APPLICATION OF WIRE WEAVING TO THE PRODUCTION OF LIGHT FITTINGS

By

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KNUST

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NYANSAPƆ WƆSANE NO BADWENMA

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DECLARATION

I hereby declare that this submission is my own work towards the M.F.A and that, to the best of my knowledge it contains no materials previously published by any other person nor material which has been accepted for the award of any degree of the University, except where a due acknowledgement has been made in the text.

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ABSTRACT

The main objective of this project was to explore application of wire weaving, a jewellery and metalsmithing technique for the production of light fittings in a studio setting. This study was deemed necessary because it was observed by the researcher that much attention has not been given to the technique by fellow craftsmen over the years due to the claim of some that it is difficult and time demanding. The research employed studio based research methods under qualitative design to execute the project. After collecting and analysing data for the study, the researcher explored various weaving types at the studio in order to select the appropriate weaves that will be suitable for the project. After the exploration of the weaves, the plain weave, diamond twill weave and twinning technique of basketry were selected and used for producing the light fittings. The result of the study revealed that using wire weaving technique in the production of light fittings is not time demanding and difficult as claimed by some metal artists.

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CHAPTER ONE

INTRODUCTION

1.0 Background of the Study

The jewellery and metalsmithing field abounds in a variety of techniques which have been used over centuries in the production of metal products and artefacts for both utilitarian and decorative purposes. The techniques range from complex industrial processes such as metal stamping, spinning, casting, and extrusion to simple but intricate studio based metal techniques such as chasing, repoussé and some form of wire work.

Though most of these techniques are being used widely by jewellers and other metal artists, the use of a technique like wire weaving has not been a common practice among metal artist in the production of artworks. However, this technique has boundless possibilities, especially with wire having the ability of being easily manipulated to create intricate objects of art that are light weight and also aesthetically pleasing to the eye, due to the rich textures created by the weaves. Also wire woven objects tend to be relatively elastic and can resist dents to a great extent. Upon a visit to the market one sunny day, an observation was made that the woven straw hats worn by the market women against the sun created very fascinating shadow impressions on their bodies and immediate surroundings. A later contemplation on the sight of these beautiful impressions created as a result of the sunlight passing through the woven straw hats birth the idea and possibility of applying the wire weaving technique in the production of light fittings that will bear African design concept and motifs.

1.1 Statement of Motivation

Wire weaving like the other techniques in jewellery and metalsmithing has been in existence for centuries. However, this technique has not been given much attention by fellow craftsmen in their studio practice like the other techniques such as casting, embossing and forging. Upon interacting with some metalsmiths, it came to light that their passiveness towards these techniques lies in the fact that in their opinion, it is difficult and time demanding just like filigree. While others claimed they were not taught the weaving technique during their apprenticeship by their masters. This has limited the application of the technique even though it has endless possibilities if explored.

Inspired by the qualities that can be derived from wire weaving, this project seeks to explore the technique in the production of light fittings that will reflect African design concept and motifs. The outcome (product) will be different from those found on our markets as the imported ones mostly bear foreign themes and design concept.

1.2 Objectives of the Study

The objectives of this study are:

- To explore various ways by which wire weaving can be used in the production of light fittings.
- To develop concepts based on traditional themes.
- To produce light fittings using wire weaving techniques.

1.3 Delimitation

This project is limited to the design and production of light fitting using wire weaving techniques.

1.4 Limitation

The challenges the researcher faced during the execution of the project include:

- Lack of enough written information on weaving pertaining to metalsmithing, this made the researcher to seek most of the information in relation to the study in the fields of textiles and basketry.
- The difficulty of attaining precision during the fabrication of the forms for the light fittings. This was due to expansion and contraction of the different sizes of wires and strips being used.

1.5 Importance of the Study

- This study will create awareness about the use of wire weaving techniques in metalsmithing and jewellery.
- It will also be a source of inspiration for metal artist who like to depart from the conventional sheet forming and casting techniques to explore other intricate techniques such as wire weaving.
- The project report will be a body of knowledge which will serve as a reference for other researchers, students and scholars.

1.6 Definition of Terms

Annealing: This is a heat treatment that alters the physical and sometimes the chemical properties of a material to increase its ductility and reduce its hardness, making it workable.

Buffing: This is a process of polishing metal by applying some abrasives known as buffing compounds to a soft material mounted on a revolving wheel.

Coiling: This is a technique in basketry, which is sewing a stationary horizontal element (the foundation) with moving vertical elements (the stitches).

Design: This is the creation of a plan or convention for the construction of an object or a system.

Fabrication: This is the act of making or constructing a product from raw materials. It is also the act of manipulating metal by bending, cutting and shaping into a form.

Light fitting: This is an electrical device used to create artificial light by use of electric lamp.

Milling: This is a process of using a reduction gear mill to reduce the thickness of metal.

Pendant lamp: Is a light fixture that hangs from the ceiling usually suspended by a cord, chain, or metal rod.

Pickling: This is the act of immersing and soaking metal in a dilute acid solution primarily to chemically remove or dissolve surface oxides or subsurface fire stain formed on metal during heat treatments such as annealing, soldering, casting or fusing.

Sanding: This is the processes of using abrasives such as emery paper to smoothen surfaces of metal.

Sconce: This is a type of light fixture affixed to wall in such a way that it uses only the wall for support.

Soldering: This is the process of joining two metals together by the use of solder and heat.

Table lamp: This is a small electric light fixture that is usually placed on a table.

Twisting: It is the process of making ends of wires turn in opposite directions.

Twinning: Twinning is the process of passing horizontal elements such as wire or metal strips known as weft or weavers around stationary vertical elements known as warp stakes.

Oxidation: Oxidation is the process of tarnishing metal by dipping in a solution of sulphur or other chemicals as the activating compounds.

Visual Texture: Is a result of the light rays hitting the weave patterns on the light fitting to cast shadow impressions on the environment where light fitting is situated.

Warp: These are threads or wires that run lengthwise in a weave.

Weaving: Weaving is the method of forming a pliable plane of threads, metal wires or strips by interlacing them in a rectangular motion to form fabrics and artefacts.

Weft: These are threads or wires that run horizontally across a weave.

Wire: This is a metal in a form of thin flexible strands, or a single strand of it.

1.7 Organisation of the Rest of the Chapters

The rest of the chapters of the study are:

- Chapter Two: This provides an extensive review of literature in relation to weaving and light fittings, as well as examine the various extend to which artists have explored weaving in the field of light fittings.

- Chapter Three: Presents the materials and methods that were used in the study. It gives a systematic account on materials and preparation, exploration of wire weaving, design concepts and the fabrication of light fittings.
- Chapter Four: Constitutes the discussion of results and appreciation of the woven light fittings.
- Chapter Five: Contains for the summary of findings, conclusion and recommendations.

CHAPTER TWO REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter provides an extensive review of literature in relation to weaving and light fittings, as well as relevant history, and examines the various extent to which artists have explored weaving in the field of light fittings. The review of related literature was conducted under these thematic areas:

- Wire
- Weaving
- Basketry
- Wire Weaving Artist
- Light
- Light Fitting
- Copper
- Brass

2.1 Wire

Oddy (1977) has it that, wire is something, which we all underestimate in the twentieth century. It is crucial for the electrical and mechanical industry and a huge amount is fabricated every year in an extensive variety of metals and composites. The system of production includes the slow lessening of the thickness of a metal bar by drawing it through a progression of holes of consistently diminishing measurement, so that the subsequent wire increases in length with every pass. The key instruments being a solidly braced "draw-plate", containing the arrangement of decreasing holes, and an exceptionally solid pair of draw tongs with which to hold the wire and pull it through the following smaller opening.

According to Cusick (2000) wire is available in any number of gauges and shapes as well as in different metals. Wire made from alloys (blends of less expensive metals) is an acceptable choice, especially for jewellery for everyday wear or for working a new design.

Collins (2003) describes wire to be a thin adaptable strand of metal or a few metal strands turned together. It can likewise be said to be an adaptable metallic conduit, particularly one made of copper, generally protected, and used to convey electric current in a circuit. Be that as it may, wire for this purpose can also be used for weaving.

Firor (2014) asserts that wire is the component that will have the greatest impact on an art piece. Even though everyone is most familiar with round wire, wire is also available in several other shapes. Square, half-round, domed, rectangular, and triangular wires are often used in wire wrapping and other jewellery-making techniques.

- Round Wire

Round wire offers the greatest versatility, and it is still the most frequently used shape of wire in both jewellery and non-jewellery applications. Round wire is available in the widest array of colours, sizes and types of metals. Also, and most importantly: Because of its shape, round wire bends with equal ease in all directions, which makes it the easiest to mould into various configurations.

- Square wire

Square wire has four flat sides and four corners, the gauge of square wire is determined by its thickness, the same as round wire. However, because its corners adds extra bulk, square wire has about 20% more metal in it than round wire of the same size.

- Half-round wire

Half-round wire has one flat and one rounded side. Its gauge is determined by its width, and because it is half of a round wire, its weight is also half of round wire of the same gauge. It bends well only toward the flat side. Half-round wire is commonly used in wire wrapping to bind square or round wires together, in weaving projects, it can be used for the same purpose.

2.2 Weaving

Because weaving is a textile fabric construction technique that has been adopted by metalsmiths as a fabrication technique, most of the books and materials reviewed are mainly of textiles origin.

Albers (1974) describes weaving as a popular ancient craft. She further explained that hand weaving is a method of forming pliable threads by interlacing them rectangularly.

She added that it was developed in the pre-ceramic age and that it has remained essentially the same till now, even by the modern production methods of the craft through the introduction of power machinery.

Untracht (1982) is of the view that weaving is the most important of the hand or mechanism work process that can be used to interwork wire and strip element. In all weaving, the basic concept involves the insertion and interlacing of a set of horizontal (width) elements called the weft through a set of vertical, (length) elements called the warp. He further stated that wire and metal strips weaving can be done without the use of a loom. This he stated was so because of the scale and size range of metal fabric woven for use in jewellery and also the stiffness of wire that makes it stand when weaving without any structural support.

Gokarneshan (2004) states that a woven material is one created by the interlacement of two arrangements of yarns, to be specific, warp and weft yarns. These yarns are joined with each other as indicated by the kind of weave or plan.

2.2.1 History of Weaving

Adanur (2001) expressed that, weaving is most likely as old as human civilisation. One of the essential necessities of people is to cover their bodies to shield themselves from outside impacts (hot or cold) and look more "cultured". He proceeded that, different explanations behind advancement of various garments all through history are economic wellbeing, religious requirements, and so on. Clothing patterns also depended on geographical location. Verifiable discoveries propose that Egyptians made woven fabrics about 6000 years ago. The Chinese also made fine fabrics structures some 4000 ago years. He additionally revealed that, weaving began as a local workmanship and stayed as an indigenous industry until the innovation of the fly shuttle.

