

It is based on following disciplines

- Study of human and their environments.
- Anthropometric survey.
- Bio mechanics.
- Mechanical engineering.
- Industrial design.
- Information design.
- Kinesiology.
- Physiology
- Cognitive psychology
- Industrial and organisational psychology

Ergonomics comprises of three main fields

- Physical
- Cognitive
- Organisational ergonomics

Physical ergonomics include visual ergonomics depends on principles used designing for consumer and industrial products.

Cognitive ergonomics includes usability e.g. Sewing machine/ computer with human interaction (User) such as perception, memory, reasoning and motor responses.

Organisational ergonomics include socio-psycho technical procedures and structure of organizations e.g. team work, virtual organization and quality management etc.

Weakness of ergonomics methods

- More time consuming
- Highly effort planning
- Longer study period is required
- Longitudinal in nature.

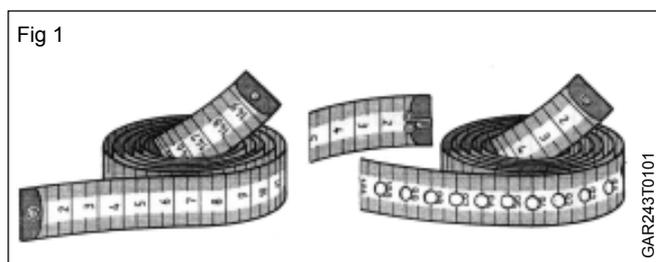
Tools and Equipments

Objectives: At the end of this lesson you shall be able to

- **state various types of**
 - **measuring tools**
 - **drafting tools**
 - **marking tools**
 - **cutting tools**
 - **sewing tools.**

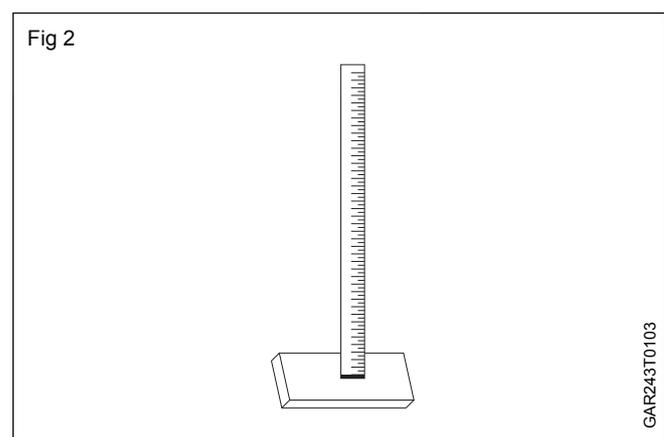
Measuring tape

Flexible fiber glass or fabric measuring tape that is ideal for taking body measurements, measuring patterns and layouts as well as general measuring. Fabric types tend to stretch after prolonged uses. It has marks of inch and centimeter only. Its width is 5 points. It is a measuring ribbon made on scientific base knowledge about the use of fundamental for tailoring. (Fig 1)



Measuring stand

This stand is used to measure long garments as over coat, ladies nighty, gown etc., as well as to check the flare of enriched garments. (Fig 2)



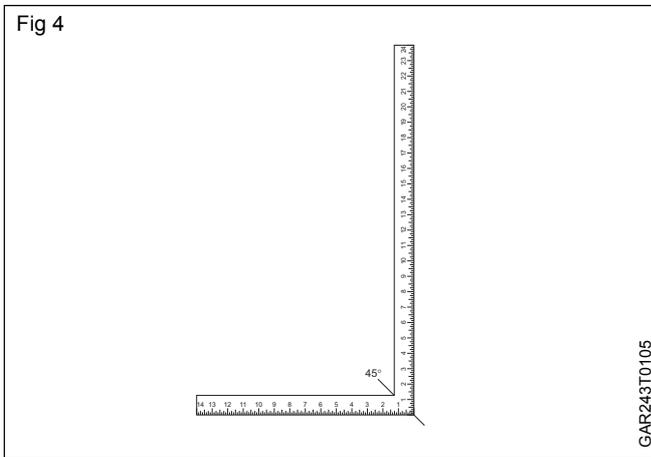
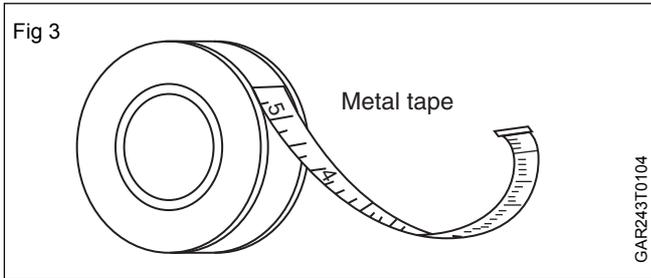
Metal tape

It is convenient and flexible for measuring form or figure. It is made of flexible metal. (Fig 3)

Drafting tools

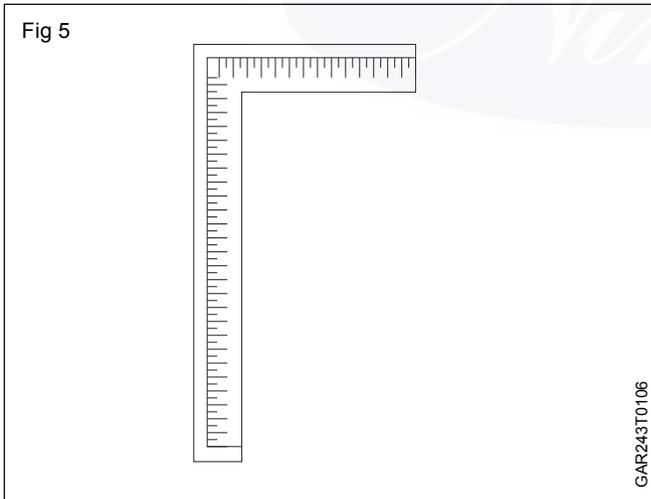
'L' scale

It is made up of wood or iron, it is called try square also. Its one arm is 12" in length and another is 24" in length. Each inch contains 8 marks. Wooden try square is used in tailoring. Fig 4.



Graduated square

It is also 'L' square scale, but here inch mark are given on the one side and on the other side with 1/2" marks are in the denomination of 1/4, 1/7, 1/16, 1/32 and side with 24" marks are in the denomination 1/3, 1/6, 1/12, 1/24, 1/48. These marks are used for drafting the patterns. (Fig 5).

