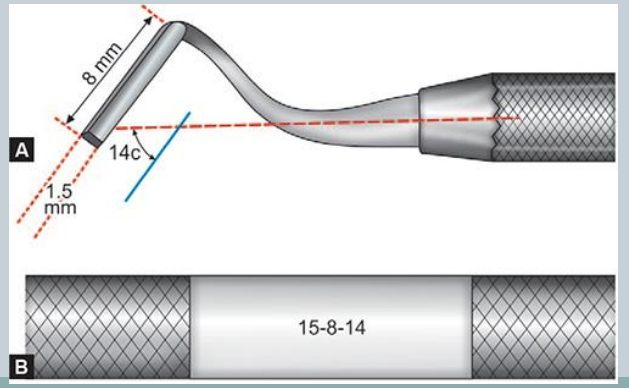
BLACKS INSTRUMENTS FORMULA

G.V. Black established instrument formula as **3 units**

a. **First unit –** Describes the width of the blade in millimeter.

b. **Second unit** - Describes the length of the blade in millimeter.

c. **Third unit**- Describes the angle of the blade forms with the axis of the handle.(Blade angle) expressed in centigrade degree



Sturdevant's Art and science 5 th edition page 324

INSTRUMENT FORMULA - 4TH UNIT

- The 3 Units or measurements are sufficient to describe most of hand cutting instruments .

- However for certain instruments with their cutting edges at an angle other than Right Angle to the long axis of Blade (GMT & Angle Former) a fourth unit called cutting edge angle is added to the basic 3 units formula

- which is expressed in centigrade degrees & placed in the **second** position in the formula.

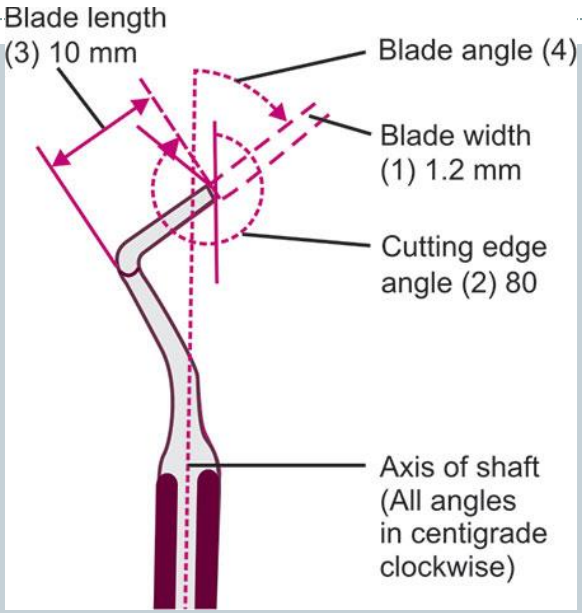
Sturdevant's Art and science 5 th edition page 324

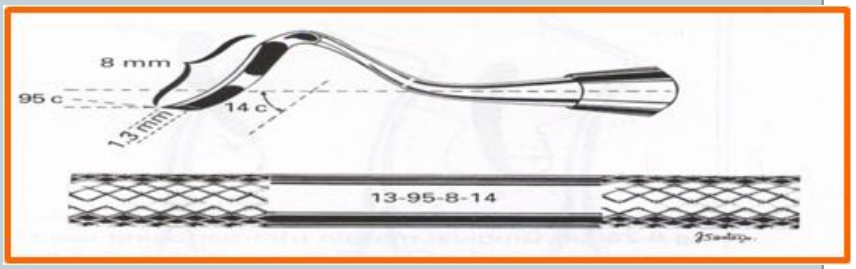
FOUR UNITS INSTRUMENT FORMULA

1st Unit - The width of the blade in 1/10th of millimeter.

