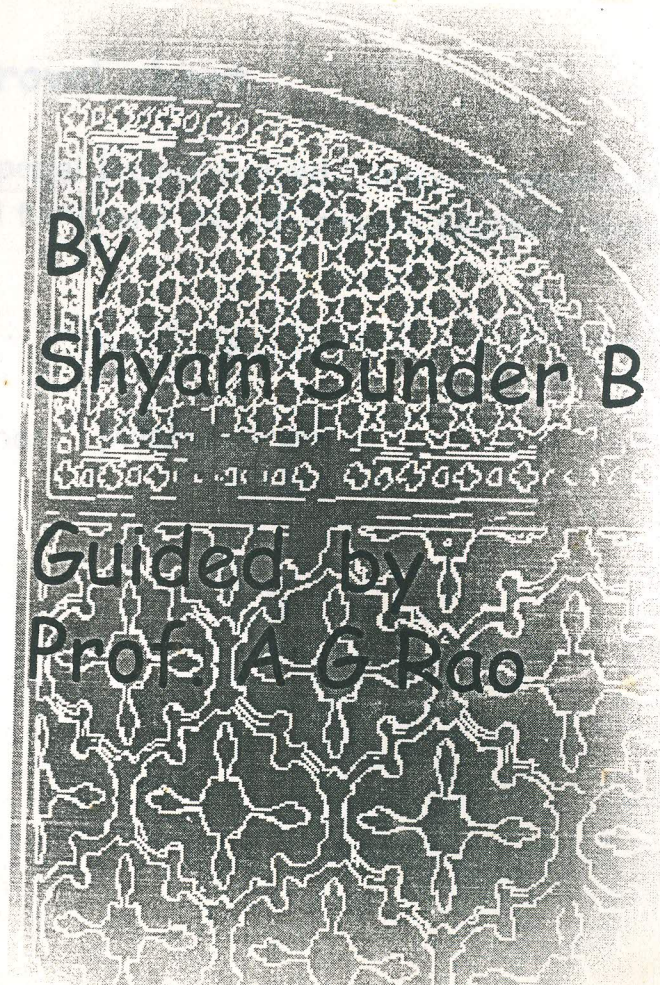


Inlay on wood



By
Shyam Sunder B K

Guided by
Prof. A G Rao

Industrial Design Centre

special project

MSR-

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Approval sheet

The special project entitled " Inlay on wood " by Shyam Sunder B K is approved in partial fulfillment for the masters degree in Industrial Design from IIT, Bombay

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Date : 17.6.58

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Shyam Sunder B K

1. Introduction

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1. Introduction

Every object is not just a shape or form. When a craftsman creates it, a definite design is worked out through basically organic or geometrical shapes. When the designs are repeated on a surface, a whole rhythmical composition emerges. A rhythm is worked out by relating the size of the motif in relation to the surface by alternating positive, negative space or varying the size of the motifs. Design can be two or three dimensional, projected through texture, color and the variations throughout by the interplay of light and shade in an object. Man has always tried to accentuate certain basic qualities of material by further ornamentation. These methods could be painting, carving, lacquering, plating, glazing, inlaying etc.

This study covers few evidences of inlay craft of the past, their analysis for motifs and materials which were used, the advent of this craft in India, types of inlay followed and in particular inlay on wood. Inlay work is a very pleasing to the eye and can afford a good deal of aesthetic pleasure. People have tried this craft on different materials like marble, metal, wood with inlaying materials like mother of pearl and colored stones on marble; tortoise shell and sea shells, animal bones, gold and silver on metal; ivory, plastic, natural colored wood etc.,

It is interesting to understand this process of inlay and try to formulate a rule which will direct us to apply this technique on materials which have been not tried so far. Another important aspect is that in the present world of imitation, craft is losing its importance which is not a positive sign. So it is important to develop this craft and find an application in utility area which can be easily mass produced.

2. About inlay

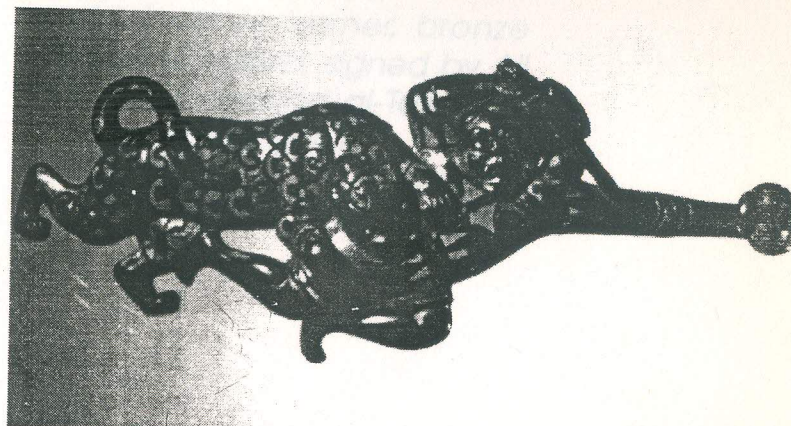
Inlay is the medium of art by which a surface is decorated by setting pieces of other materials into it for decorative effect. The resulting surface is even and continuous. The effect is that a colored design set against a contrasting background.