Fisch (2003) took us back to biblical origins of wire weaving, as he quoted,

> "…and made the holy garments for Aaron, as the Lord command Moses… and they did beat the gold into thin plates and cut it into wires, to work it in the blue, and in the purple, and in the scarlet, and in the fine linen, with cunning work…. Chain of pure gold, twisted like cords, were made for the breast piece…" Exodus 39:1-15

Ancient Greece, pre-Columbian Peru, medieval Europe, seventeenth-century Japan, Sung and Mandarin China, primitive Africa, and twentieth-century industrial societies are some of the places that garments and artefacts combining metal and textile technologies can be found. They do not evidence any particular chronology nor do they represent any cultural, stylistic, or technological development. Rather, they seem to occur randomly whenever sophisticated technologies in both metalwork and textiles exist simultaneously.

Archaeological findings of the origin of weaving has been dated to more than 24,850 years (Riggs, 2004). He opined that, due to the hazards of climatic change, insects and fire, the number of early fabrics that have survived are limited. It is believed that basketry and weaving were likely to be the "crafts" that were first created by humans. Man's quest for basic needs of life, namely, food, shelter, and clothing may have contributed to the discovery of weaving. Also archaeological research shows that cultures all over the world developed their own looms and procedures of weaving. The motivation

of their weaving may have come from watching spiders spinning a web, birds building a nest, or beavers building a dam. Riggs continued that, after early civilizations brought how to weave, items such as rugs, blankets, curtains, purses, body coverings, fish netting, hut coverings, food containers, and infant carriers were made by the people. Clothing materials were made in Mesopotamia and Turkey as far back as 7000 B.C. Pieces of clothing and weaving apparatuses were found in Egyptian tombs. Most Egyptian fabrics were of linen and cotton. Despite the fact that wool was accessible, it was viewed as a fibre of the lower class. One law even restricted priesthood from the wearing of wool on their skin or during worship. The
Hebrews in 3000 B.C. utilised wool more than any other fibre.

According to Keffaber (2009) the basic principles of weaving was developed in the pre-ceramic age and examples of woven materials were found in Mesopotamia as early as 7000BC. He confirmed that the first looms were used around 560BC. Keffaber further stated that, the first electric loom was introduced in 1785 by Edmond Cartwright. However, major innovations were made for the textiles industry in 1804 as Joseph Marie Charel Jacquard created a mechanical loom that made it possible to weave fabrics into all kinds of intricate patterns and beautiful designs using a punch card.

2.2.2 History of Trichinopoly (Viking wire weaving)

Viking wire weaving was practised during the Viking age (AD 793-1066) in Scandinavia by a sect of pagan worshipers known as the Norse. Archaeological findings revealed that many graves of the Norse people had necklaces, chains, bracelets, edging for clothing as well as trim, which were made using a knotting technique known as Nalbinding. This specific method was not as common as the twisted wire torques that is considered today as Viking or Norse jewellery. Wire weaving has likewise been found in Roman, Greek and Byzantine archaeological digs, far earlier than in the Anglo-Saxon finds (first century B.C. to fourth century A.D.). This research has revealed that, many of the wire weaving that exists today are from archaeological hoards, or bulk finds that were large amounts of treasure that was buried together, as opposed to individual graves (Freygerdr, 2006).

2.2.3 Types of weaving

Untracht (1985) asserts that there are four main basic weave systems employed in weaving; plain weave, twill weave, satin weave and open weave. He continued that, it was based on these that many derivative weaves came.

2.2.4 Plain weave

Untracht (1985) again explains that plain weave consists of an interlacing order in one pick or weft roll, of over one, under one warp element. In the following pick, the sequence alternate, the warp formerly passed over is passed under, and vice versa. Each pick is forced against the last to lock the previous weft in place by pressure to reduce or completely close the space between them.

According to Gokarneshan (2004) the plain weave is also known as “calico” or “tabby” weave. This is the basics of all weaves having a repeat size of two. He stated that, the scope of utilisation of this weave is wide and the following as being characteristics of the plain weave:

- It has a maximum number of binding points
- The threads interlace on alternate order of 1 up and 1 down

- The thread density is limited
- Cloth thickness and mass per unit area are limited
- It produces a relatively stronger fabric than is obtained by any other simple combination of threads, except that of “gauze” or “cross weaving”

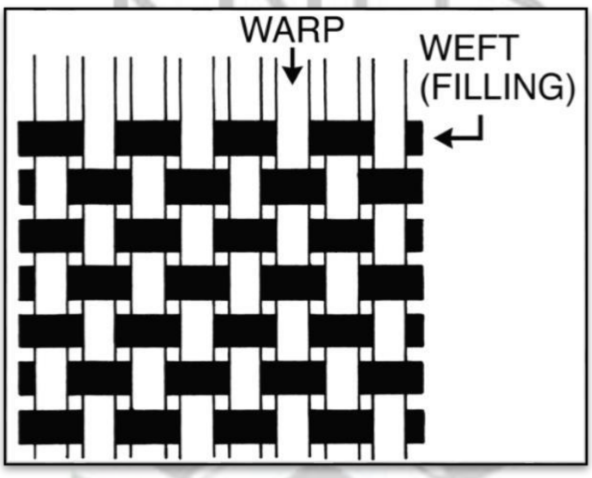

Fig. 2.1: Plain weave
Source: http://www.yatesdesign.net/YDL-Glossary/diagrams.html

Becker (2009) stated that with tabby weave which is the same as plain weave, the wefts go alternatively over and under one warp end, so that the weave unit is 2 × 2, which is the heddling order. Variations are obtained by doubling warp ends or weft or both.

2.2.5 Twill weave

According to Untracht (1985) twill weave is done by making each successive interlacing of warp and weft occur with the intersection taken place one warp end to the right or left so that a diagonal movement occurs in the resulting pattern which is typical of all twill derivative weave. There are many weaves derived from the twill; among them is the well-known herringbone weave.

According to Gokarneshan (2004) the main feature of the twill weave which make it stand out from other types is the presence of noticeable diagonal lines that run along the width of the fabric. He outlines these as the fundamental characteristics of the twill weave:

- They form diagonal lines from one selvedge to another
- More ends per unit area and picks per unit area than plain cloth
- Less binding points than plain cloth
- Better cover than plain weave
- More cloth thickness and mass per unit area

Becker (2009) on the other hand states that twill wefts go over two or more warp ends and the binding points are moved stepwise from one end to the next on successive wefts and form diagonal lines. In his opinion innumerable variations are possible by means of entering in straight repeat or in point repeat; the treading can be varied similarly. The smallest unit is 3x3. Larger numbers of course still give richer variation.

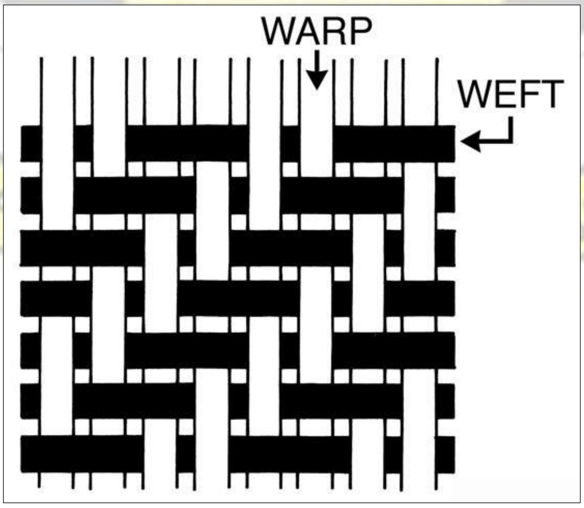

Fig. 2.2: Twill weave
Source: http://www.yatesdesign.net/YDL-Glossary/diagrams.html

2.2.6 Satin weave

Untracht (1985) states that, some authorities claim satin weave to be a derivative of twill weave. In this system, the single warps or wefts interlace or are bound in a dispersed sequence in which adjacent wefts are never bound by the same warp. The sequence is regularly repeated, however, and produces a smooth faced fabric often without any apparent diagonal movements, with either the weft or warp making long floats on the fabric surface. Its application to use in metal is limited because of the long floats unless the scale of the elements is small, as they would make a loose structure. The appearance resembles long floats, wrapped coil work where the wrapping element predominates, though of course the techniques are entirely different. Wide belts are made this way in Egypt.

According to Gokarneshan (2004) a warp faced restructured twill is known as Satin while sateen is a restructured weft faced twill. Satin according to him, is the opposite side of sateen weaves. These weaves form an important category of weaves. They are combined with other weaves, particularly in case of ornamented fabrics. The striking feature of these weaves is their bright appearance and smooth feel. The basic characteristics of satin and sateen weaves are as follows:

- They are either warp or weft faced weaves
- They have no prominent weave structures
- Only one binding point in each end or pick
- No continuous twill lines
- Have poor seam strength due to thread mobility
- More thread density is possible in warp and weft
- More mass per unit area is possible
- Have less binding points and more float lengths

- Use of more numbers (intervals of selection) is necessary to construct these weaves

Becker (2009) opines that satin, is characterised by binding points being spread evenly out to give the best smooth surface. The lowest number for a weave unit is five in both warp and weft.

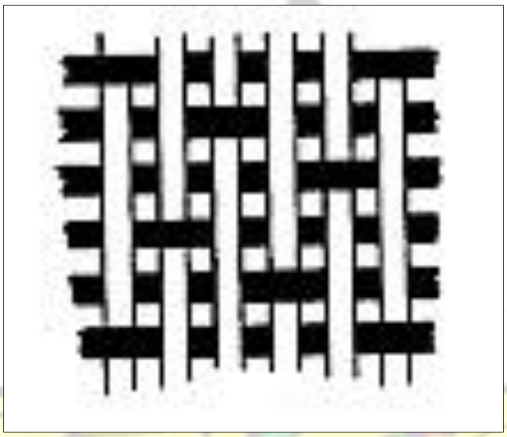

Fig. 2.3: Satin weave
Source: http://www.yatesdesign.net/YDL-Glossary/diagrams.html

2.2.7 Open weave

Fisch (2003) is of the view that wire is ideally suited for open weaves because the twist of warp and weft which locks such weave structures in place is much firmer and more permanent than it would be in yarn.

Untracht (1985) establishes the fact that open weaves produce open work fabrics, open by utilising the techniques of twinning and wrapping to create stability in the position of the warp and the weft elements in the open areas. Typical open weaves are lino and gauze weaves, and their derivatives. In these weaves two or more elements lock on each other while they are held in place by a third element. This can be accomplished by crossing the warp ends in pairs or groups or twisting them, then passing the weft through or wrapping it around them, the open spaces are secured.

Open weaves are particularly suited to metal wire in any scale.

Fig. 2.4: Open weave
Source: http://www.woodworkingplans.ca/product/modern-open-weave-cane

2.3 Basketry

Holmes (2015) has it that, basket is one of mankind's most established works of art, and it is positively an ethnic and social symbol loaded with myth and theme, religion and imagery, and adornment in addition usefulness. Basketry, indeed, incorporates an extensive variety of articles from about unbending boxes such as carriers to mesh sacks. Baskets reach in size from "burden baskets" that are as much as 91.44 cm in measurement to small collectibles about 0.64 cm in diameter.