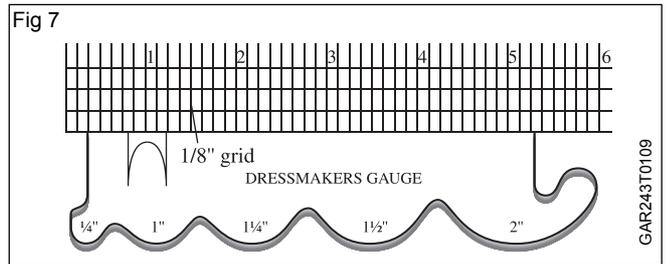
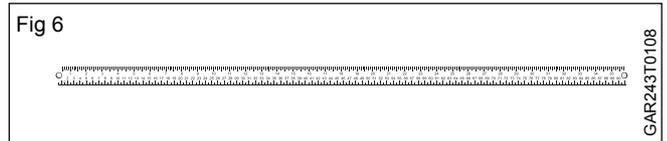


Measuring stick

It has marks of inch and centimeters. It is flexible stick used for checking the grains of the fabric and marking the hems. (Fig 6).

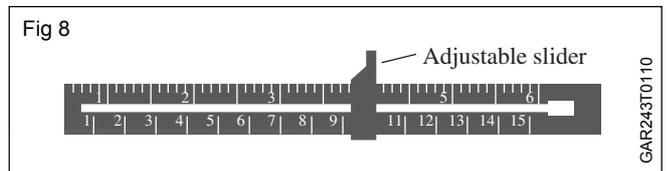
Dress marker's gauge

It has one side with scallop edges and the other side with straight edges. Scallop edge side contains 1/4", 1", 1 1/4", 1 1/2", 2" where as the other side with straight edge contains 1", 2", 3", 4". Scallop edges used for measuring pleats, tucks etc., and straight edges are used for measuring the button holes. (Fig 7).



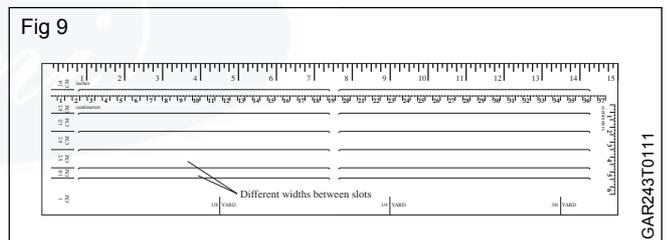
Seam gauge

Seam gauge is 6" ruler with a sliding rod marker has many uses. It is used to mark seam margin lengths, buttons and button holes as well as design details such as pleats and tucks. (Fig 8)



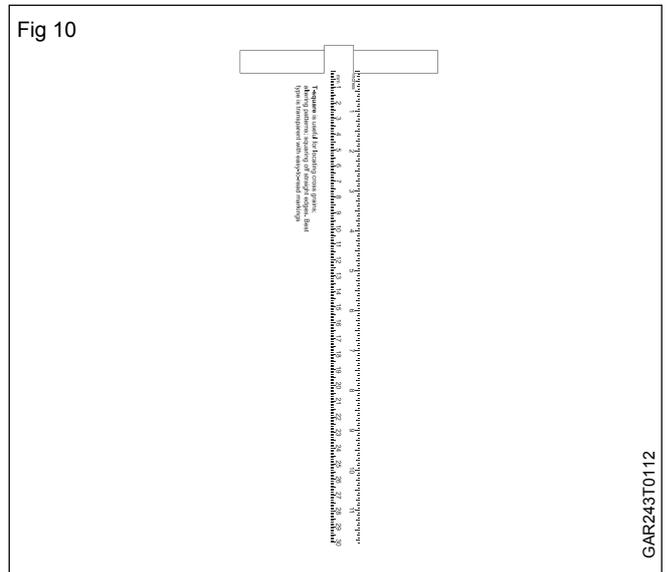
Transparent ruler

It is made of plastic, it has marks of inches and centimeters. It is used for measuring straight or bias lines. (Fig 9)



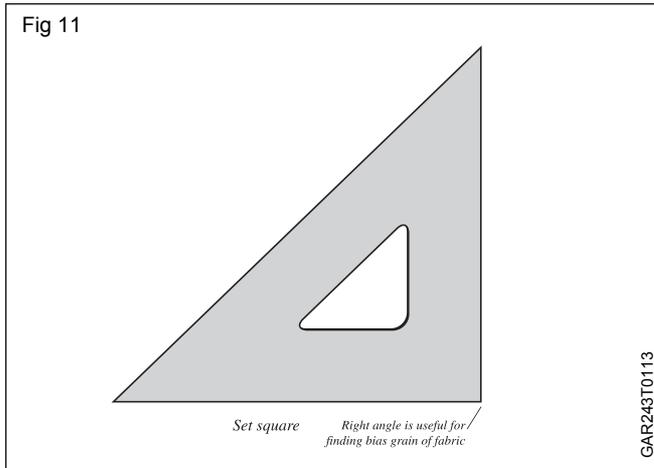
T – square

It is transparent with easy to read the markings. It has marks of inches and centimeters. It is used for measuring the square off straight edges. (Fig 10)



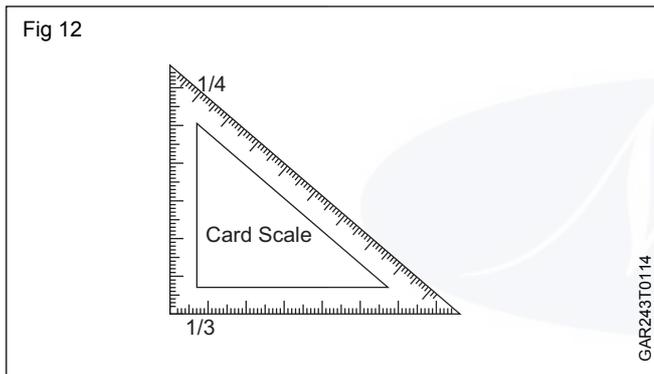
Set square

Set square made of crystal clear, shatter proof synthetic material, metal or wood. They are used in the design and pattern departments. (Fig 11)



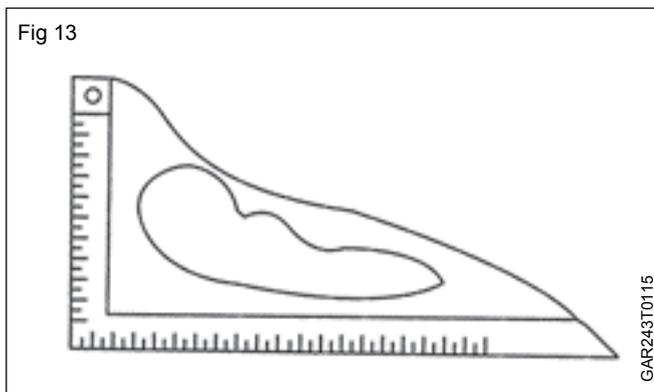
Card scale

It is made up of paper card board. It is commonly used for small drafting in the record note books. (Fig 12)