Evidences of inlay in history

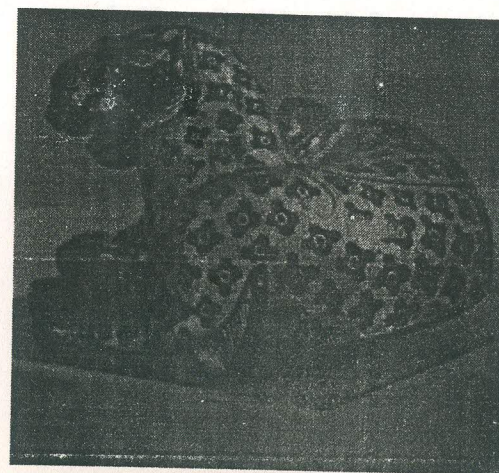
This art was most celebrated by Syrians, chiefly in Damascus along with Persians. Remarkable works were produced also in central Asia, Egypt and Spain. This art was popular even in second and third century B.C. People had tried this art on wood as well as metal. Gold, silver and enamel were mostly used as inlaying material. It is very much evident that this craft was in existence in the early 11th – 12th century in Persia and was mainly practised on metal. During this period in Khurasan, silver shortages forced most craftsmen to give up working with this precious metal, and they and their clients had to be content with a cheaper metal – brass. But the craftsmen discovered that this shining metal, when inlaid with silver and copper and elaborately beaten into beautiful shapes. Following are the few examples of antique pieces.



pl.1 Silver inlaid bronze stag found from the restored foundations of Alacahoyuk outline location of Hittite, 3rd century B.C. (ref.4)



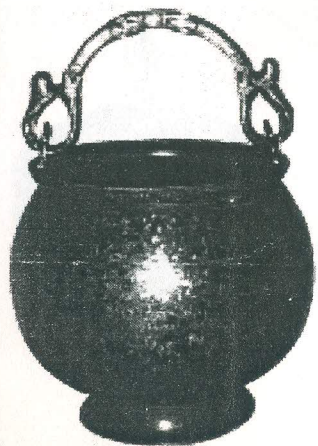
pl.2 Belt hook, bronze inlaid with turquoises, seems to be from China, first century B.C. (ref.5)



pl.3 Bronze inlaid with gold, silver and garnets from the tomb of Princess Dou Wan at Mancheng, Hebei, end of second century B.C. (ref.5)



*pl.4 Incense-burner, bronze
inlaid with silver, signed by Ali
ibn Muhammad al-Taji. Iran,
10th century (ref. 6)*



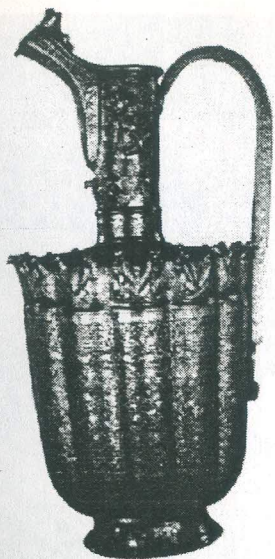
*pl.5 The Babinski Bucket,
bronze inlaid with silver and
copper, made in Heort in 11th
century (ref.6)*



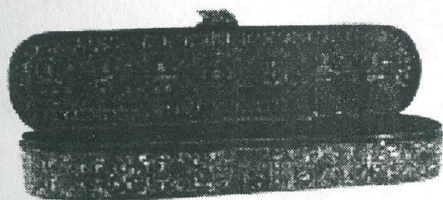
*pl.6 Hoard of objects, silver
with gliding and niello inlay,
found in northern Iran, from
11th century (ref.6)*



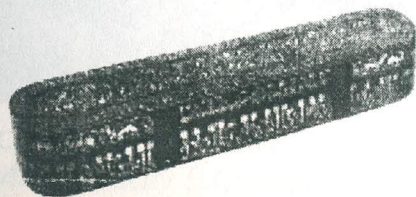
*pl.7 The Vaso-Vescovali, high
tin bronze inlaid with silver.
Khurasan, late 12th century
(ref.6)*

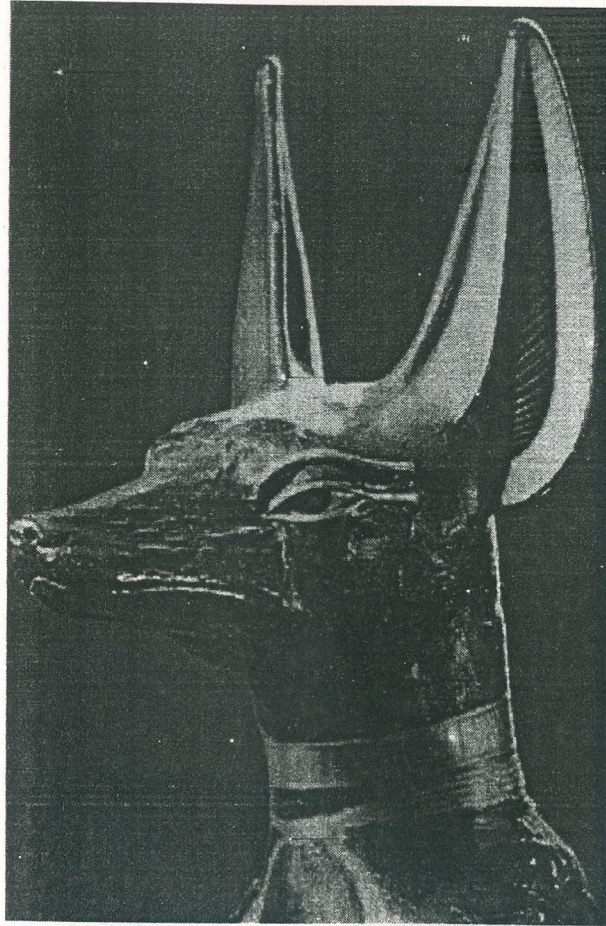


*pl. 8 Ewer brass inlaid with silver
and copper which belongs to
12 th century (ref.6)*