He further states that a few baskets are fabricated by machines, however part of the convention is that baskets are characterised as containers that are woven by hand and of vegetable filaments. Despite the fact that baskets might have unmistakable bottoms and tops, they are basically continuous surfaces. They can be said to woven in that, their strands are twisted together, just that, unlike the weaving of textiles, tension is not placed on length-wise threads or warp because the strands are less flexible than threads.

2.3.1 Types of Weaving Techniques in Basketry

According to the Museum of Anthropology (2015) there are four essential systems used to weave a basket: twining, coiling, plaiting, and stake and strand. Any of these systems can be utilised to make an assortment of various sorts of containers, from a small basket for jewels to an enormous one for storing grain. Basic materials utilised in this type of art work include roots, grasses, wood, and tree barks.

- Coiling comprises of sewing a stationary horizontal component also known as the foundation with moving vertical components also known as the stitches.

  The stitching and bindings on a coiled basket can be decorative, purely functional or both.

Fig. 2.5: Coiling
By: Connor O'Malley
Source: http://www.wildernesscollege.com/native-american-basket-weaving.html

- Twining comprises of passing horizontal components (weft or weaver) around stationary vertical components (warp or stake). It can also be said that twinning is a technique in which two wefts or weavers cross over one another between the stakes or warps.

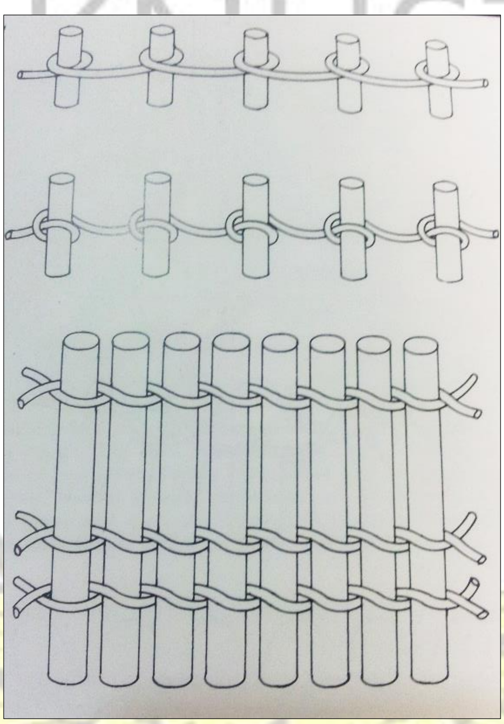

Fig. 2.6: Twinning
By: Untracht Oppi
Source: Jewelry Concepts and Technology (1985)

- Plaiting: Plaiting involves passing strips of fibre over and under each other at a fixed angle. It produces a checked pattern. Untracht (1985) explain plating as a method of forming a fabric with the fingers by diagonally interweaving or inter linking any number of elements, usually strips of the same width or multiple strands of wire. In plating variety of fabric types and structures can be made including the plain weave and twill weave variations.

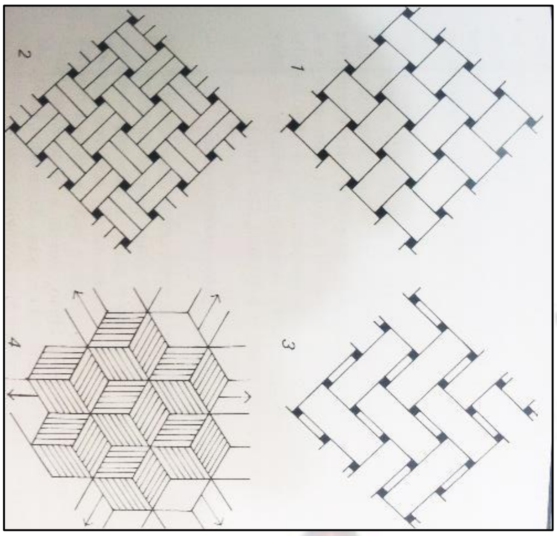

Fig. 2.7: Plaiting
By: Untracht Oppi
Source: Jewelry Concepts and Technology (1985)

- Stake and Strand: Stake and strand consists of two sets of interlaced elements; one set is stable, while the other is moved in and out alternating the stakes.

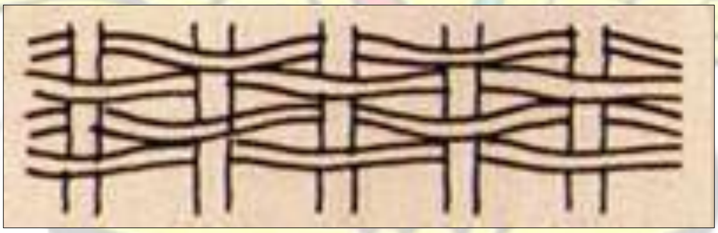

Fig. 2.8: Stake and strands
Source: https://anthromuseum.missouri.edu/minigalleries/baskets/intro.shtml

2.4 Wire Weaving Artists

According to Kangas (2012) Mary Lee Hu and Arline Fisch were among the first to explore textiles techniques in jewellery. The following are some of their works.

Fig. 2.9: Crochet Neckwear
By: Arline Fisch
Source: http://www.facerejewelryart.com/exhibit.php?id=39

Fig. 2.10: Silver & Orange Maltese
By: Arline Fisch
Source: http://www.facerejewelryart.com/exhibit.php?id=39

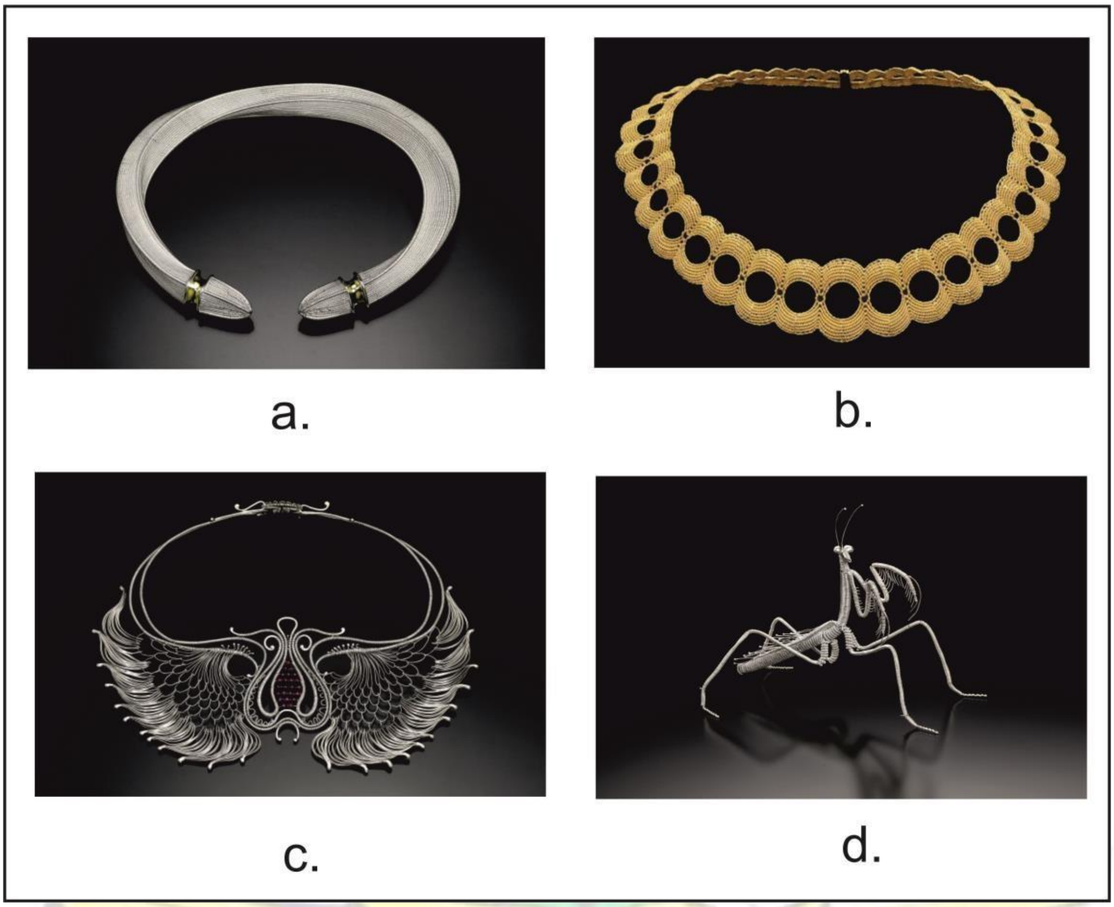

Fig. 2.11: Woven jewellery works
By: Mary Lee Hu
Source: http://www.ornamentmagazine.com/slideshow032_mary-lee-hu.php

2.5 Light

Goldstein (2005) states that, the presence of light is the main means by which we know the world. From the single celled animals, we see under a microscope, to the most far off stars seen in a telescope, it is light that informs us. The mind boggling variety of forms and structures of our universe are uncovered by the presence of light. Yet the nature of light eluded researchers and scholars through the vast majority of written history. He adds that it was just since the mid-nineteenth century that physicists started to comprehend this most fundamental natural phenomenon and that even with the full array of modern systems in physics, there are still unsolved issues pertaining to the interaction of light with matter.

Oy (2013) clarifies the phenomenon of light as the narrow part of the wide electromagnetic spectrum that our eyes can see and deliver a visual sensation. The spectrum of visible light reaches from profound purple, near Ultra Violet radiation, up till warm red, near Infra-Red radiation. He proceeds by saying, Electromagnetic radiation has a wide spectrum reaching from ultra-short wavelengths (< 10-14 m) for cosmic radiation to radio frequencies where waves can be kilometres long. Amidst the spectrum lies the visible light having a border around 380 nm to Ultra-Violet radiation and around 780 nm to Infra-Red radiation.

2.6 Light fitting

William (1999) asserts that a light fitting is known as a 'Fixture' or as an 'Instrument' in America, as a 'Light Fitting' or a 'Lantern' in Britain and as a Luminaire, in other parts of the world and by the engineering community.

William continues by explaining that, a complete light fitting unit usually consists of; a metal housing, socket, lamp, reflector, electrical cord, connector and lens. He adds that the term 'luminaire' is also commonly used by electrical engineers and architectural lighting designers. Although the word luminaire (from the French) has been in use for some time, it was only in the 1960's that the term started to be used in

North American theatre by the architectural and theatre lighting industries.