Tailor's art curve

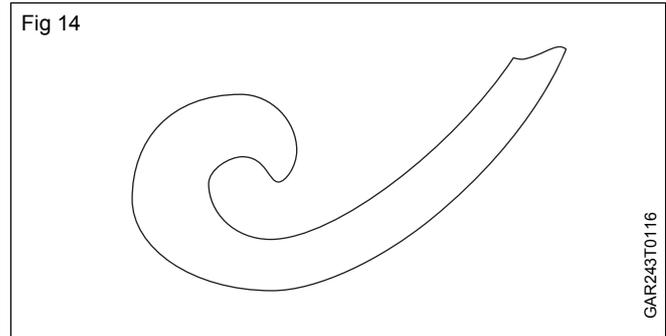
It is made up of wood, plastic and steel. It is also of 'L' shape but other side is closed also and is curved in circles. It contains marks of 1/2 centimeter on the one side and that of 1/5 centimeter on the other side. (Fig 13)



French curve

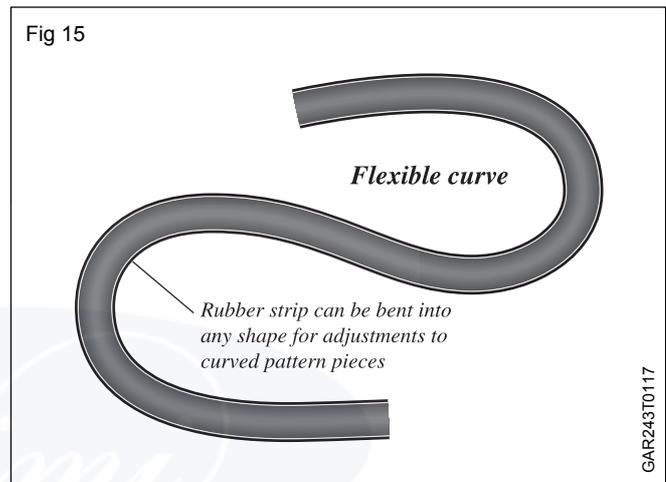
These are made up of transparent plastic. It is a set of 12 tools in tailoring only 3 or 4 is commonly used. It helps in

drawing the shapes of neck, armhole depth, side and bottom. (Fig 14)



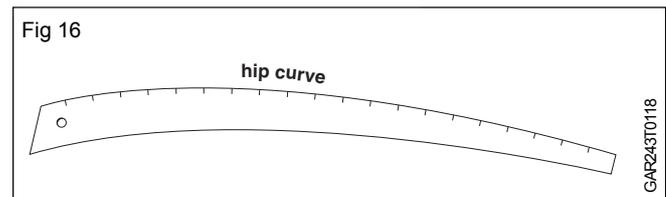
Flexible curve

These are made of flexible rubber. It can be bent into any shape of adjustments to curved pattern pieces. (Fig 15)



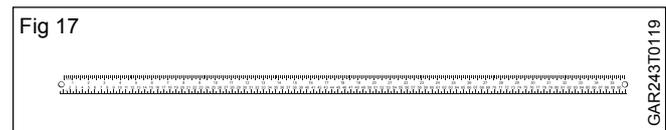
Hip curve or Curve rulers

It is made of wood or plastic. It is a slightly circled rod, it is used for drafting the side shape like shirt, pants etc., (Fig 16)



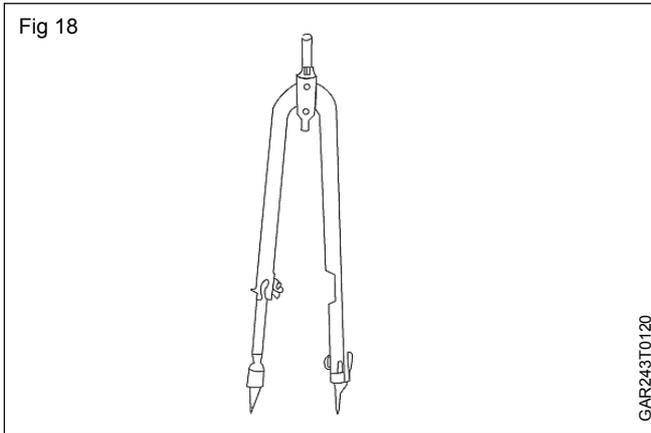
Long rule

It has marks of inch and centimeter. It is used for drawing the straight lines. (Fig 17)



Compass

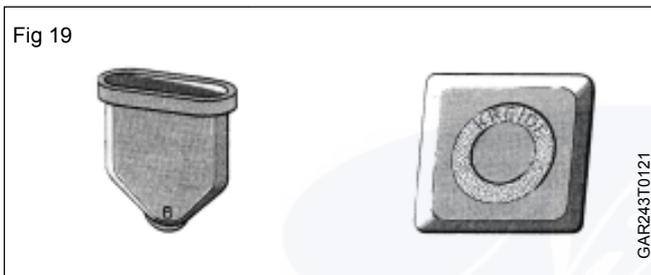
It is made of metal and it is used for drawing circles and arcs, in tailoring it helps only for make curve in an umbrella frock. (Fig 18)



The most common drafting tools are

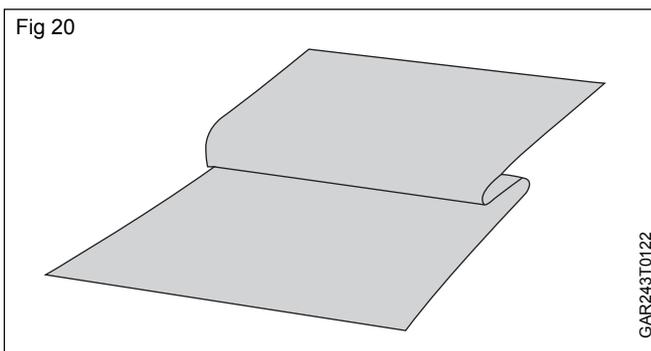
Tailor's chalk

This is available in many forms at sewing motions. Tailor's chalk is hard chalk is used to make temporary markings on cloth. Marking pen may be self erasing after 2 to 8 days or can be removed either by wash or by ironing. It is useful for marking on the top of the cloth eg. Pocket position (Fig 19).