*pl.9 Pen-box, brass inlaid with
copper, silver and black
organic material; made by
Shadhi for maji al-Mulk al-
Muzaffar dated 1210
A.D.(ref.6)*

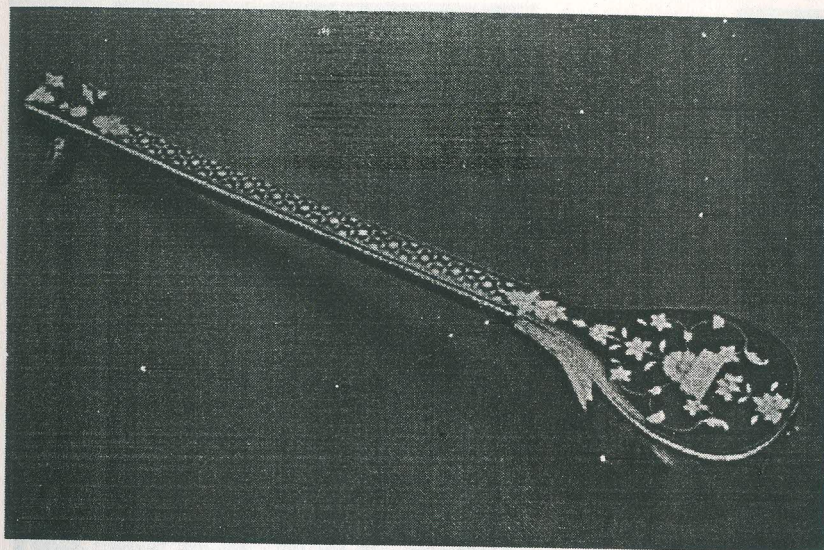




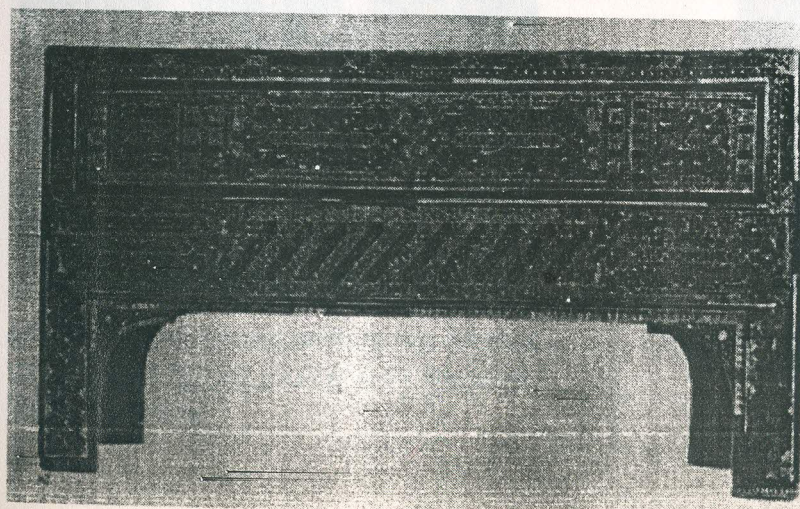
*pl.10 Wooden statue with gold inlay,
14th century B.C.-Egypt (ref.7)*



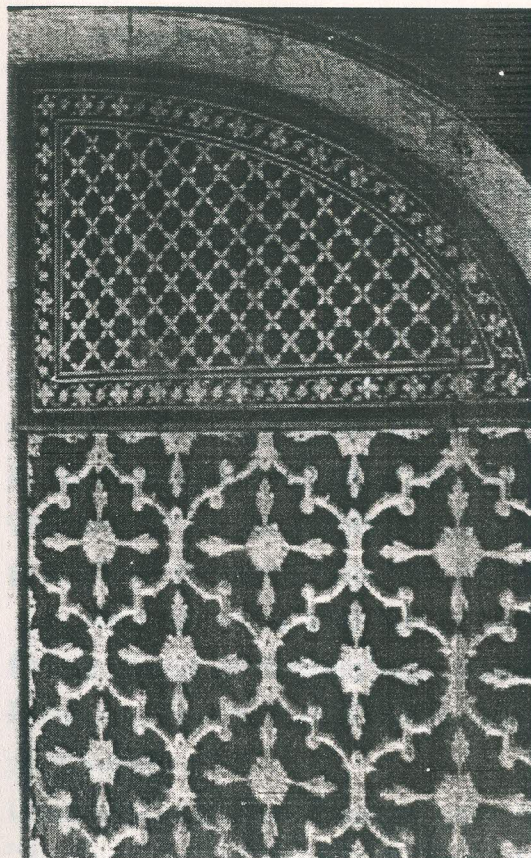
*pl.11 Back of Tutankhamen's royal
throne with gold plated wood with
enamel and semi-precious stone inlay,
14th century B.C.- Egypt (ref.7)*



*pl.12 Tanpura of Maharaja
Pratap Singh of Jaipur, late
18th century. Wood inlaid
with ivory (ref .8)*



*pl. 13 Qalamdan, wood
inlaid with mother of pearl
Sultanate tradition, Gujrat
dated A.D.1587(ref. 8)*



pl.14 Wood, inlaid with ivory, doors of the Junagarh palace in Bikaner, 16th century.