2nd Unit - Cutting Edge Angle in centigrade

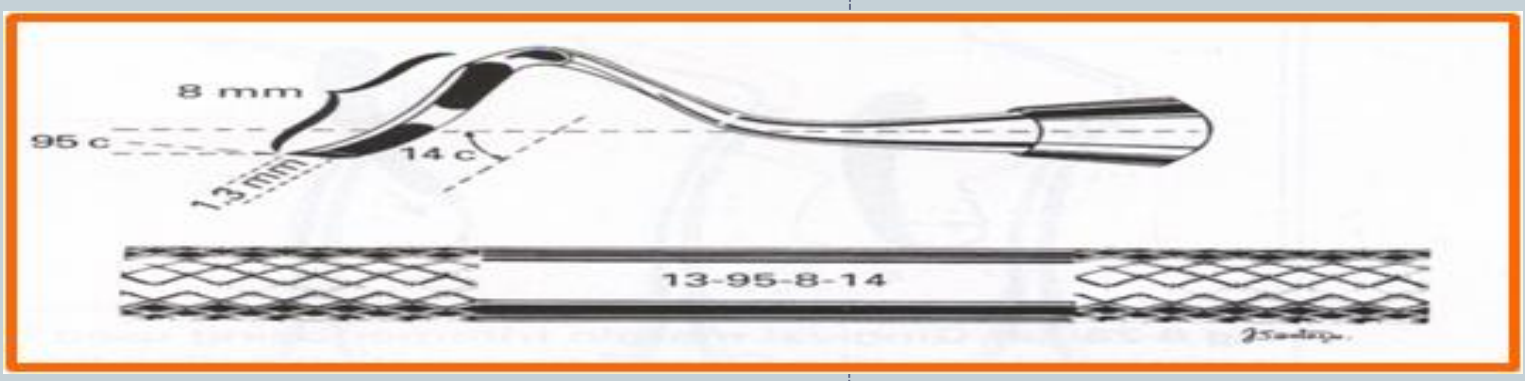
(the angle between the cutting edge and the long axis of the handle)





3rd Unit - The Length of the blade in millimeter .

4th Unit - The Blade Angle in centigrade. (The angle between the blade and the long axis of the handle)



Sturdevant's Art and science 5 th edition page 324

Restoring instrument

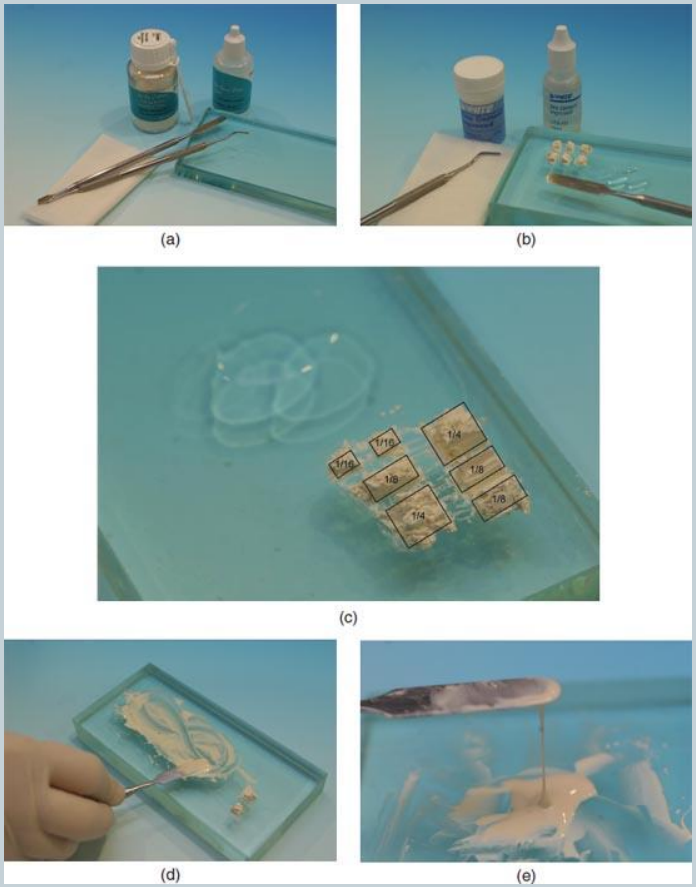
- Cement spatulas

1. Metal spatulas
2. Plastic spatulas

Flat and wide nib with blunt or pointed edges.

These may be single or double ended.