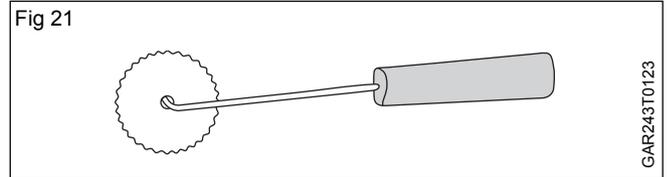
Tracing paper

Tracing paper is named as such for its ability for an artist to trace an image onto it. When tracing paper is placed onto a picture, the picture is easily viewable through the tracing paper. (Fig 20)



Tracing wheel

A tracing wheel is with serrated teeth on a wheel attached to a handle used to transfer markings from pattern on to fabric with or without tracing paper. Such markings might include pleats, darts, button holes or placement lines for appliances or pockets. There are two basic types of tracing wheels are available to the modern sewing machine one with a serrated edge and one with a smooth edge. (Fig 21)



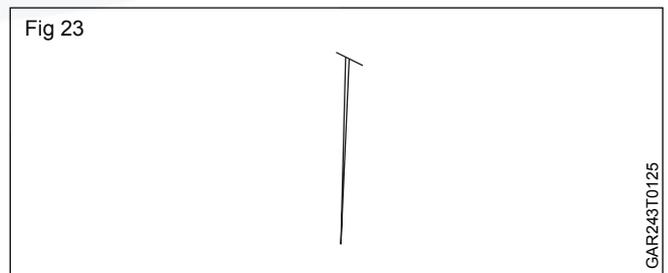
Cutting table and cutting board

Cutting table is 6 feet wide and 3 feet , 3 feet height. People who work in standing position use table and those who work in sitting position use board. (Fig 22)



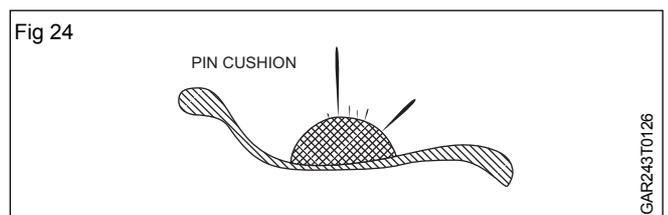
Pins

Straight pins range in length from 1/2" to 1 7/8" look for sharp, smooth, rustproof pins that can bend without breaking. (Fig 23)

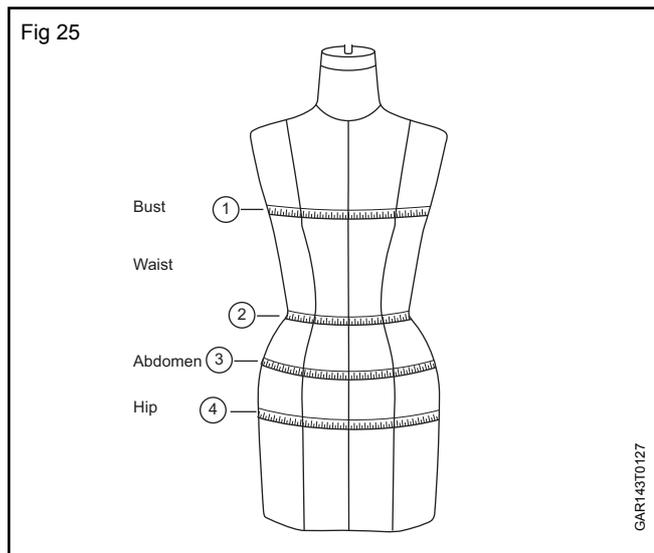


Pin cushions

Pin cushions are in variety of styles. It sharpens and cleans pins and needles, a rectangular, wrist band pin cushions mounted on a plastic wrist band that is perfect for pin filling and marking hems and magnetic 'grabber' types net marks for easy pin catching. (Fig 24)



Dress form (Fig 25)

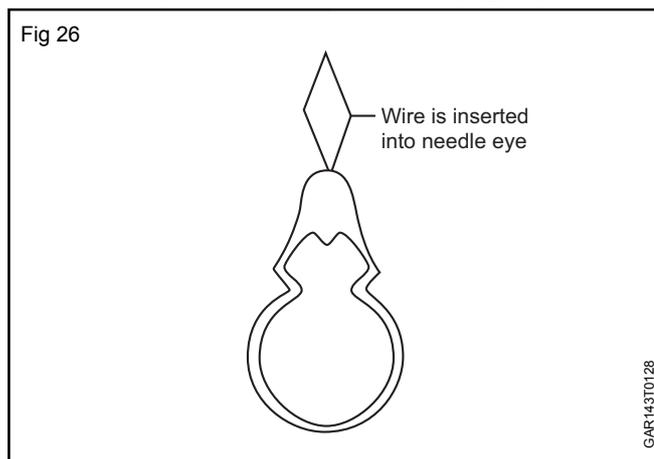


Dress form is used to give a three dimensional view on the article of clothing that is being sewed. They come in all sizes and shapes for almost every article of clothing can be made.

When a piece of clothing is made it can be put on the dress form so one can see how the piece of clothing will turn out. Then one can make alterations up on the clothing on appearance of the dress form.

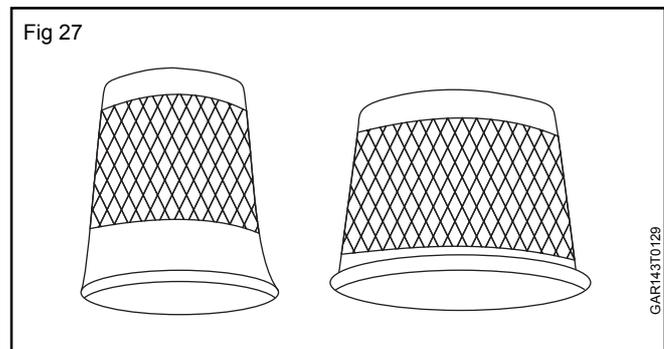
Needle threader

A needle threader is a small device for helping the thread through the eye of small needles. Most familiar today is the needle threader of Victorian design consisting of a small tinned plate stamped with queen's head and with a diamond shaped steel wire attached. (Fig 26)



Thimble

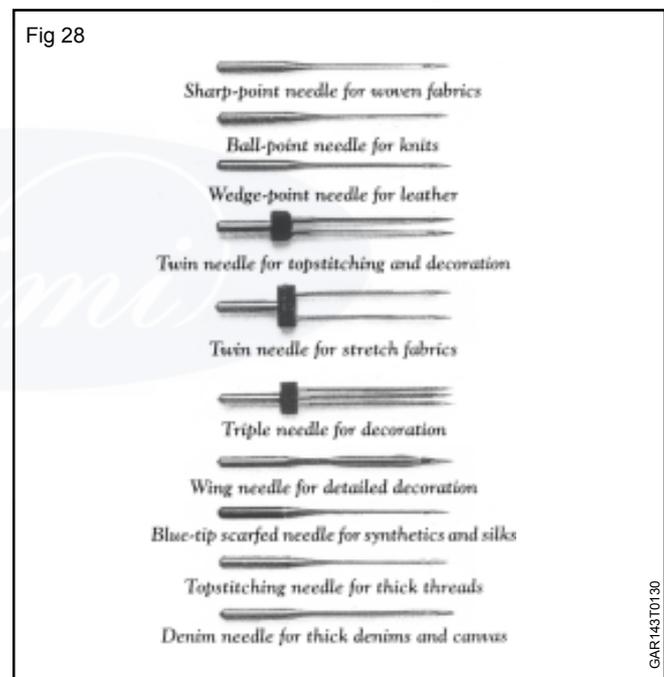
Made of metal, rubber or plastic. This small protective cover slips over the index or middle finger. When hand sewing or quilting a thimble protects the finger tip from pin pricks and it is used to push the needle through multiple layer of fabric. (Fig 27)



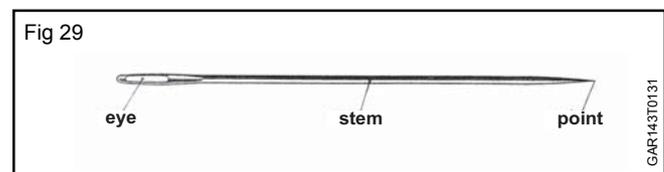
Sewing needles

A sewing needle is a long slender rods with a pointed tip. A needle for hand sewing has a hole called the eye at the non – pointed end to carry thread or cord through the fabric after the pointed end pierces it. Needle rings is defined by a number on the packet.