pl.15 Blackwood with ivory inlay, Possibly from Sind, 17th century (ref.9)

3. In India

It has been contended that inlay work is a very ancient craft in India and in proof ^{it} if is pointed out that shell was commonly used as inlay at Moenjo-Dar and Harappa. But such ancient lineage is in considerable doubt. However, it cannot be denied that the use of marble inlay was very popular under the Mughals and led to excellence in the costly art of inlaying costly stones in marble. It has been said that the art of inlaying of colored semi-precious stones in marble was introduced into India by Akbar, but reached its zenith under the beauty-intoxicated Shah Jahan, the dreamer of Taj, which perhaps contains the finest examples of this beautiful art. Marble, crystal, jade and stones like agate, canelian, jasper cut into thin slices, have been inlaid into architectural marvels in marble with faultless taste and superb skill to produce masterpieces of loveliness. One of the finest stone inlaying is to be seen in the tomb of Itmad-ud-Daula at Agra, probably completed by A.D. 1628.

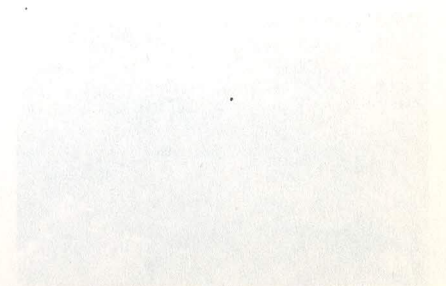
According to another school of thought, the craft reached Sind from Shiraz in Persia about 200 years ago, having been introduced into the country by three Multani brothers, Purshottam Hiralal, Devidas and Valiram and from Sind it travelled to Bombay and Surat.

Inlay work achieved great popularity in the Bombay area and came to be known as "Bombay Inlaid Work", boxes, desks, card cases, glove boxes etc., generally being produced, the inlay being of tin wire, ebony, sandal wood, horn, ivory. Triangular, round or rhombic strips of the inlay material is tied together into a bundle and then cut across in thin sections, the pieces forming the individual motifs of the inlaid decoration.

4. Types of inlay

Punjab is also celebrated for its ivory and brass inlay in wood, while ivory inlaying is extensively practised in Hoshiarpur where small stools, cupboards, cabinets and boxes are made of *shisham* expertly inlaid with ivory. Work resembling to Hoshiarpur is also found in certain parts of Rajasthan where also the wood used is *shisham*, inlaid with ivory or mother of pearl (ref1).

In the south this craft is popular in Mysore. In the Mysore Gazetteer it is recorded that, " The art of inlaying ebony and rosewood with ivory which seems to have been persuaded by Muslims an of which the doors of Mausoleum at Srirangapatna are good examples, has lately been revived at Mysore and many useful and ornamental articles. Such decorations are also come across on musical instruments especially Veena". It is believed that craftspersons migrated from Persia to Srirangapatna during the rule of Tippu Sultan. They use of carve using deer horn and later carved wooden doors for the wooden palace of Srirangapatna. Later craftspersons migrated to Mysore due to the shifting of capital to Mysore after Tippu Sultan.



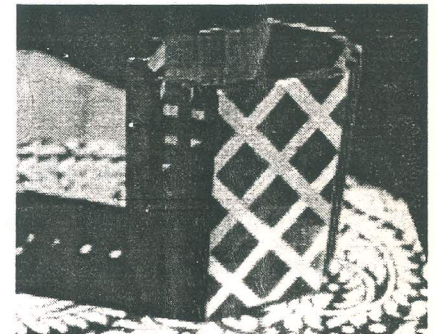
pl.17 Teak wood inlaid with ivory

4. Types of inlay

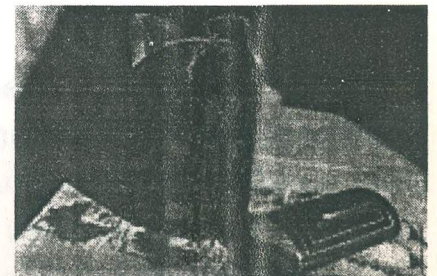
Inlay can be broadly classified as inlay on metal, inlay on stone and inlay on wood. Depending upon the type of base metal or background material, proper inlaying material is chosen and variety of designs can be generated. Each type of inlay can be explained in detail as follows

4.1 Inlay on wood

Karnataka began with inlay of rosewood and ebony with ivory. Gradually various types of wood, especially with different shades, began to supplant the original expensive material with easier and cheaper medium; incidentally expanding its scope by introduction of a wider range in colors. Due to the ban on use of ivory, plastic is being increasingly used nowadays. Saharanpur in Uttar Pradesh is known for its inlay on wood using copper and brass as inlaying material. Here different designs are obtained by first chiselling out the design from the base material and then inserting the cut inlays into it. Wide range of articles are prepared viz. Panels, trays, bowls, tables, chairs etc., Most commonly rosewood is used as a darker background for inlaying. As rosewood is costlier craftsmen have started using other woods for inlaying work.