Use: To mix the dental cements

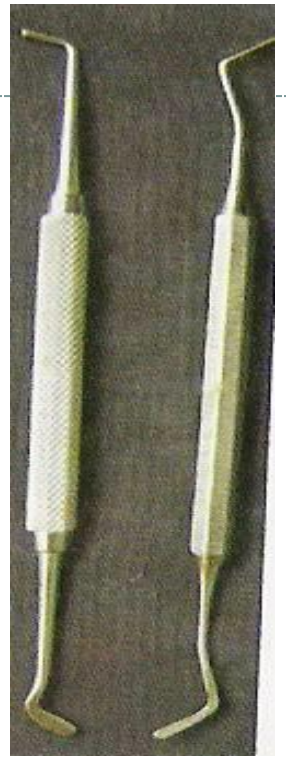

(a)
(b)
1/16
1/16
1/4
1/8
1/8
1/4
1/8
(c)
(d)
(e)

Plastic filling instruments

- They are double-ended having a flat nib with blunt edges on each end

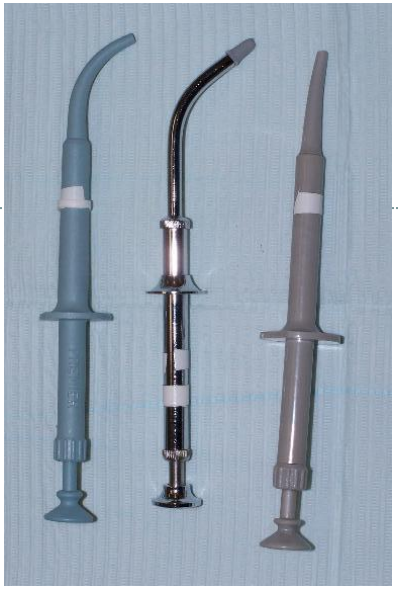
No sharp edges

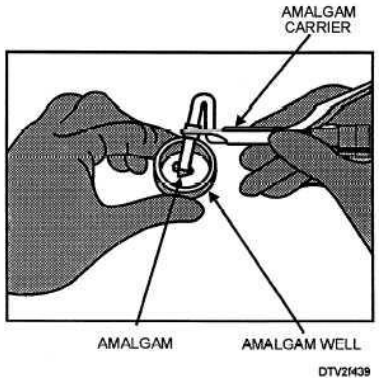
Use: To carry mixed cements into the cavity preparation

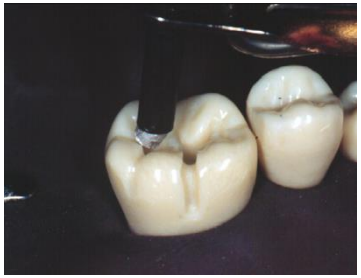


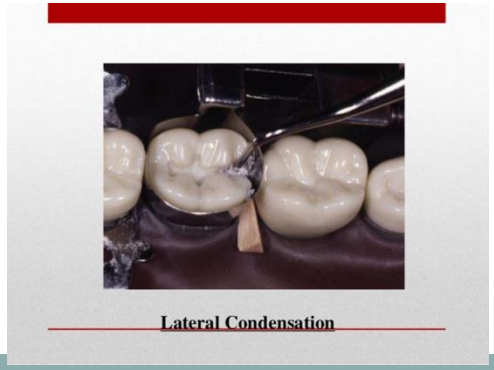
Amalgam carriers

- To carry mixed amalgam to the prepared cavity







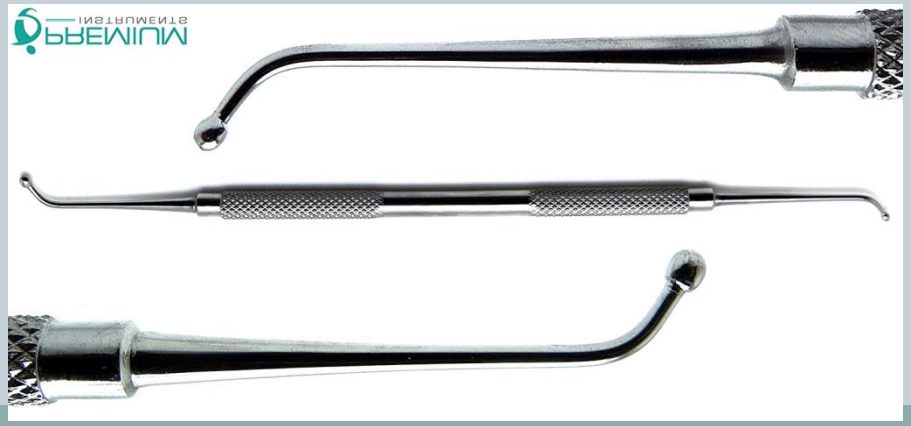


Condensers

- Hand
- They are used to compact or condense amalgam into the prepared cavity.
- Nibs of condensers may be round, parallelogram(flat)

Burnishers

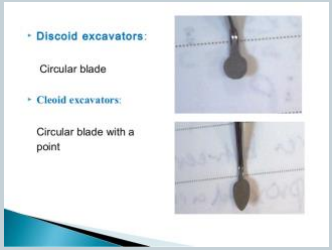
- To make surface of the restoration smooth .
- The nibs may be ball-shaped, egg-shaped.