The convention for sizing is that the length and thickness of a needle increase as the size number decreases. For example, a size 1 needle will be thicker and longer, while size 10 will be shorter and finer. (Fig 28)



Sewing needles

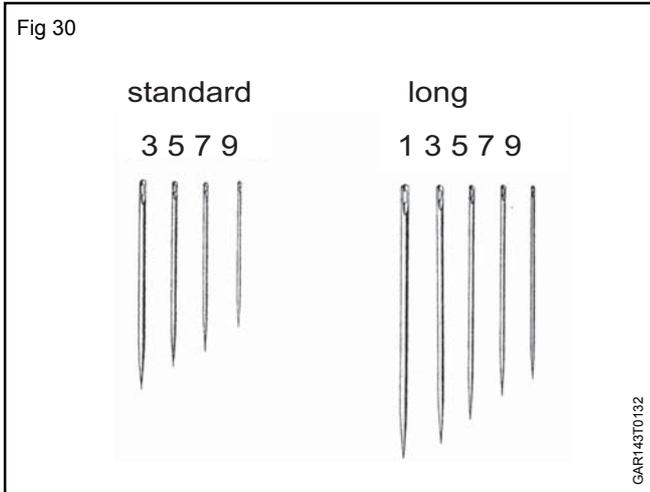


Sewing needles are classified by their length and thickness. The usual types are “standard” and “long”.

The numbering system is not directly related to the length or thickness of the needles; it serves only to distinguish one needle from another.

The length and thickness of a needle will be chosen according to the fabric to be sewn, the thread to be used and the sewing technique.

Sewing needles are made of nickel-plated steel. They have to be flexible, smooth and sharp. (Fig 30)



The needle has to be able to penetrate the material being sewn, without damaging it, by pushing the yarns aside. Solid materials, such as leather or plastic, will be holed. Sewing machine needles of various types are available according to the application.

Selection of the needle type will depend on the characteristics of the material, the size of the sewing thread, the type of seam and the stitch type.

Characteristics and Terminology

The **shank** locates the needle in the needle bar. The following types are found:

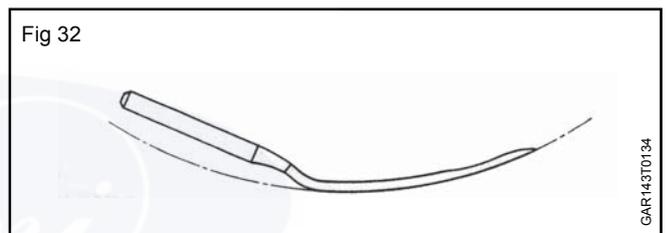
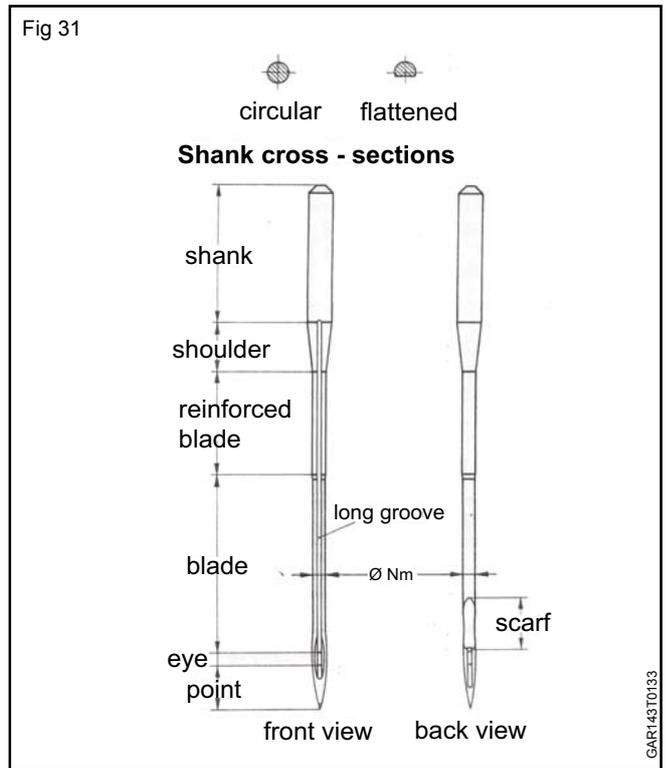
Shanks with a circular section

Shanks with a flat side which serves to locate the needle in a specific position in the needle bar

Needles in which the thickness of the shank is maintained all the way down the blade. They are used in speciality machines. (Fig 31)

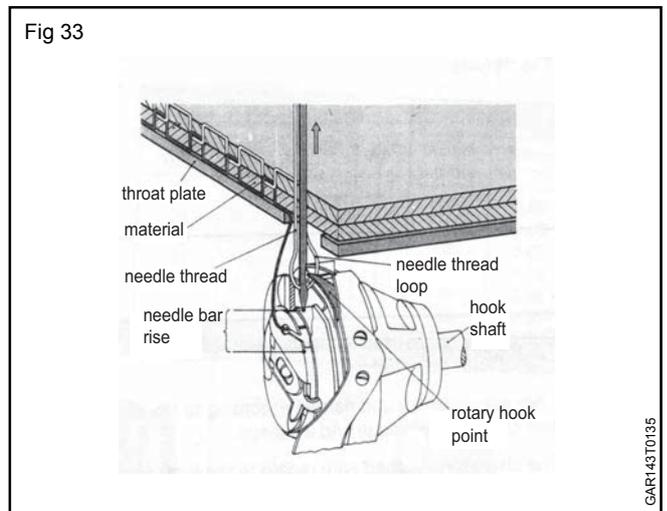
The **blade** of the needle runs from the end of the shoulder to the beginning of the eye. Often the blade will increase in thickness, in stages, from the eye to the shoulder. This reinforcement of the blade increases its stiffness. Moreover, by widening the stitch hole, it tends to reduce the friction between needle and material the upstroke which can help to avoid overheating of the needle.

There are also needles with curved blades (Fig 32) which are used, for example, in blind stitch machines.



On the threading side of the needle is the **long groove**. Its function is to guide the thread while forming the stitch and to protect it against excessive friction.