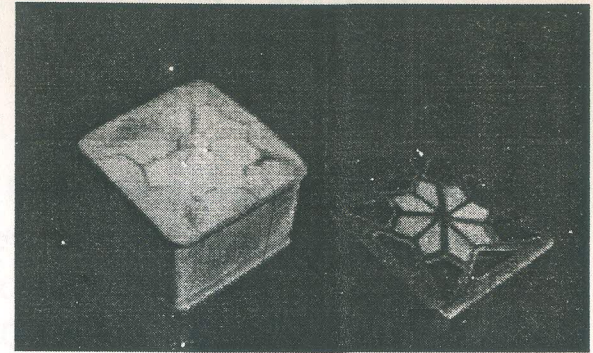
pl. 16 Teak wood inlaid with wood



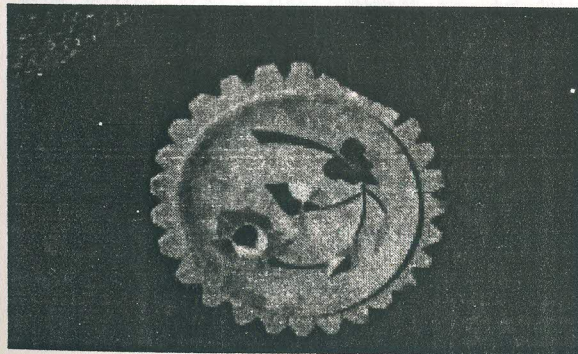
pl. 17 Teak wood inlaid with brass

4.2 Inlay on metal

This is a technique by which metals like brass, copper and bronze used as base material and metals like silver, gold and copper are used as inlaying material. Materials like shells, horns and bones are also used for inlaying. In India this craft is famous in Bidar, Karnataka. This is popularly known as Bidri craft. Bidri –an alloy of zinc and copper, is cast into required patterns with the help of moulds. After casting, the surface is smoothened and applied with copper sulphate to give the product a temporary black color. Designs are engraved on the surface with a grooving chisel and pure silver wire is inlaid into the grooves. The surface is then polished using buffing machine. The soil of Bidar City which has special oxidising properties, is boiled into which the products are dipped. As a result, the zinc turns black while silver retains its original color. These products are polished with coconut oil to give a rich lustrous finish.



pl.18 Brass inlaid with camel bones, sea shells and stag horn



pl.19 Granite inlaid with colored stones

4.3 Inlay on stone

In this art marble, granite and red sandstone are used as background material. Colored semi precious stones are used as inlaying material. Agra is famous for its red sand stone inlay.

5. Inlay on wood

As it is mentioned earlier this craft is popular in Mysore, Karnataka. This expusitely delicate art consisted hitherto ornamenting rosewood with attractive combination of woods of various natural colors against the dark rosewood background.

The first firm was established during 1870 name Yusuf Ali & Sons. The inlay section was started in Sri Chamarajendra Technical Institute (CTI), Mysore. It was a happy coincidence that, when the industry was languishing the Elephant brand Cigarette company placed orders for inlay boxes to popularise their brand of cigarettes which went to longway in its revival. Thus wild and tamed elephant figures were inlaid on boxes. The turning point was during 1913 when Mr. Alderson, Superintendent of CTI took interest to introduce Ivory inlay in wood. Inspired by new designs late Shri Mir Showkath Ali supplemented woods of different color successfully. It is believed that during A.D.1940 only two production units were established and during A.D.1960 the units were increased to 45 and presently there are about 300 units engaging 2000 artisans(ref.2).

5.1 Raw materials :

The main raw materials that go into production of inlay articles are rosewood, woods of different colors, plastic, carpenters glue, polish, bee wax, wood dust paste. Rose wood (*dalbertia latifolia*) is locally named as Bitemara or Karimara, smells of rose water and burns with smoky flame. The sapwood is narrow and yellow, while heartwood is dark brown to black in color possessing longitudinal streak. This wood is close grained and takes very fine polish. The price of rosewood varies depending

upon the quality of the wood. The price is around Rs.1750/- per cubic feet. This wood needs to be seasoned before using which otherwise creates warping problem.

The most common colored woods are,

wood	color	wood	color
Jack	Yellow and bright yellow	Nelli	Rose
Devadaru	Light brown	Ebony	Jet black
Patanga	Dark red	Seege	Amber
Champa	Green	Honne	Yellow
Tamarind	Ash grey	Oak	Pink
Rakha	Blue	Hale	white

Generally these inlaying wood is available in the form of planks of size 10x30x0.3 cms. and their rates ranges from Rs.1.50/- to Rs.3/- per plank depending upon the type of wood. Out of the above said woods Patanga is a costlier wood which is available at Rs.40/- per kg. Plastic is nowadays used in place of ivory.

5.2 Tools :

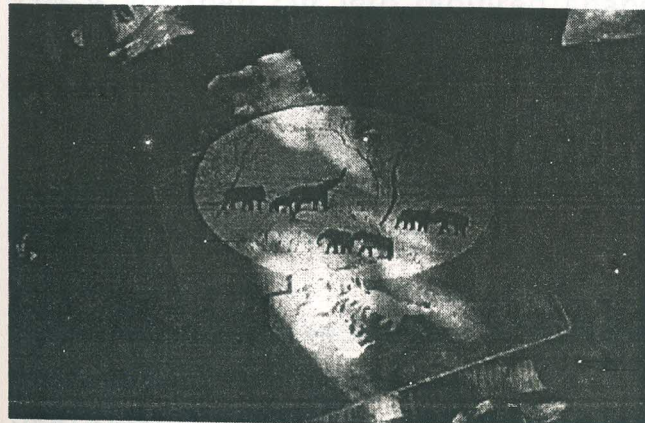
The tools employed by the crafts persons are chisels, saw, plainer, hammer, drills, files, vice, rasp file, engraving tools, punches, scrapers and sand paper.