Carvers

- Carvers are usually double-ended, binangled instruments with their nibs knife edged.

- The most universally used carvers are the Hollenbeck carvers, Cleoid-discoid carvers.



Sturdevant's Art and science 5 th edition page 333

INSTRUMENTS GRASP / GRIP

There are four Grasps or Grips used in Hand instruments :

1. Modified Pen Grasp
2. Inverted Pen Grasp
3. Palm and Thumb grasp
4. Modified Palm and Thumb Grasp

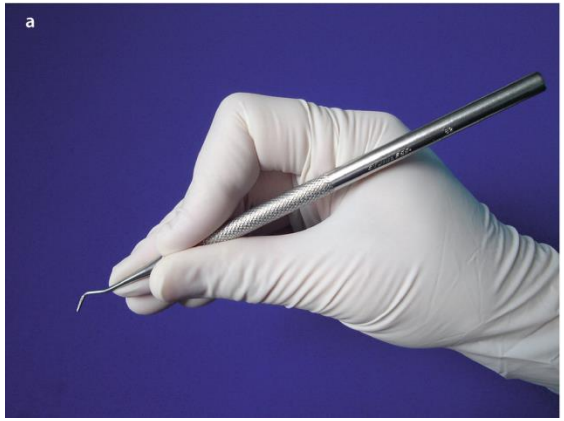
Sturdevant's Art and science 5 th edition page 333

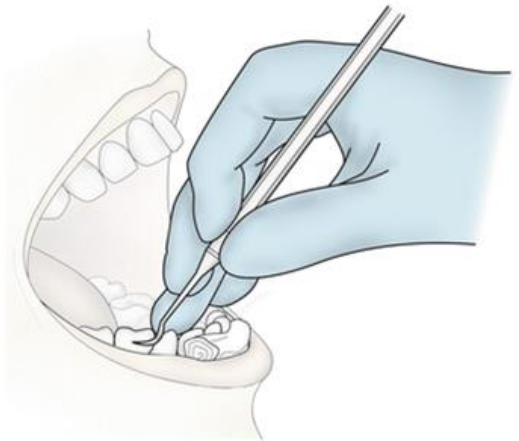
MODIFIED PEN GRASP

- As the name implies , it is similar to that used in holding a pen.

- The pads of the thumb, index & middle finger contact the instrument

- The pad of the middle finger generates the required pressure for cutting.



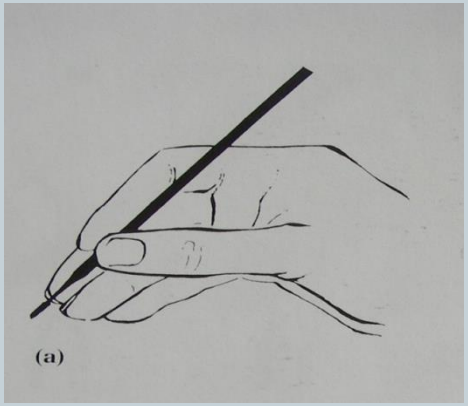


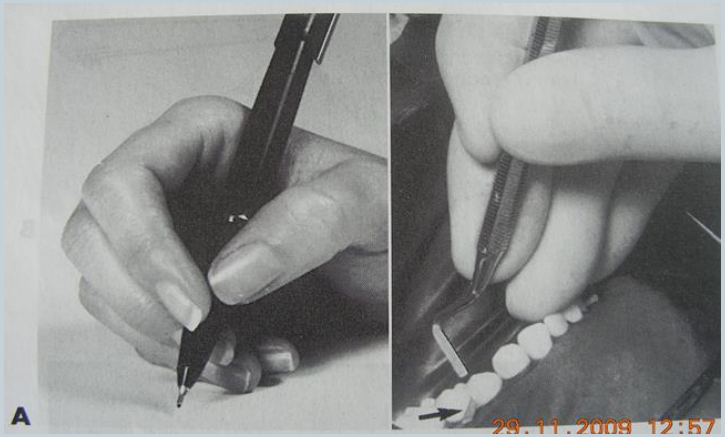
Sturdevant's Art and science 5 th edition page 333