2.6.1 History of Light Fitting

According to Yee (2008), for centuries the utilisation of beeswax candles remained the privilege of the church, the crown and the nobility. The imperial family utilized its own particular wax chandlers and although independent craftsmen in this craft are thought to have emerged in the thirteenth century, it was not until 1484 that the Wax Chandlers of the City of London were conceded a Royal Charter by Richard III of England. Yee continues by stating that, electric lighting remained an extravagance for a long time, and a house lit by electricity showed prosperity and progressiveness. The non-inflammable nature of electric lighting gave unprecedented opportunities for decorative effects, while its combination of novelty, luxury and modernity was underlined through the utilisation of expensive and occasionally frivolous devices. Toward the end of the nineteenth century, almost every type of secured lighting was being used in various settings. It was uncommon for the poor to waste light, despite the fact that in the homes of the "respectable a shaded light might have been amongst the prized ownership in the parlour or "front" room. For exceptionally poor city or country dwellers, abundant light was still past the purchasing power for some, even toward the end of the nineteenth century.

In conclusion Bellis (2013) asserts that, the first light was created around 70,000 BC. He further explains that hollow rock, shell or other natural discovered items were loaded with moss or a similar material that was soaked with animal fat and lit. People started creating similar shapes with synthetic ceramics, alabaster, and metal. Wicks were later added to control the rate of burning. Around the seventh century BC, the Greeks started making earthenware lamps to replace handheld torches.

2.6.2 Table Lamp

According to "Shades of Light" (2015) table lamps are an integral part of almost any room, not only for illumination, but also to enhance the style and colours for the space. The site further states that one ought to consider buying a table lamp as a basic component to a room's totality in terms of design, bringing in accent colour, texture and a style statement as one big table lamp will fill empty table space with personality that may need several smaller accessories to accomplish the same task.

Fig. 2.12: Fine wire table lamp
Source: http://www.sahm-one.net/lamp-with-table/13/wire-table-lamp

Fig. 2.13: Aer table lamp
Source: http://www.contemporist.com/2008/03/19/10-table-lamps-to-light-up-your-life

Fig. 2.14: Lotus table lamp
Source: http://bilinterior.com/beautiful-decorative-lamp-for-the-light-source-and-theroom-decor/lotus-table-lamp

Fig. 2.15: Tiffany-style Blue Dragonfly table lamp

Source: http://www.overstock.com/Home-Garden/Tiffany-style-Blue-DragonflyTable-Lamp/3275038/product.html

2.6.3 Sconce

According to Pegasus (2015) a wall sconce is a decorative or ornamental bracket fixed to a wall for holding a candle or electric light. He continues that, wall sconces come in various materials, shapes, sizes, lamp intensities, and with a variety of design concepts and light sources. Wall sconces can be functional by providing some or all of the general lighting in a space. At different times the light provided by a sconce or a series of sconces can help one securely navigate a long corridor or a stairway. Wall sconces can likewise give illumination to a bathroom mirror when they are utilised on both sides. Wall sconces likewise offer great opportunity to be inventive and make room for artistic expression. Truth be told, certain wall sconces may be works of art themselves. In a few cases, the outline components of the wall sconce may be utilised to supplement the configuration components of different things in the space. Pegasus concludes that, some wall sconces are paintable, which implies that the shade of the sconce can be chosen to supplement or diverge from alternate colour utilised as a part of the space. At times it is essentially the shine given by the wall sconce that makes the best commitment to the feel of a given space. In an office space, wall sconces can provide a touch of skill to the artistic theme, impressing guests and motivating pride in the individuals who work there. Where wall sconces are situated on very textured wall they can give an emotional lighting impact on the wall called "wall grazing," which highlights the texture on wall surface by making a difference between light and dark, pointing out the wall's surface textures.

Fig. 2.16: Light – Wall Sconce
Source: http://www.turbosquid.com/FullPreview/Index.cfm/ID/526412

Fig. 2.17: Wall Sconce
Source: http://www.rejuvenation.com/catalog/categories/lighting/wall-sconces

Fig. 2.18: Leaf Cut Out Sconce
Source: http://silkroute.com.au/store/leaf-cut-out-sconce-metal-silver-wall-light

Fig. 2.19: Odysee one-light sconce
Source: http://www.lightingstyleblog.com/lighting-tips/2009-color-year-mimosa

2.6.4 Pendant Lamp

According to Wisegeek (2015) a pendant is something that suspends from something else. In jewellery, a pendant suspends from a chain or other material. A pendant light is any light that suspends from the ceiling by anything, for example, a rope, pole or chain.

As opposed to being straightforwardly connected to the electrical fixture, a pendant light is suspended from the installation. The modern pendant light is motivated by the clay pendant lights that were hung off the ground in antiquated times with the goal that hands were free and light could be spread out to cover a substantial area. These clay-based lamps had animal fat stores to hold fire and were common around 2700 BC. The present day pendant lamps are predominantly glass-based so that the light would radiate through from the underside of the suspended light.

Fig. 2.20: Goldrush Pendant Lamp
Source: http://www.blisshomeanddesign.com/Goldrush-Pendant

Fig. 2.21: Laura Kirar Three Light
Source: http://www.blisshomeanddesign.com/Laura-Kirar-Three-Light-Chainmail-Pendant

Fig. 2.22: Pendant lamp
Source:
http://www.ikea.com/us/en/catalog/categories/departments/living_room/18751/

Fig. 2.23: The death star lamp
By: David Wahl
Source: https://www.woont.com/en/Magazine/Living/Furniture/IKEA-PS-2014pendant-lamp-by-David-Wahl-471

2.7 Copper

Lenntech (2014) describes copper as a reddish metal with a face-centered cubic crystalline structure. It reflects red and orange light and absorbs different frequencies in the visible spectrum, because of its band structure. copper is malleable, ductile and a great conductor of heat and electricity. It is a soft metal that can be polished to a brilliant finish. It is found in group Ib of the periodic table, together with silver and gold. It has low chemical reactivity. It forms a greenish surface film called patina when exposed to moist air; this covering shields the metal from further atmospheric attack. The chemical symbol is Cu (from Latin: cuprum) with an atomic number of 29 and melting point of 2526°C.

Fig. 2.24: Copper

Source: http://www.electrical-insulators-and-copper-groundbars.com/0th16ozcosh.html

2.8 Brass

According to Zronik (2005), states that, brass is a metal with the primary components of copper and zinc. Copper is the principal component, and brass is normally categorised as a copper alloy. The colour of brass ranges from dark reddish brown to a light silvery yellow depending upon the quantity of zinc present. More zinc gives a lighter colour. The zinc content can range between 10% to around 45 %. Brass has unique properties, being harder and stronger than copper, it is easy to manipulate into various forms, a good conductor of heat, and generally resistant to corrosion from salt water. As a result of these properties, brass is typically the first-choice material for many of the parts for hardware made in the general, electrical and precision engineering industries. Brass is likewise used to make pipes and tubes, weather stripping and other engineering trim pieces, screws, radiators, musical instruments and cartridge casing for guns. Brass has a melting point of 900 - 940°C.

Fig. 2.25: Brass
Source: http://www.moormetals.com/brass.html

CHAPTER THREE MATERIALS AND METHODS

3.0 Introduction

The researcher used the studio based research approach in the execution of the project. In order to give a vivid and systematic account on the procedures and techniques that were employed in the studio during the fabrication of the light fittings using the wire weaving technique, the researcher deemed it right to divide the chapter into the following sections:

- Materials and preparation
- Exploring wire weaving
- Fabrication of the light fittings

3.1 Material and Preparation

The desired gauge of brass and copper rods for the fabrication of the framework or armature for the weaving processes were not readily available on the market so the researcher had to melt some brass and copper scraps to obtain ingots for the work.

Fig. 3.1: Copper scraps

Fig. 3.2: Melting scraps for ingot

Fig. 3.3: Pouring of the molten metal

Fig. 3.4: Ingots

Upon obtaining the ingots as shown in Fig. 3.4, they were milled into varied thickness for the construction of the skeletal frame that will support the weaving process. Also, a bobbin of 22 gauge (0.64mm) copper wires as shown in Fig. 3.5, was flattened through the rolling mill, annealed and twisted to be used in the weaving process. Medium solder was prepared by the research artist and used in all the soldering procedures.

Fig. 3.5: 0.64mm copper wire

Fig. 3.6: Flattened copper wire

Fig. 3.7: Twisting of copper wire

Fig. 3.8: Twisted copper wires

3.2 Exploring wire weaving

It came to light through studio experimentation that certain weave patterns and techniques in textiles and basketry are difficult to make in jewellery and metalsmithing. This is due to the fact that metal wires and strips as compared to yarns, fibres, and cords will easily break or snap when given too much tension during bending, coiling, knotting or tying. With this experience at hand the researcher basically selected the plain weave in doing two of his test pieces which was much easier to do in metal and tried the diamond twill weave pattern as the third test piece.

3.2.1 Test piece 1 - A Spider on Web (Plain Weave)

The first test piece is a decorative wall hanging with a diameter of 243mm and a height of 80mm. The metal used in making the spider and the web was copper. The weave employed in the creating of the web was the plain weave, this was done by interlacing twisted copper wire which represented the weft to copper rods arranged in a circular manner that represented the warp as shown in Fig. 3.9. In order to create contrast between the spider and the woven web, the spider was created by doming two pieces of sheet metal as shown in Fig. 3.11 and fixed to the web as shown in Fig.

3.13.

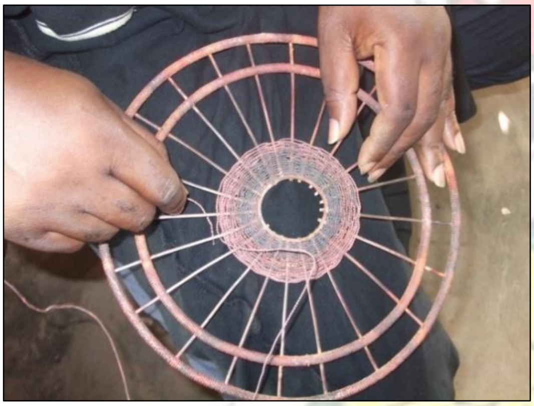

Fig. 3.9: Weaving the web

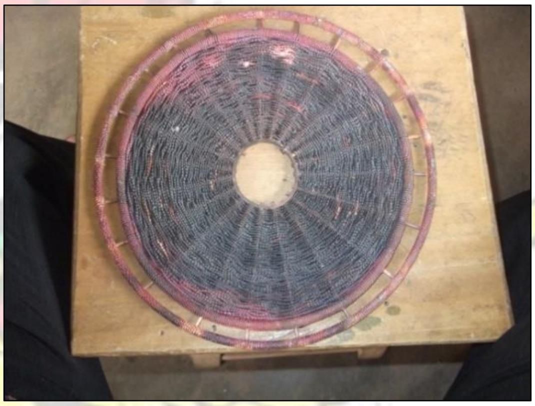

Fig. 3.10: The completed woven web

Fig. 3.11: Doming of spider's body

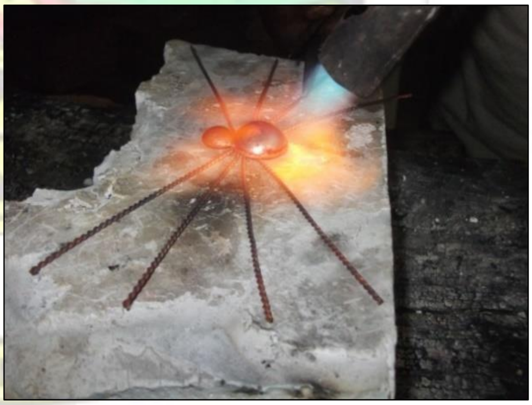

Fig. 3.12: Soldering the spider's legs

Fig. 3.13: The spider attached to the woven web

3.2.2 Second Test Piece – Mask (Plain Weave)

A mask was created as the second test piece and it had a length of 250mm, breadth of 85mm and height of 60mm, this was also made in copper. The weave pattern used was the plain weave. This was done by building an armature of the mask using copper rods with thickness of 2mm. The reason for the armature was to support the weaving process, give form to the weave and to let the mask look three-dimensional. Copper wire both smooth and twisted and also copper strips were used in the weaving so to create variation and textures in the weave.