5.3 Process :

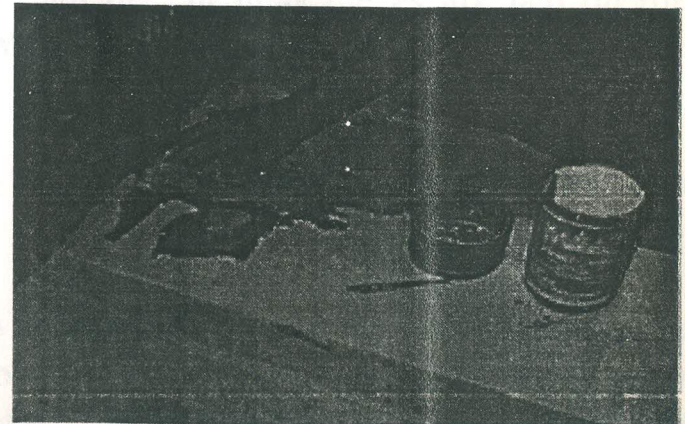
Cutting : Design is drawn and its blue print is taken. Then the design is broken down into different fragments. Each fragment is coded as per the type of wood being used for that particular piece. Then the print is stuck to each colored wooden plank and cut using bow saw. Likewise different wooden pieces are made which ultimately when joined using fevicol or carpenters glue or as locally called *vajra* to form required design. Then it is kept under pressure for one day to dry.



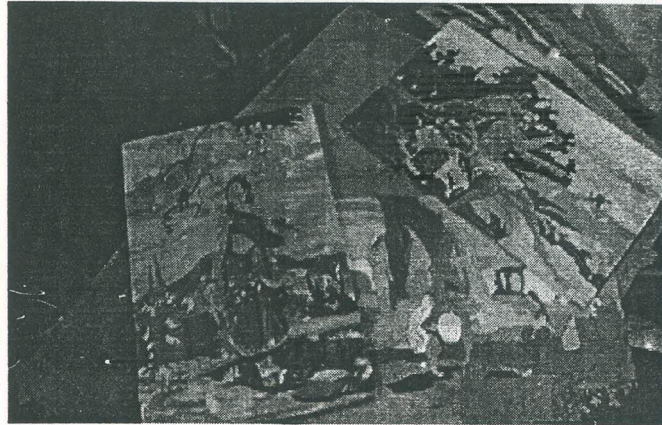
pl.20 Cutting colored wood using bow saw



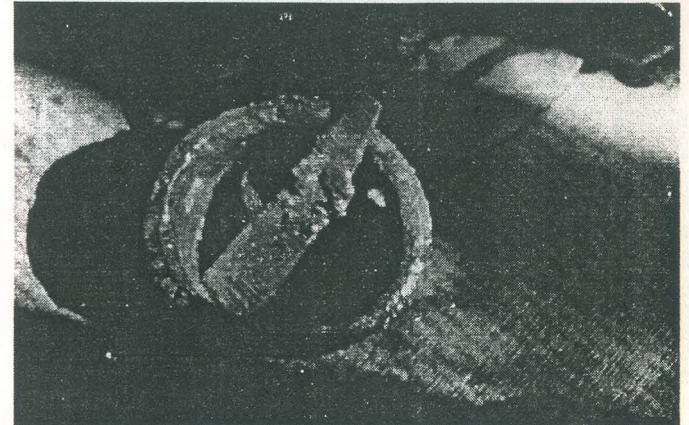
pl.21 Design cut on colored wood



pl.22 Joining cut pieces using glue



pl.23 Final joined design

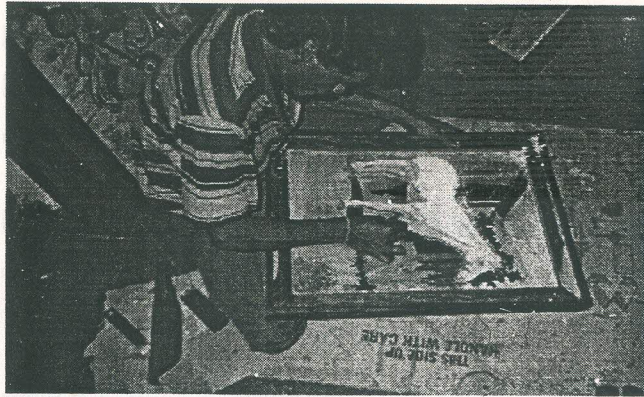


pl.24 Carpenters glue - vajra

Scooping : Rose wooden plank of required sizes are readily available in the market. These are then cut into required shape. Then the cut inlay pieces are laid on the rosewood plank and outlines are marked. Wooden plank which forms as background is scooped.

Inlaying : These cut pieces are inserted in to the groove which is scooped in the wooden plank by slight hammering.

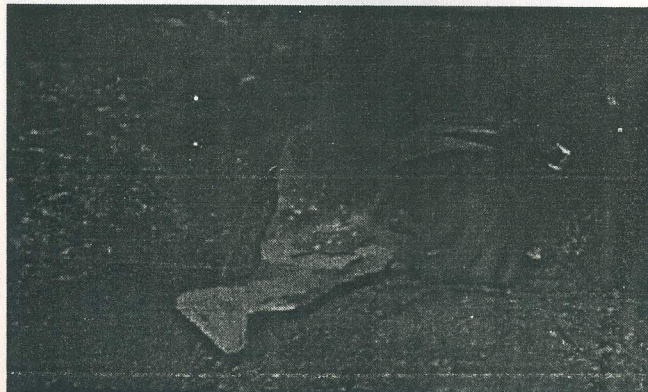
Scraping and sanding : Then the surface is scraped using scraping tool and finally the unevenness is removed by either sander or by using sand paper. Sanding should be done very carefully because the final polish is applied over this surface. Scratches are avoided and finished to high level of accuracy.