Above the eye there is usually a recess or **scarf** across the whole face of the needle. This facilitates the passage of the hook into the loop and reduces the danger of missed stitches. Fig 33



The shape of the **eye** is always extended in its length, because the needle thread has to pass diagonally through the needle in the length direction. The width of the eye is the same as that of the long groove.

Needle sizes

The metric size "Nm" of a needle defines the diameter of the blade (in 1/100 mm) at a point above the scarf.

Fine needles have a size up about 70; medium needles are about Nm 80 or Nm 90; thick needles have a size greater than about Nm 110.

Forming the Needle Thread Loop

First, the needle thread is carried all the way through the material to be sewn and beyond the underside. As the needle begins its upstroke, the thread is retarded by friction between it and the material so a loop is formed in the needle thread. The loop is caught by the point of the rotary hook, enlarged, and passed around the underthread. The needle thread is then withdrawn whilst the stitch is tightened by the movement of the take-up level. These vertical movements are extremely rapid, so the efficient functioning of the long groove, in permitting smooth passage of the thread, is critically important.

Needle Points

Needles are manufactured with a wide variety of needle points appropriate for the differing properties of materials which have to be sewn. The needle point can be located either centrally or eccentrically.

There are two basic classes of points, namely Round Points and Cutting Points

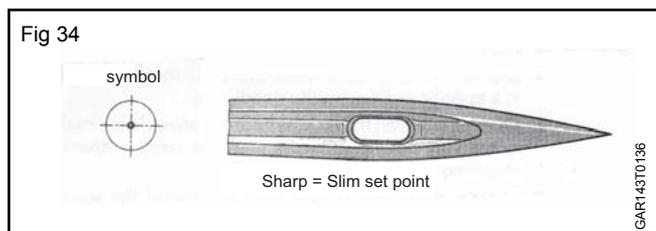
Round Points

Round points have 3 circular cross-section but may have two basic shapes known as Set Points and Ball Points, which are suited for different materials.

Set points

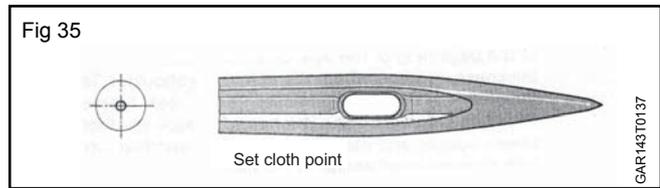
Slim set points (Fig 34)

Slim set point needles can penetrate the yarns of the material being sewn. They are used for blind stitches and for fine, densely woven fabrics. They are not suitable for knitted fabrics.



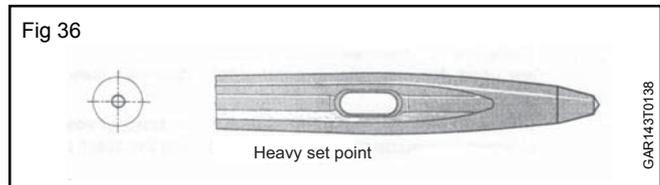
Set cloth point (Fig 35)

The set cloth point is slightly rounded. It displaces the yarns of the material being sewn without damaging them. This is the most versatile point shape.



Heavy set point (Fig 36)

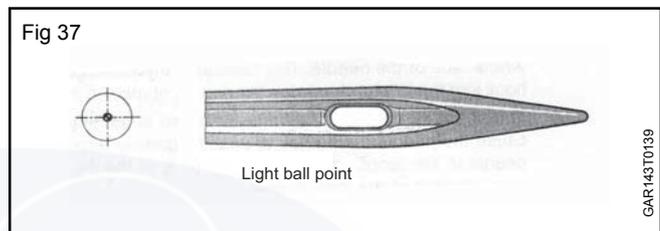
The heavy set point is strongly blunted. It is especially used for button sewing machines.



Ball points

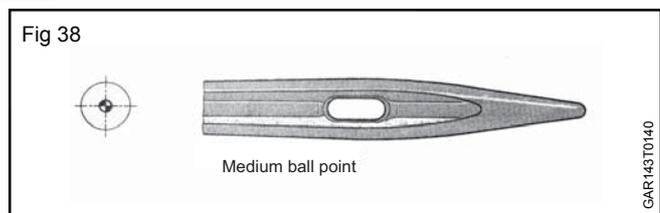
Light ball points (Fig 37)

Light ball points are used for sensitive fabrics such as knits, to prevent damage to the loops.

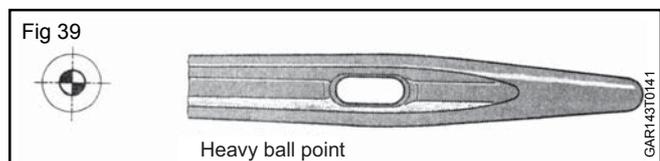


Medium ball point (Fig 38)

Elastic materials containing rubber or elastomeric threads are sewn with medium or heavy ball points. The threads are not pierced, but displaced.



Heavy ball point (Fig 39)

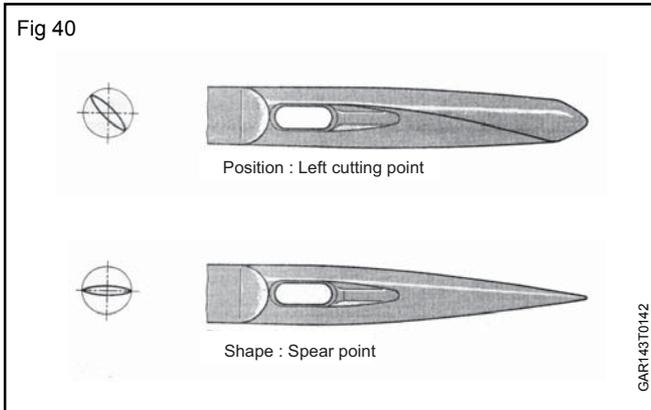


Cutting points (Fig 40)

Cutting points are used for sewing leather and films or coated and laminated textiles.

They are classified and named according to the position of the cutting edge and its shape.

The shapes are named with regard to the form of the cutting edge e.g. spear point, triangular point, diamond point.



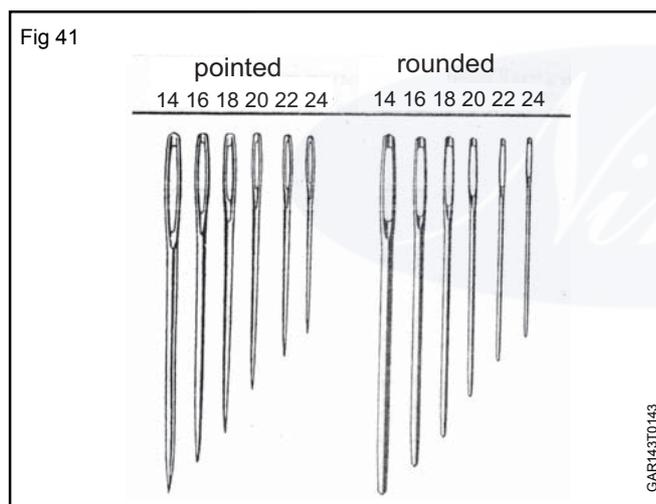
Embroidery and Darning needles

Embroidery and darning needles are particularly thick sewing needles. Material and yarn thickness determine the length and thickness, of the needle to be used .