Fig. 3.14: Soldering the armature

Fig. 3.15: Completed armature

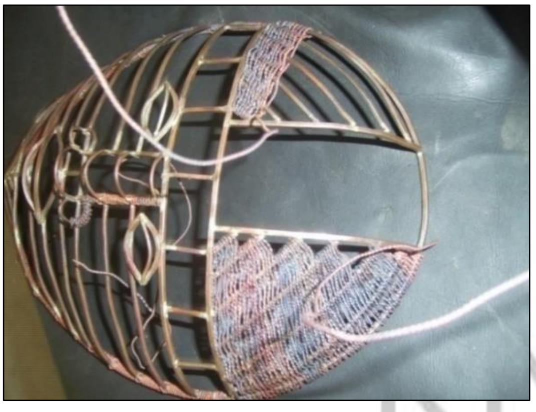

Fig. 3.16: Weaving process

Fig. 3.17: Mask completed

3.2.3 Test Piece 3 - Diamond Twill Weave

The diamond twill weave was experimented in addition to the plain weave. The procedure that the researcher followed in doing this weave was not exactly what pertains in textiles when doing the twill weave yet good results were obtained during the experimentation. Copper and Brass strips were the elements used in making the weave. This was intended to make the warp and weft distinctive. To obtain the diamond shape, a vertical midpoint had to be determined as shown in fig. 3.18. Using that as a starting point, the warp (picks) were made to interlace with the weft (ends) from the left and the right side of the midpoint. The subsequent picks from the midpoints were extended one step each at every level. This process was continued till the design got to the horizontal midpoint as shown in fig. 3.18. From there each pick was reduced step by step at each level and when each process continued, the design then started closing up to complete the diamond shape.

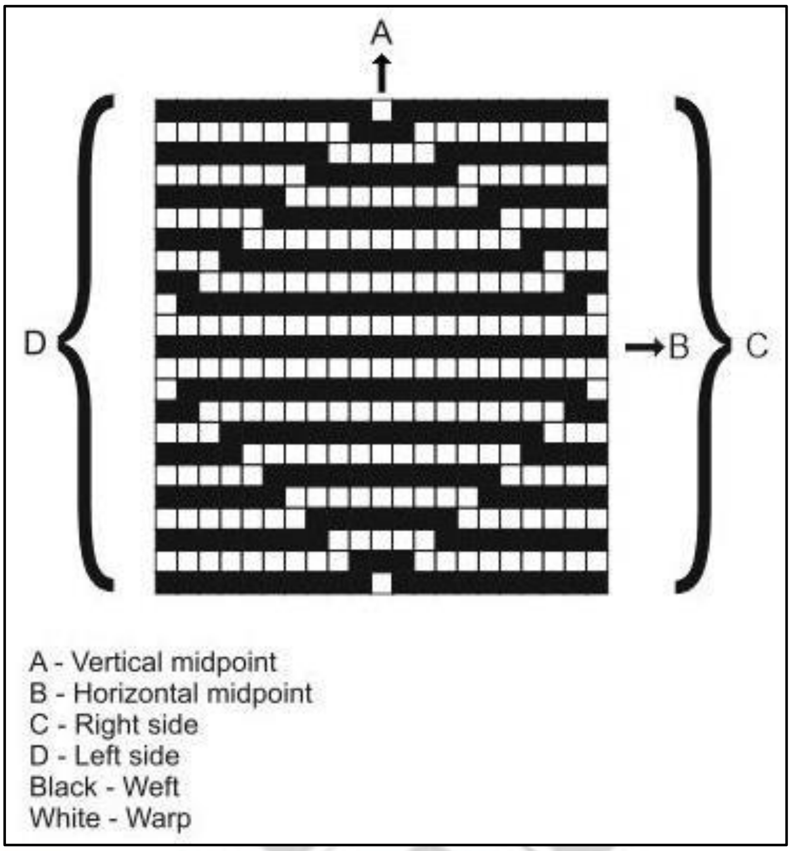

Fig. 3.18: mapping graph of the diamond twill weave

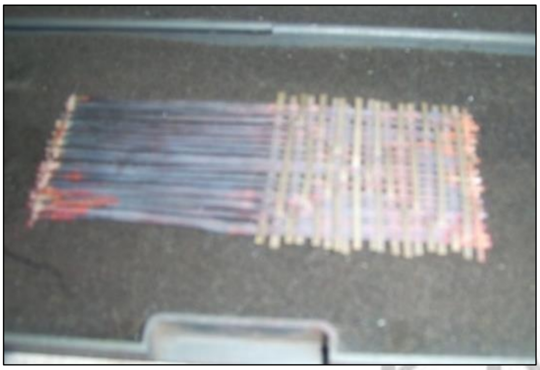

Fig. 3.19: Interlacing of weft to warp

Fig. 3.20: Completed diamond twill weave

3.3 Fabrication of the Light Fittings

3.3.1 Design Development

Design development was conceived carefully bearing in mind the production of light fittings using the wire weaving technique. The researcher used forms and motifs that bear Ghanaian concepts for the fittings. This was deliberate so as to bring variety into the design of the light fittings since majority of light fittings on the market are of foreign in origin and bear foreign design concepts. For the easy manipulation of the wires for the weaving process, the technique at hand which is the wire weaving informed the shapes and forms during the designing stage and also those that was selected during the project. Another factor that influenced the researcher's design was the availability of materials, tools and equipment and also considering the time frame in which the project had to be executed. Since the purpose of the project was not only for aesthetical use but also for utilitarian purposes, thus to give light or to illuminate an environment. The researcher had to consider some technical properties during design such as the angle at which the bulb holders should be placed and the concealment of the bulb in the shade. This is to make sure the project function effectively upon production.

3.3.2 Designs for the pendant lamp

Pendant lamp is a type of lamp that is hanged from to the ceiling of buildings for illumination and aesthetic purposes. A major feature of this type of lamp is that it is either hanged by a metal rod, tube or chains to the ceiling of the building. Design number 7 was selected for the pendant lamp.

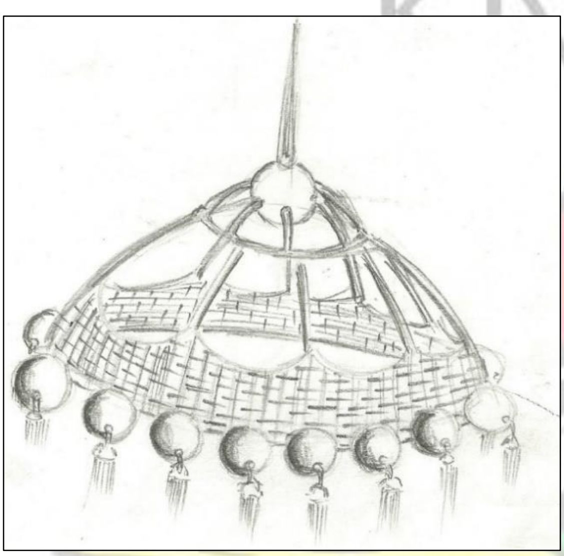

Fig. 3.21: Pendant lamp design 1

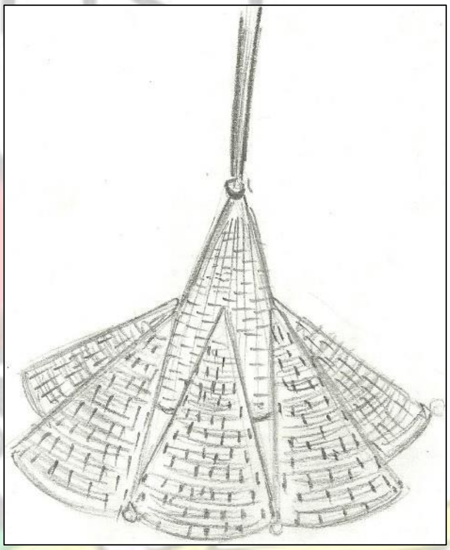

Fig. 3.22: Pendant lamp design 2

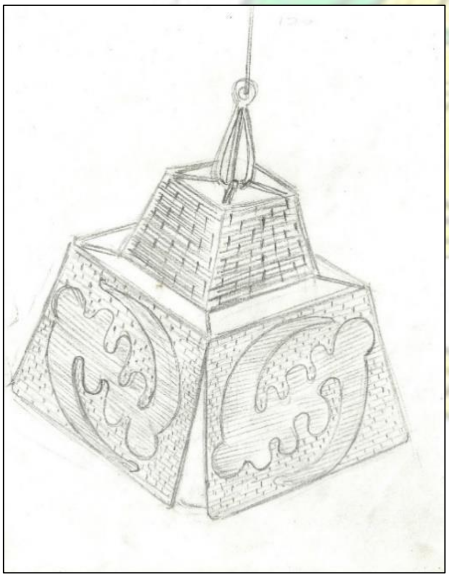

Fig. 3.23: Pendant lamp design 3

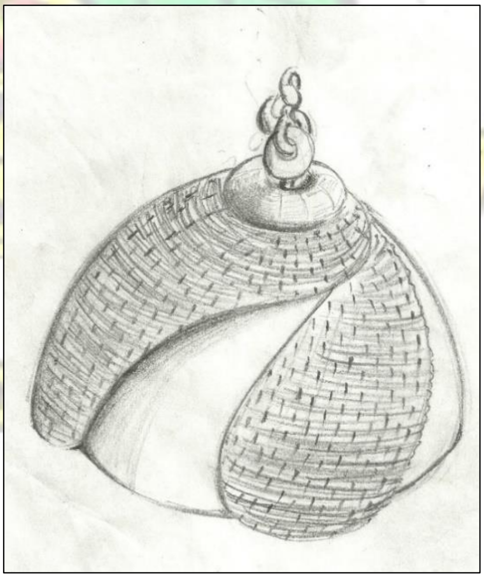

Fig. 3.24: Pendant lamp design 4

Fig. 3.25: Pendant lamp design 5

Fig. 3.26: Pendant lamp design 6

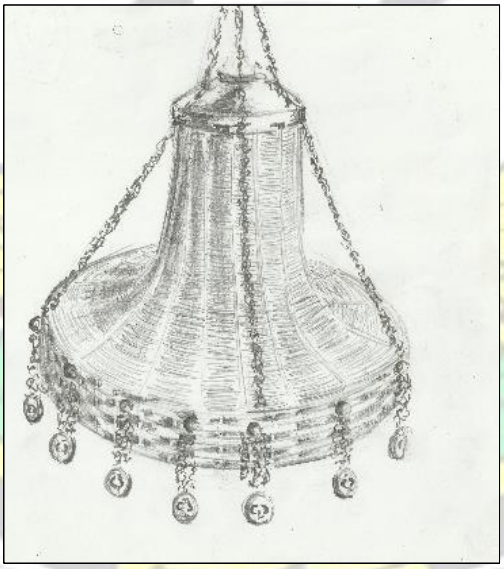

Fig. 3.27: Pendant lamp design 7

3.3.2.1 Pendant Lamp

In order to systematically explain how the pendant lamp was fabricated in the studio, the process has been divided into stages and the lamp has also been sectioned to help the researcher explain the production procedure.