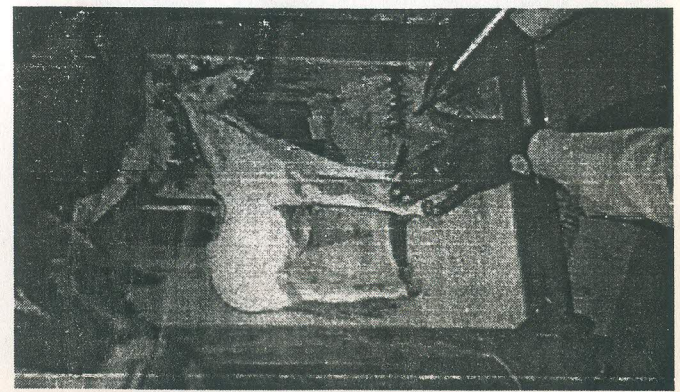
pl.25 Inlaying



pl.26 Scraping the surface



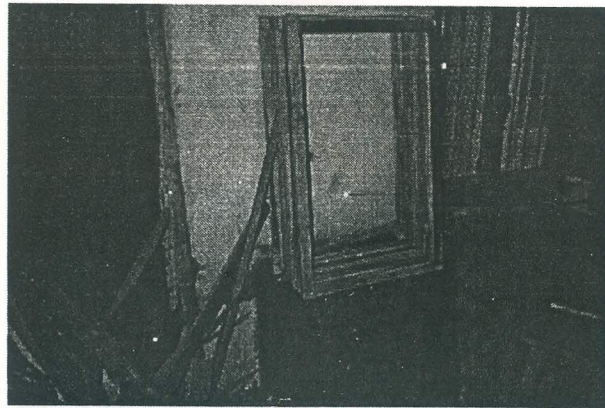
pl.27 Polishing



pl.28 Engraving

Engraving : Details of the design are then engraved by using engraving tool. Paste of beewax and black powder is rubbed over the surface. This defines borders of each details by filling up grooves.

Framing : In case of wall hangings the designs are framed. Frames are initially prepared and then the design is fitted into it. Finally polish is applied on to the surface to get the final finished product.



pl.29 Frames



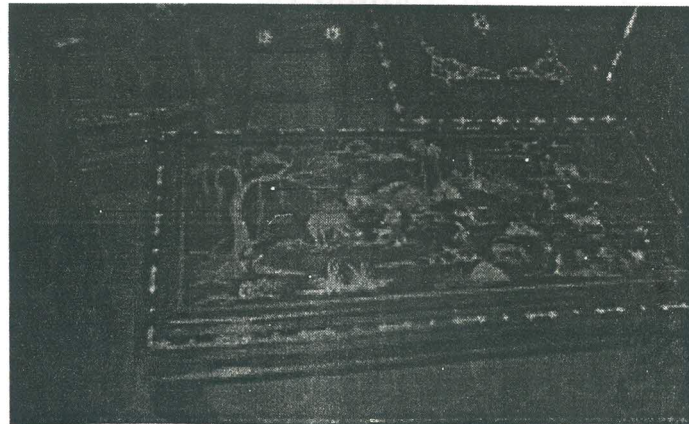
pl.30 Frames fitted

pl.32 Relief worked wall hanging

Other forms :

Patch work : Since the base material used is costlier and the process is tedious, designs are limited, new style called Patch work is developed. Here the design is pasted on selected wood and cut by saw. Finally these pieces are joined together like a jigsaw puzzle using carpenters glue. Then this is pasted to a background (generally plywood). Then it is pressed and kept under that condition for 24 hours. The other processes are similar to inlay.

Relief work : It is an advanced version of patch work. A 3D effect is given to the work by placing dummy volume beneath the patch work.



pl.31 Patch worked table top

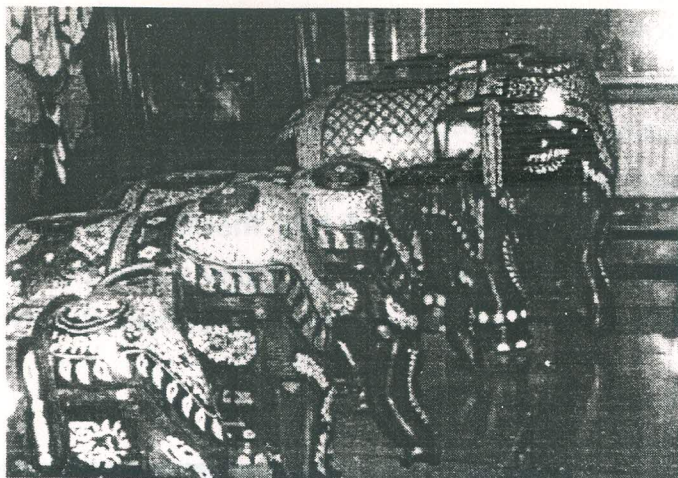


pl.32 Relief worked wall hanging

6. Motifs

If we analyse the inlaid objects of the past, we can make following conclusions.