The numbering system is not directly related to the length or thickness of the needles; it serves only to distinguish one needle from another

Rounded needles are used for coarse materials; pointed needles are used for finer materials.

Embroidery needles (Fig 41)



Darning needles (Fig 42)



Pins (Fig 43)

Pins are made of steel or brass and may have plastic heads.

The length, thickness and type of pins are chosen depending on the type of fabric and the application (component assembly, decoration, packaging).

Fig 43

Pins	
Length mm	Thickness Φ mm
30	0.60 extra fine
34	0.60 extra fine
30	0.70 fine
34	0.70 fine
40	0.85 fine

Plastic-head Pins		
Length mm	Thickness Φ mm	Head Colour
30	0.60	white
30	0.60	black
30	0.60	coloured
40	0.70	coloured
48	0.80	white
48	0.80	coloured

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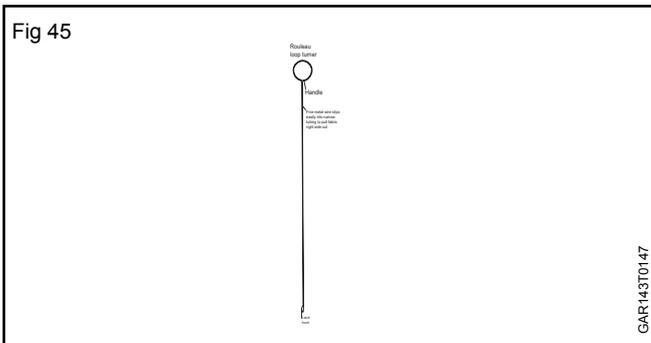
Darning mushroom (Fig 44)

It is a mushroom shaped tool usually made of wood. The sock is stretched over the curved top of the mushroom and gathered tightly around the stalk to hold it place for darning.



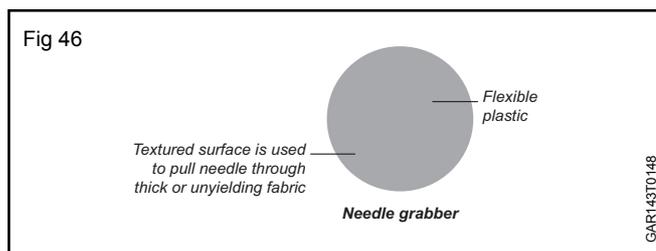
Loop turner (Fig 45)

It is one of the tools designed for turning the fabric tube right side out after it has been sewn. It is made of metal average about 12" (30.5cm) long. At one end they have a large circle through which hooks the fingers to pull them along and at the other side, is a latch hook that can be placed in the open or closed position.

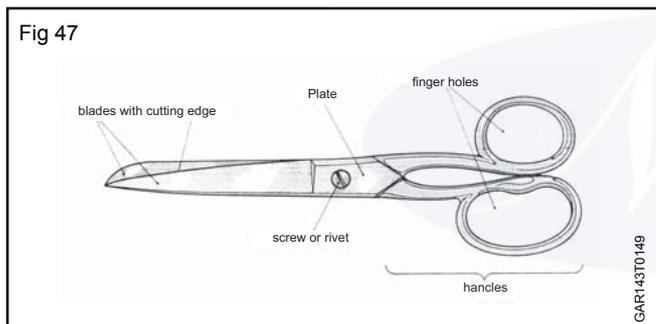


Needle grabber

It is a 2 count rubber disc that grip and pull the needle through layer of fabric. It is useful when hand sewing heavier fabric. It provides protection for sensitive fingers. (Fig 46)



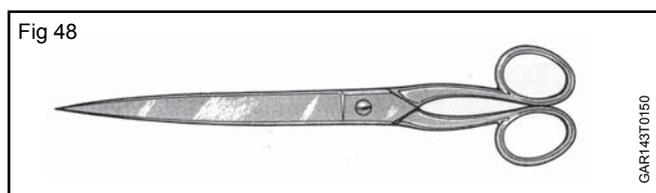
Scissors (Fig 47)



Paper shears (Fig 48)

Paper shears have long pointed blades. The blades are longer than the handles.

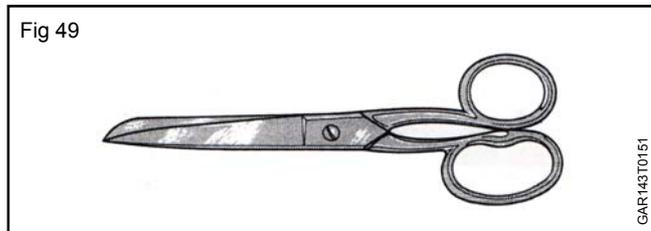
They can be used for accurate cutting of thin paper.



Hand scissors (Fig 49)

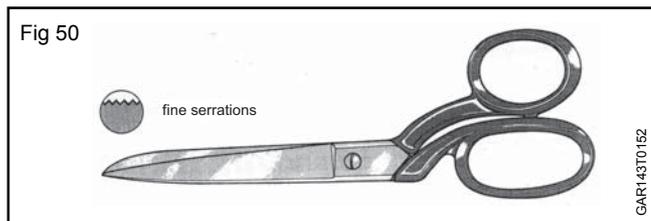
Hand scissors are designed to be easy to handle, with their differently-shaped blades and finger holes.

Hand scissors are used in all general purpose cutting operations.



Tailors shears (Fig 50)

Tailors shears are large and stable. The finger holes are specially contoured, shaped and positioned to make it easier to cut thick fabrics. One of the blades is provided with serrations which helps to prevent smooth fabrics from slipping. Tailors shears are suitable for cutting garment components from single layers.



Pattern shears (Fig 51)

The handles, which are strongly contoured, are much longer than the short, strong blades. In heavy duty types the blades are screwed on and can be changed.

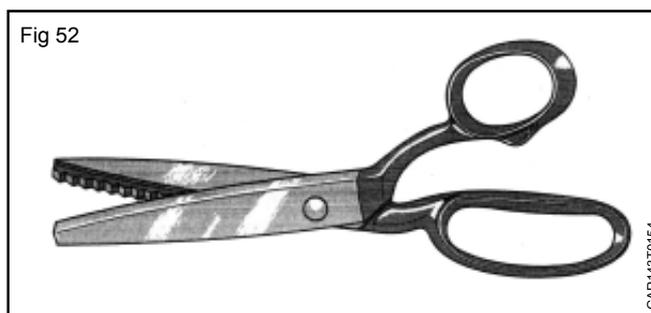
They are used for cutting out pattern templates from thick card-board, or plastic.