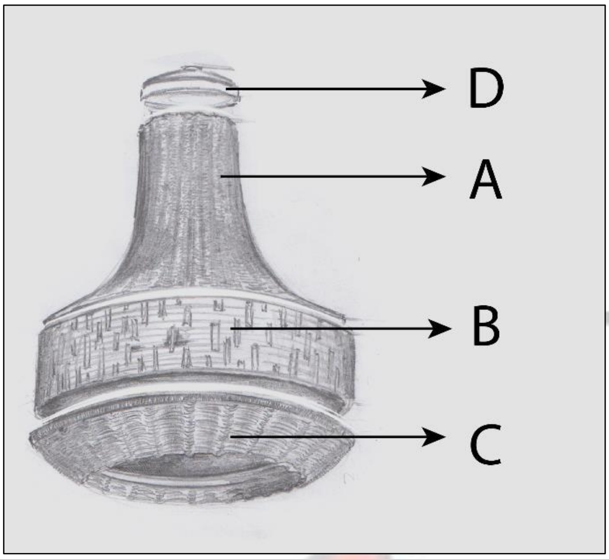

Fig. 3.28: Pendant lamp in sections

3.3.2.2 Stage 1, Section A

The pendant lamp was started by cutting 3mm round copper rods into 25 pieces, in lengths of 200mm. These were formed in a specially created mould as shown in figure 3.29 into a shape that looks like the letter 'U' divided vertically into two. Three copper rings were then formed with one having a diameter of 100mm and the rest two having 270mm each as in Fig. 3.30. The stakes that were formed early on were then soldered around two of the rings as in Fig. 3.31, to complete the skeletal frame of section A. After the forming of section A, the plain weave technique was employed in the weaving of the whole section as shown in Fig. 3.32.

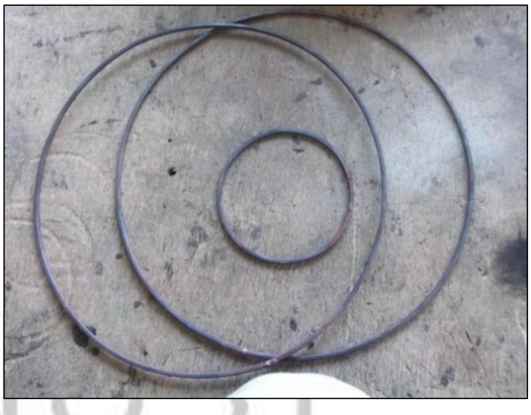

Fig. 3.29: Forming of 'half u'stakes Fig. 3.30: Formed rings with mould

Fig. 3.31: Soldering the stakes around the rings Fig. 3.32: Section A completed

3.3.2.3 Stage 2: The forming and weaving of section B and C

The same thickness of copper rods 3mm was cut into 25pieces each measuring 50mm long and was soldered to the base of section A as seen in Fig. 3.33, corresponding with the stakes that formed section A, which formed the skeletal frame of section B. The last of the three rings formed early on in stage 1 during the fabrication of the section A was soldered at the base of section B as seen in Fig. 3.34. This created the base on which section C was built. During the forming of the skeletal frame of section C, another 25 pieces of copper rods each measuring 50mm in length were formed into a shape as shown in Fig. 3.35 and soldered to the base of section B as shown in Fig.

3.36. A copper ring was then formed with diameter of 200mm and soldered at the end of section C to give it strength as seen in Fig. 3.37. This was to make the stakes well positioned for the weaving process. After forming the skeletal frame of sections B and C, the plain weave was done on section C as shown in Fig. 3.38 to cover the entire section. The weave pattern used for section B was the diamond twill weave which was explained in detail during the making of the 3rd test piece in this project. The only difference between test piece three's diagonal twill weave and that of the one being done here is the length and size of the copper and brass strips that were used as seen in Fig. 3.39. After the completion of the diagonal twill weave pattern, which was done separately, it was then soldered around the entire circumference of section B as shown in Fig. 3.40.

Fig. 3.33: Soldering the stakes that form section B

Fig. 3.34: Framework for section B

Fig. 3.35: Formed stakes for section C

Fig. 3.36 Soldering of the stakes of section C

Fig. 3.37: Completed skeletal frame of section C

Fig. 3.38: Plain weave being done on Sections B and C

Fig. 3.39: Diamond twill weave process for section B

Fig. 3.40: Soldering the diamond twill weave for section B

3.3.2.4 Stage 3: Formation of section D

After the completion of section A, B and C, which constituted the shade of the pendant lamp, copper sheet was domed to form a cap for the top of section A with a locking mechanism to hold it in place. Within the cap is a bulb holder for holding the bulb.

3.3.2.5 Stage 4

At this stage, a chain known as ‘double hearts’ was woven using 19gauge (0.91mm) copper wires as seen in Fig. 3.41 These chains are the mount of the pendant lamp. Their purpose is to hold and suspend the pendant lamp in the air when attached to the ceiling of the room. Also 16 pieces of brass pierced Gye Nyame symbols were domed and soldered in pairs to form 8 symbols as in Fig. 3.42. These with glass beads were then attached to chains measuring 100mm to form charms attached around the middle portion of the pendant lamp as in Fig. 3.43. This was done to give the work a Ghanaian touch.

Fig. 3.41: Weaving of the chain Double Heart

Fig. 3.42: Domed Gye Nyame symbols

Fig. 3.43: Domed symbols attached to chains

Fig. 3.44: Finished pendant lamp with accessories

3.3.3 Wall Lamp – Sconce

The sconce was done in two parts; the body which is the shade of the sconce and the box which is the wall mount.

3.3.3.1 Design for Sconce

Design 3.52 which is a spider, known in Ghanaian folklore and stories as "Kweku Ananse" was selected for the sconce.