- * Products till third century B.C. used animal forms. (pl. 1,2,3 & 10). They reflect that hunting was practised during those times. It also reflects the power of the ruler during that period.
- * These had more of circular , triangular and striped inlaid designs.
- * These products had less utility value.
- * Later people started making utility products like pen boxes, water pots, incense burners etc., (pl. 4,5,6,7,8&9)
- * People largely practised this craft on metal.
- * People started using floral motifs (pl. 6,8&9), religious motifs were also followed (pl.5&9).
- * It reveals people had given importance to their religion. We can find script motifs on products like incense burners and pen boxes (pl. 5 & 9).
- * From 17th century onwards wood inlay gained popularity. Ivory was mainly used as inlaying material. This shows people had given importance to precious items.
- * People were making more utility items like tables, cabinets etc.,
- * Here we find motifs like flower, animals like elephant, birds like peacock ,men and women were used (pl. 12,14&15).
- * Present day products are more of decorative items rather than utility items.
- * Religious motifs include Ganesha, Saraswathi, Lakshmi, Krishna, Hanuman, Jesus etc., These motifs are chosen for inlaid wall hangings and inlaid statue.
- * Other motifs like animals (horse, elephant and camel are normally used), landscapes, scenes related to rulers reign are selected for wall hangings, table tops etc., (pl. 33& 34).



pl. 33 Inlaid elephant



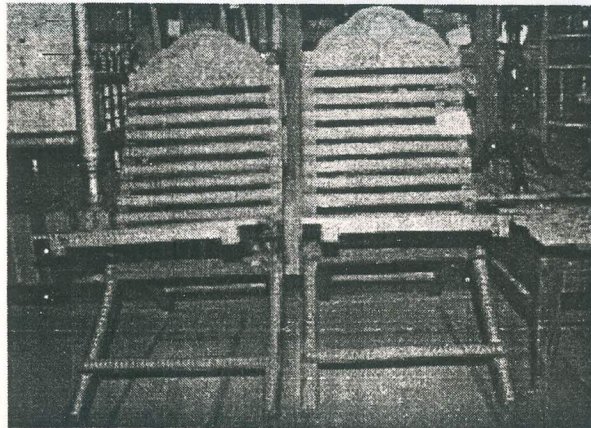
pl.34 Patch worked wall hanging

The reason could be that the above themes have become part of everyday life or these are practised from traditions. Other designs seems to be drawn from Persian designs. Diversified attempt has not taken place. As discussed with craftsmen, it is due to the demand, those themes are followed and nobody takes risk by introducing new themes.

7.Products

It is necessary to define utility and non utility products. If I define utility products as those which are used daily or occasionally tactile or not and which is not just a show piece, then there is diversified products ranging from pen holders to chairs and tables. But there are very few crafts person making this type of products as it needs huge investment and becomes a dead investment if inventory builds up.

Usually wall hangings which are just show pieces are made. People have shown modifications by coming out of defined boundaries for the designs in the wall hanging.

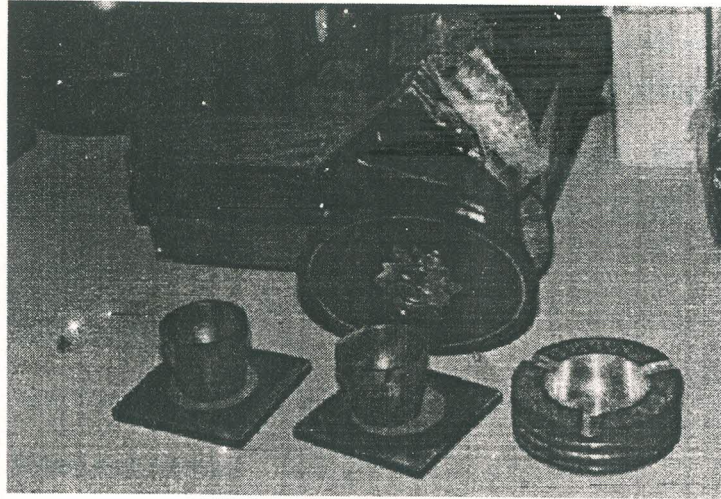


pl. 35 Teak wood chair inlaid with plastic



pl.36 Teak wood trays, mirror frame and box inlaid with plastic

8. Inference



Pl. 37 Teak wood tea coasters & ash tray inlaid with brass

8. Inference

Following are the valuable inferences of this craft which can be made use of when new materials are to be introduced for inlay.

Criteria to achieve contrast in different types of inlay

Material	Texture	Color	Size	Richer material
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Wood and Wood

*

*

Wood and Metal

*

*

Wood and Ivory

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*

Wood and Plastic

*

*

Metal and Metal

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*

*

Metal and Shells

*

*

*

Metal and bones

*

*

*

Stones and stones

*

*

If any new combination is to be tried, the above factors can be evaluated and used.

Relative property of background and inlaying material

It is observed that for inlaying on wood, the inlaying material should be harder or equivalently harder than the base material. This is because finishing is done by using a material which is harder than inlaying material and this can finish both base as well as inlaying material otherwise it is difficult to finish..

For inlaying on metal and stone, it is not necessary that the inlaying material is harder than the base metal. Those can be finished separately.

Products

Since inlaid utility products like tables, chairs are costlier because of total manual operation, a thought can be given to break up these in to smaller units which can be worked on using simple machines and joined together to form the required product. Many more motifs can be tried out rather than following the same old motifs.