MODIFIED PEN GRASP

- It is most commonly used for mandibular teeth

- The tips of the ring(fourth) & little(fifth) fingers are placed on the next or near by tooth surface of the same arch called as **Rest**





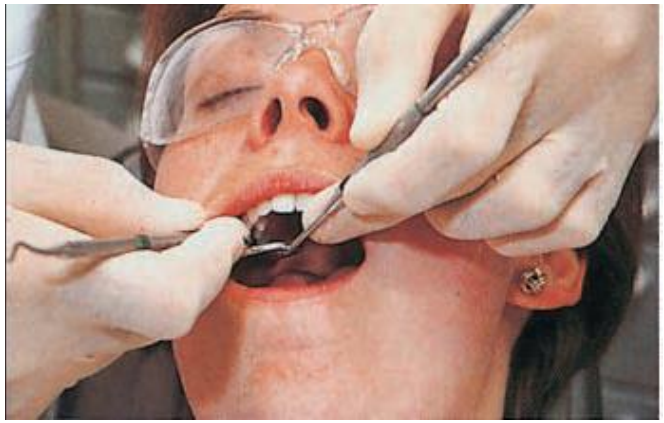
Sturdevant's Art and science 5 th edition page 334

Advantages of modified pen grasp

- Better control of the instrument
- Prevention of finger fatigue
- An increase in tactile sensitivity.

INVERTED PEN GRASP / GRIP

- The finger positions of inverted pen grasp is same as that of modified pen grasp
- However the hand is rotated so that the palm is facing upwards .
- This grasp is commonly used for palatal surface of maxillary teeth .



Sturdevant's Art and science 5 th edition page 334

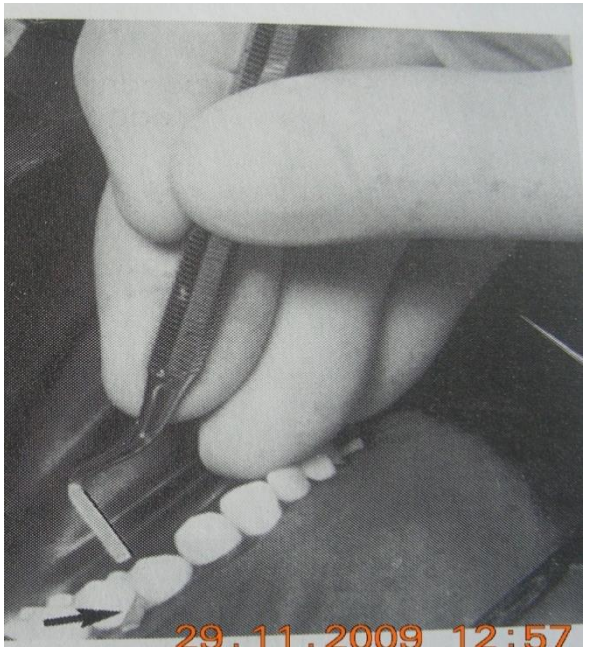
PALM-AND-THUMB GRASP

- Is similar to that holding a knife while peeling the skin of an Apple .
- The handle is placed in the palm of the hand & grasped by all four fingers , while the thumb is free of the instrument
- The rest is provided by the tip of the thumb placed on the tooth operated on or adjacent tooth.
- Very limited use in Operative dentistry, used in Class III cavity preparation

Sturdevant's Art and science 5 th edition page 334

FINGER RESTS

- In Modified pen and inverted pen grasp , the remaining ring & little fingers are held firmly against the adjacent tooth of the same jaw , this is called a REST



- It is used to **steady** the hand & prevent **slipping** of the instruments, and to have remarkable **control** of the instrument.

Sturdevant's Art and science 5 th edition page 334

Learning Resources :

Sturdevant's art and science of operative dentistry 5 th edition Page no ;320 – 364

2. Charbeneau 's Principles and practice of operative dentistry 3rd edition Page no ; 132 - 137

Thank You