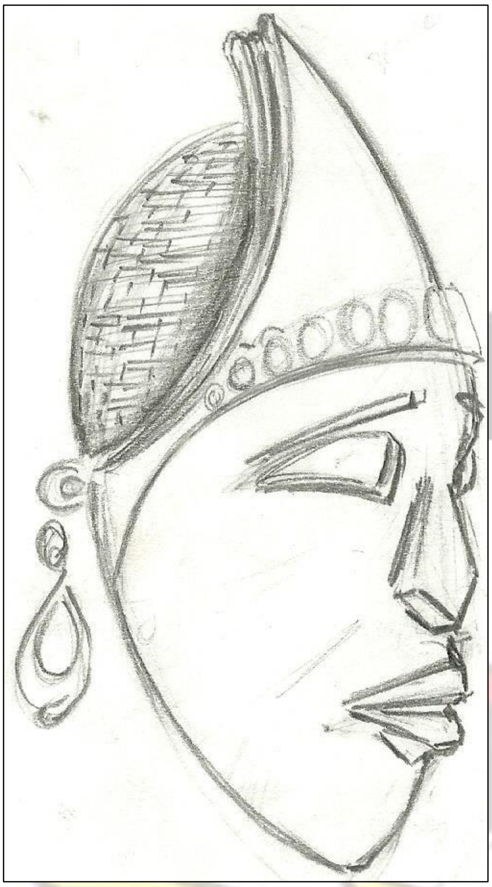

Fig. 3.45: Sconce design 1

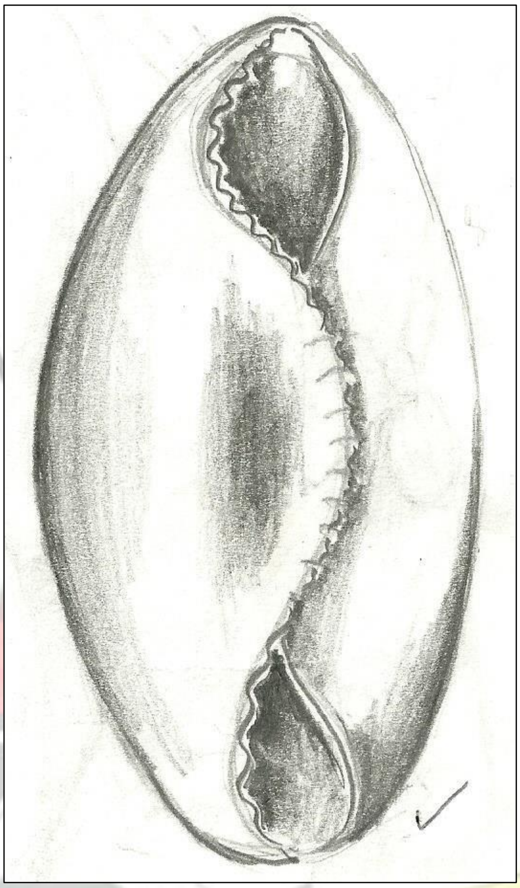

Fig. 3.46: Sconce design 2

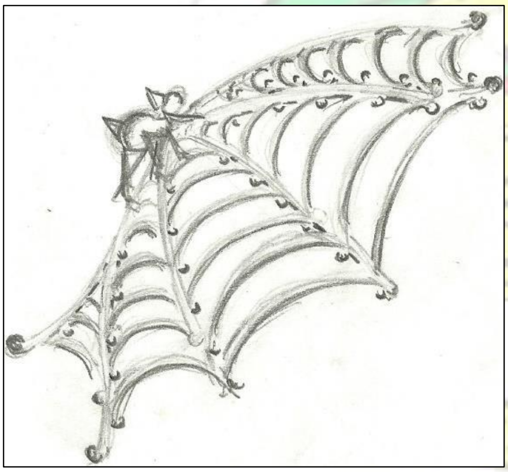

Fig. 3.47: Sconce design 3

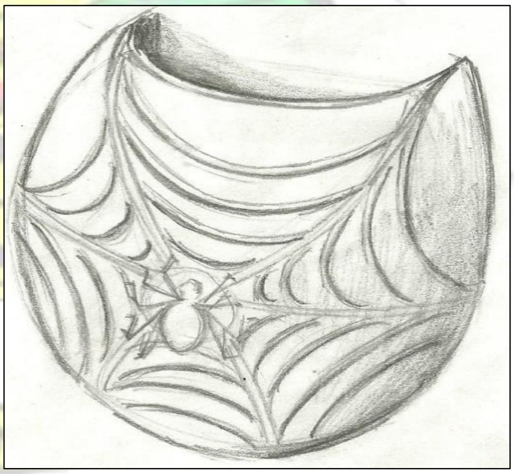

Fig. 3.48: Sconce design 4

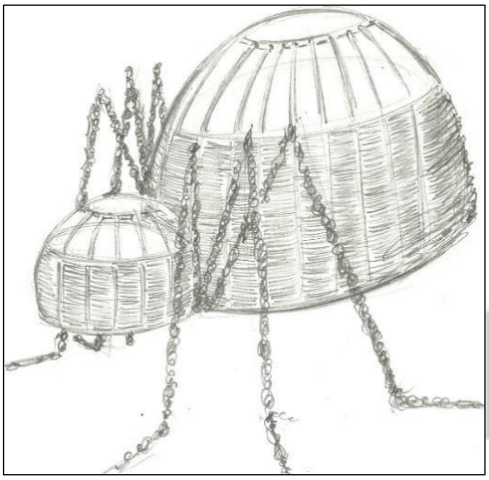

Fig. 3.49: Sconce design 5

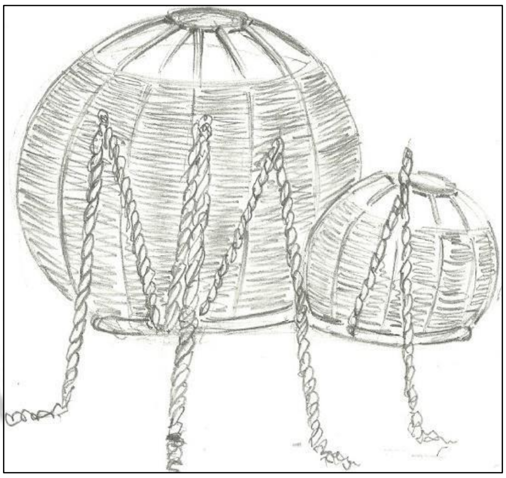

Fig. 3.50: Sconce design 6

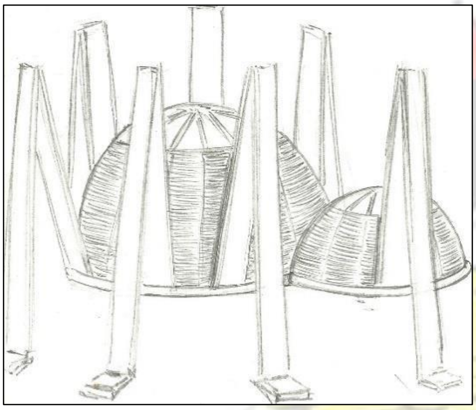

Fig. 3.51: Sconce design 7

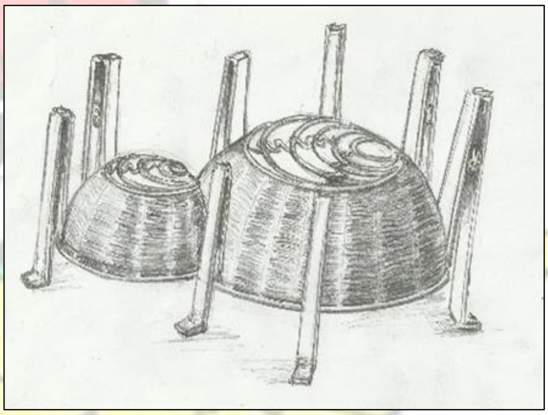

Fig. 3.52: Sconce design 8

3.3.3.2 Main body (Shade)

Two solid half spheres were shaped in wood on a lathe machine and a chunk taken away from each half of the two spheres so they could flush on the cut surface when joined together as shown in fig 3.53. The essence of the wooden half sphere was to create a mould that will aid in the forming of the skeletal frame that will support the weaving of the spider. After obtaining the wooden mould, a square copper rod with thickness of 3mm was formed around the circumference at the base of the wooden mould and soldered as seen in Fig. 3.54. This formed the base of the body of the spider. 25 pieces of copper rod with thickness of 3mm and length of 70mm were bent on the wooden mould and soldered to the already formed base of the body of the spider. These were soldered vertically unto the base to form the warp stakes as in Fig. 3.55. Two rings were then formed with diameters of 110m and 85mm. The bigger ring was joined by soldering it to the top of the stakes that formed the main body whiles the smaller ring was soldered on top of the stakes that formed the head of the spider. After the forming of the skeletal frame 24 gauge (0.51mm) copper wires were used in the creation of the twines as in Fig. 3.56. Twinning is a weaving technique in basketry which is done by either coiling or winding the weft which is relatively flexible and can be easily manipulated to the vertical warp or the stakes at the point of interlacing to form a weave. For the final part of the body, brass rings were formed in a reducing order and arranged in an eccentric form as in Fig. 3.57. These were then soldered on the top of the head and body of the spider with two domed 'Gye Nyame' Adinkra symbols soldered at their middle shown as in Fig. 3.58.

Fig. 3.53: Wooden mould for the forming of the spider

Fig. 3.54: Forming of rings for the base and top of the spider

Fig. 3.55: Soldered warp stakes

Fig. 3.56: Twinning process

Fig. 3.57: Eccentric ring for top of spider

Fig. 3.58: Soldering of “Gye Nyame”

3.3.3.3 Base of Spider (Wall Mount)

The base of the spider was formed by using the inner circumference of the base of the main body which measured 650mm. Four rings were then formed in a reducing order of 30mm smaller than the next that will be joined later within the outer frame of the base. The legs of the spider numbering 8 were formed with a flat copper rod with thickness of 4mm and length of 120mm each as in Fig. 3.59. These copper rods forming the legs were deliberately bent in a way that will let them meet beneath the main frame that forms the base of the spider as in Fig. 3.60. This was done with the intention of giving strength to the base. The 4 rings earlier fabricated were then joined within the outer frame of the base unto the legs forming a relatively strong base for the spider. A bulb holder and a locking mechanism for hanging the sconce on the wall was created and joined to the base. Also a locking mechanism was created to hold in place the body of the spider (shade) and the base (wall mount) together as one unit. Eight Adinkra symbols were then pierced in brass as in Fig. 3.61 and then soldered between the legs of the spider as in Fig. 3.62. This was done to strengthen the long legs of the spider and keep them in position.

Fig. 3.59: Legs of spider in copper

Fig. 3.60: Soldering of legs to the base

Fig. 3.61: Pierced brass Adinkra Symbols

Fig. 3.62: Finished base sconce

Fig. 3.63: Completed spider sconce

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3.3.4. Design for table lamps