Pinking shears (Fig 52)

The shape and handling characteristics are somewhat similar to tailors shears, but the cutting edges have a zigzag profile.

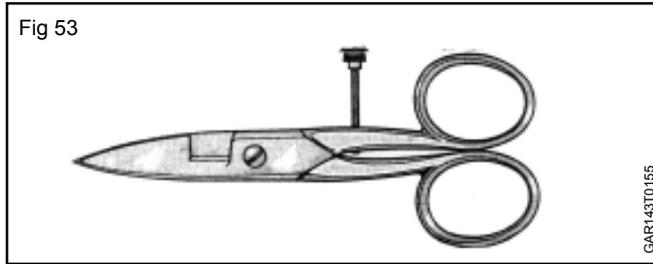
The zigzag edge of the cut fabric reduces the tendency for the cut edge to fray and may provide a more attractive trimming.



Buttonhole scissors (Fig 53)

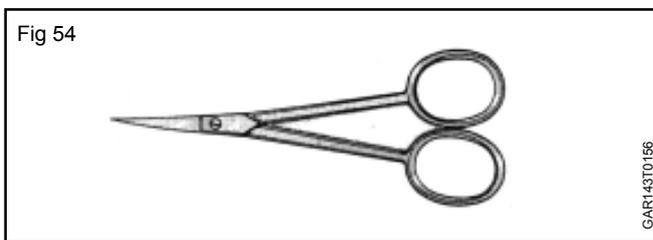
A special gap in the blades allows short cuts to be made inside the edge of the fabric.

The length of cut can be adjusted by a screw



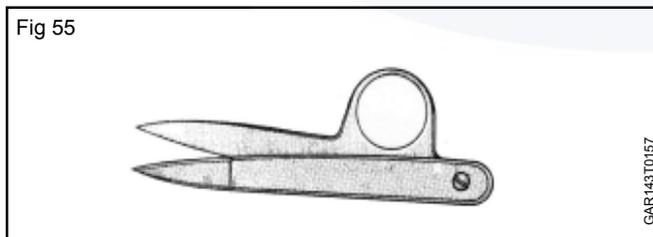
Embroidery scissors (Fig 54)

The handles are longer than narrow and pointed blades. They are suited for catching and cutting fine, short threads



Snippers (Fig 55)

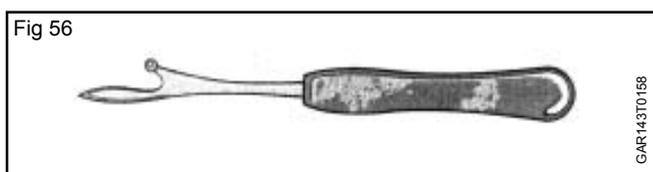
The small lightly spring loaded blades open automatically. Allows very rapid and easy snipping and trimming of waste thread, or removal of tacking stitches and opening of seams. Used e.g. in fitting, final inspection, and reworking



Other tools

Stitch cutter (Fig 56)

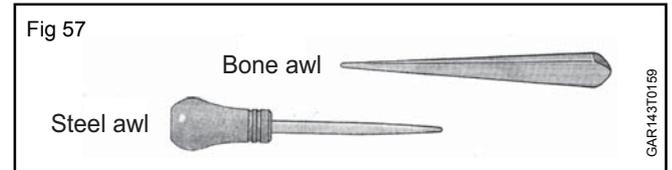
The stitch cutter has a hooked edge with an arrowhead. It is especially suitable for opening up machine made button holes.



Awl (Fig 57)

An awl is made of bone, plastic or metal. It tapers to a point and has 2 smooth surface.

It is used for rounding off button eyes or draw string holes and for pulling out threads



Hole punch (Fig 58)

Punches are available in diameters of 2 mm to 25mm.

The punch is generally used for making holes in cards or plastic pattern templates or cutting patterns.



Revolving hole punch (Fig 59)

The revolving punch has a magazine of punches of different diameters.

It is used to make holes close to the edge of the fabric.



Notcher (Fig 60)

Makes notches of various shapes according to requirements.

Used for placing positioning marks on cutting patterns, e.g. balance marks and seam allowances.



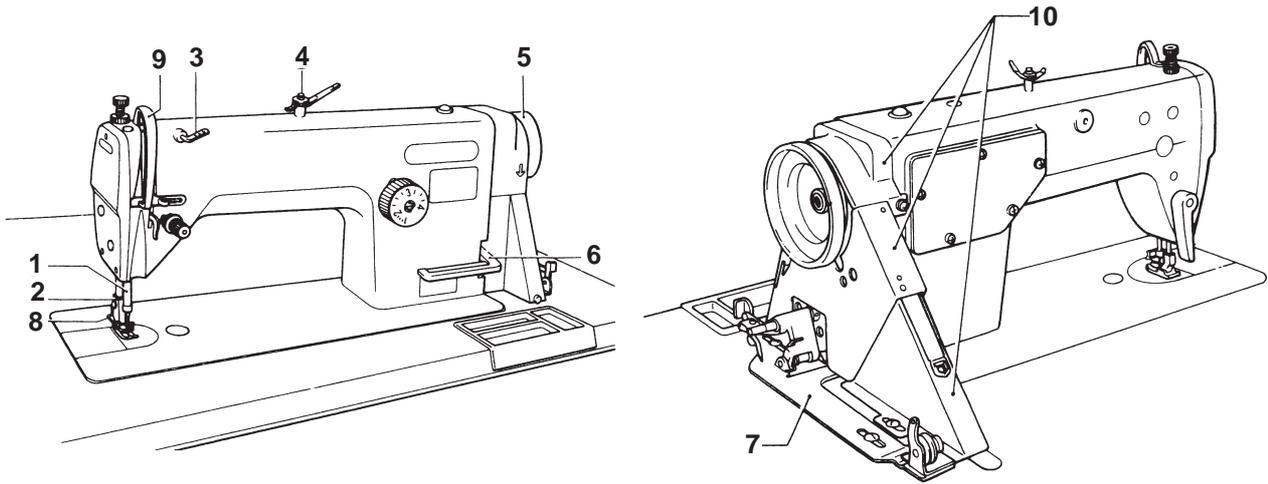
Sewing machine (Fig 61)

Sewing machines are available in a variety of different styles and configurations and most are operated using foot pedal. Most sewing machines are capable of creating a variety of different stitches including speciality stitches such as button holes.

Sewing machines draw thread from two sources to create a strong stitch in fabrics and also accommodate heavy duty fabrics with the right choice of needles. Sewing machine needles are available in different lengths and thickness to accommodate different applications.

Fig 61

NAMES OF MAJOR PARTS



- 1 Needle bar
- 2 Presser foot
- 3 Thread retainer

- Safety devices
- 4 Pre-tension
- 5 Machine pulley

- 6 Reverse Stitching lever
- 7 Bobbin winder
- 8 Finger guard

- 9 Thread take-up cover
- 10 Belt cover

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