Fig. 3.64: Table lamp design 1

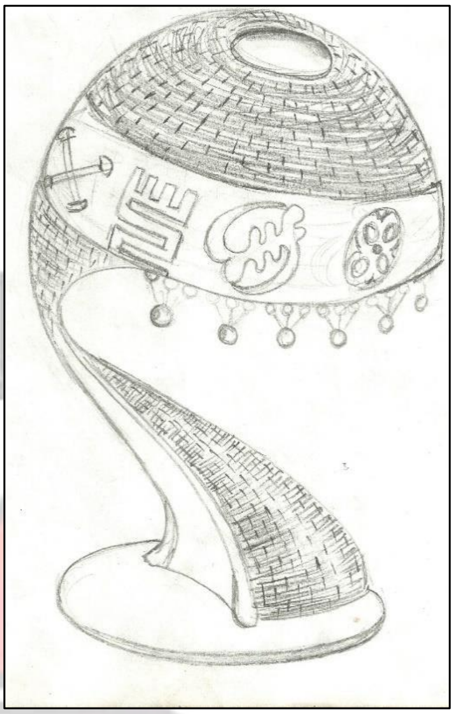

Fig. 3.65: Table lamp design 2

Fig. 3.66: Table lamp design 3

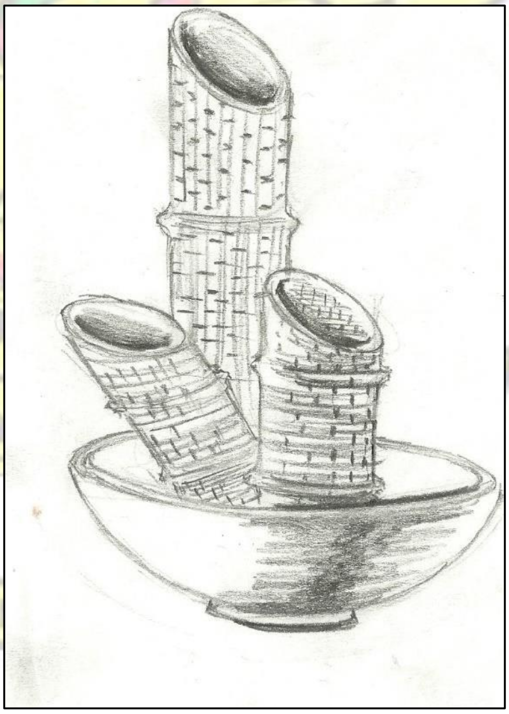

Fig. 3.67: Table lamp design 4

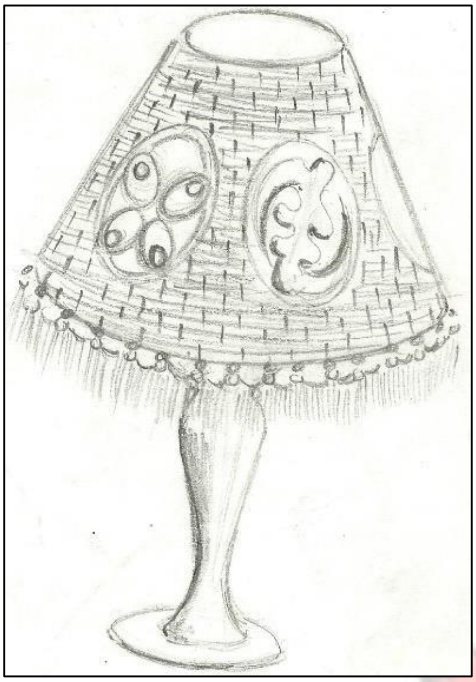

Fig. 3.68: Table lamp design 5

Fig. 3.69: Table lamp design 6

Fig. 3.70: Table lamp design 7

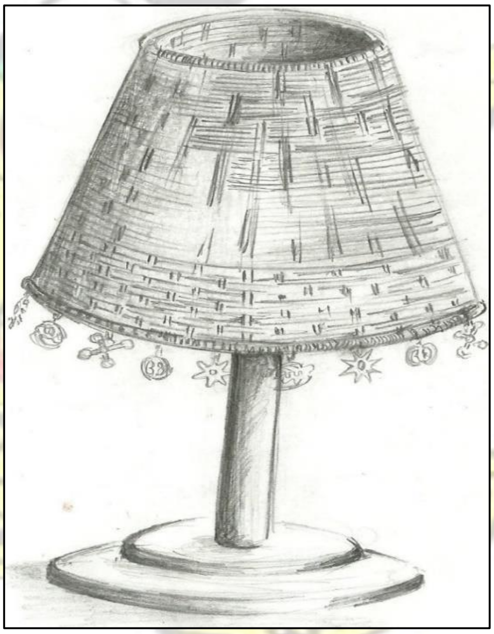

Fig. 3.71: Table lamp design 8

3.3.4.1 Table lamp

The table lamp was started by forming square copper rod with thickness of 3mm into two rings with diameters of 80mm and 270mm respectively as seen in Fig.3.72. These were to be used as rims for the top and bottom of the shade. Thirty-five pieces of copper rods with thickness of 4mm and length of 200mm were soldered around the rims to form the skeletal walls of the shade as in Fig. 3.73. Plain weave was done at the top and bottom of the shade using flattened and twisted wires as weavers as shown in Fig. 3.74 whiles smooth wire was used as weavers in creating a woven pattern known as twinning for the middle as in Fig. 3.75. Twining could be said to be a weaving technique in basketry whereby the weavers (weft) are coiled or twisted around the stakes (warp) at the point of interlacing to form a weave. After the weaving procedures, some selected Adinkra symbols were pierced in brass and soldered as charms at the lower rim of the lamp shade as in Fig. 3.76.

Fig. 3.72: Formed rings for the shade

Fig. 3.73: Soldering of the stakes between the rings

Fig. 3.74: Plain weave procedure

Fig. 3.75: Twinning procedure

Fig. 3.76: Charms attached to the edge of the shade

3.3.4.2 The stand

A round galvanised steel pipe with diameter of 40mm was cut and welded to a hollow fabricated metal base with diameter of 200m and thickness of 42mm as in Fig. 3.77. The length of the stand measured 340mm. A bulb holder was then fabricated in copper with a locking mechanism in place to fit tightly on top of the lamp stand as in Fig. 3.78. A frame was created with 3.1750mm steel rods in the form of the woven copper shade in order to support and hold the shade in position on the stand as in Fig. 3.79.

Fig. 3.77: Welding of the stand

Fig. 3.78: Fabricated copper bulb holder

Fig. 3.79: Brazing the shade support

Fig. 3. 80: Completed table lamp

3.4 Finishing

There are many metal finishing techniques. The choice of a particular technique depends on the metal being worked and the metalsmith's preference. These techniques include abrasive sand blasting, engraving, file matting, tumbling, burnishing, bathing and colouring which include oxidizing, gilding, electroplating and so on. This research adopted the oxidizing technique (colouring) which gives an antique look and is also cost effective as compared to other colouring techniques.

3.4.1 Oxidation (Patination)

According to Untracht (1985) this is a term commonly used to describe what happens when a metal reacts to a chemical dip, with which sulphur is the activating chemical. This term is actually a misnomer as it is not an oxide that forms, as in heat created colouring, but a metallic sulphide compound surface film that is a combination of the chemicals in the solution and the base metal. Oxidation could also be said to be inducing tarnishing by choice in a controlled manner on a metal surface to give it a colour different from the normal basic state of the metal.

3.4.1.1 Preparation of the oxidation solution and dipping process

The solution was prepared by mixing the following:

Caustic soda	-	1 part by volume
Sulphur	-	2 parts by volume
Water	-	10 part by volume
Sulphuric acid	-	¼ part by volume

These were then placed on fire as in Fig. 3.81 to dissolve the caustic soda and sulphur in the acid water to form an oxidation solution. Before applying the solution to the work, the work must be pickled and scratch brushed to get rid of all dirt on the surface as in Fig. 3.82 since dirt will not allow the solution to make contact with the surface of the metal. After dipping each of the light fittings in the solution for about 30seconds as in Fig. 3.83, they were taken out and placed in a basin of water and gently scratch brushed to get rid of excess oxides as shown in Fig. 3.84. After scratch brushing the items were placed in the sun to dry as shown in Fig. 3.85.

Fig. 3.81: Oxidizing solution

Fig. 3.82: Cleaning the work before oxidation

Fig. 3.83: Oxidation process

Fig. 3.84: Brushing off excess oxide

Fig. 3.85: Drying after oxidizing

3.4.1.2 Relieving

According to Untracht (1985), relieving is a post colouring treatment which is the process of using abrasives, steel wool, scratch brush or even the fingers can be used to vary the thickness and the tone of the uniform colour film created on the metal surface by the oxidizing solution. This process was carried out on the light fittings using steel wool and leather as in Fig. 3.86 to create highlight on the higher areas of the light fittings while leaving the dark colour film in the recessed area to create the effect of depth and height on the surface of the light fitting. After the relieving process, the light fittings were lacquered as in Fig. 3.87 to prevent the highlighted areas from tarnishing and also to permanently fix the oxides on the surface of the light fittings.

Fig. 3.86: Relieving process

Fig. 3.87: Lacquering process

3.4.2 Finishing of stand for the table lamp

After the fabrication procedures the stand for the table lamp was finished by grinding and filing to get rid of all the irregularities on the surface of the lamp stand which occurred during the welding process. Filler was then applied to fill all dents and welded seams on the surface of the lamp stand as in Fig. 3.88. The filler was allowed to set and dry and was sanded using various grades of emery paper to remove excess filler and also to smoothen the surface of the lamp stand as in Fig. 3.89. After the emery process, the lamp stand was primed before the final spraying with matte black paint as shown in Fig. 3.90.

Fig. 3.88: Application of filler

Fig. 3.89: Sanding procedure

Fig. 3.90: Spraying with matte black paint

CHAPTER FOUR DISCUSSION OF RESULTS / APPRECIATION

The previous chapters gave an account on the preparation of the materials for the execution of the project, the exploration of the wire weaving technique and subsequently, the production of the light fittings. This chapter deals with the findings and appreciation.

4.1 Findings

The objectives of this research were to explore and apply, the wire weaving techniques to the production of light fittings that feature Ghanaian concepts and motifs. Another was to bring to light the limitless possibilities wire weaving could offer fellow jewellers and metalsmiths if used as one of their fabrication techniques. The studio exploration of wire weaving and subsequently, the production of the light fittings revealed the following:

- Wire weaving as a technique is not as cumbersome and time consuming as some fellow craftsmen claimed it to be the reason why they did not use it often as a fabrication technique. The application was less stressful by using the appropriate gauge of wire in relation to the size and design being worked on as it was easier to manipulate the right gauge of wire to create weaves.
- When basic workshop practices such as frequent annealing during the weaving processes was adhered to, the weaving process became easier and less tiresome.
- It was also observed that finishing processes such as sanding, grinding, filing and buffing were not required for wire woven objects because the interlacement of the warp and weft created either fine or rough textures which were evenly distributed on the surface of the object produced making it aesthetically appealing.
- During the functionality test of the light fittings, it was observed that high wattage bulbs irrespective of their colour could not give visual textures or

impressions on the floor or walls of an enclosed environment but the lower bulbs of low intensity such as the LED bulbs gave visual textures or impressions on the walls and floors of an enclosed environment.

- It was also observed that the size of the wire gauge or strips used in creating a weave pattern also determine whether or not you will get visual textures. The broader or bigger gauges of wire and strips gave more pronounced results whiles smaller gauge of wire gave either little or no textures. Compactness of weave also played a major role in obtaining visual textures.

4.2 Appreciation

4.2.1 Pendant Lamp – Martaba

The pendant lamp is titled “Martaba” meaning prominence in Hausa, a language spoken by an ethnic group in West Africa. The prominence of the pendant lamp is reflected by its form: this is apparent when the hanged lamp shows off its grace and glamour and conveys to the onlooker its magnificence.

Martaba measures 650mm in high and 270mm wide. It is a decorative piece of artwork meant to beautify and to give illumination to an indoor environment. The shade has a round broad base with an opening for illumination. The walls that form the base of the pendant lamp are formed with plain weave, with flattened and twisted copper wires. The middle section of the lamp has copper and brass strips interwoven to form a diamond weave pattern. On the surface of the diamond weave are eight evenly spaced charm holders, each holding a charm hanged on its lower end. Each charm consists of a brass ring that holds three short double heart chains pointing downwards. Attached to the ends of the three double heart chains are a domed “Gye Nyame” symbols in brass with two rectangular glass beads. The rectangular glass beads are coloured red, shade blue, light green and light purple. From the middle section of the shade and extending upwards is a long circular neck which is also covered in plain weave like the base section. The neck reduces gradually as it graduates upwards to a diameter of 100mm. On the top of the pendant lamp is a domed cap made of brass and copper and attached to the sides of the domed cup are four brass rings. Each of the rings has a double heart chain passing through it and is linked to the charm holders at the middle section of the pendant lamp. At the centre of the domed cap is an opening through which connects the lamp holder to a power source. The pendant lamp has a dark brown colour with a few yellow spots. The lamp is systematically balanced from all angles. The upper part of the lamp gives has a rough surface texture. While the middle part presents a rather smooth linear texture.

The cap has smooth glossy surface.

Fig. 4. 1: Pendant lamp (Martaba)

4.2.2 Sconce – Ananse Kronkron

"Anase Kronkron" is a wall sconce measuring 280mm wide and 60mm high. The main material used is copper and brass. The work is in two main parts: the shade which is the body and the legs with the base which forms the wall mount.

The shade consist of two sections: thus the body and the head. Comparatively the head is smaller than the body. The mouth of the spider was created with two twisted strips of copper which are joined to two rods forming the base of the shade. The structure of the head is a hemispherical form with three-quarters of it twinned from the base upwards and the upper part with concentric rings soldered together with a domed brass "Gye Nyame" on top. Attached to the domed "Gye Nyame" and the eccentric rings is an undulating brass wire. The eyes of the spider are made of brass and they are in a slightly domed form.

The structure of the body of the spider is in the same form as the head, except that the head has one undulating wire attached to the domed "Gye Nyame" symbol while the body has three.

The wall mount of the sconce has eight legs. The fore legs are longer than the rest of the legs. The legs are made of rectangular copper rods with brass Adinkra symbols soldered between each leg. The order in which the Adinkra symbols are arranged from the fore legs to the hind legs are as follows: "Nyame biribi wosoro", "Nsoromma", "Mmusuyidie", and "Gye Nyame". The opposite legs have the same arrangement of the Adinkra symbols. Behind the shade is the base which is connected to the legs. The scone when viewed from the front can be seen to be symmetrically balanced. It shows repetition of weaves, legs, eccentric rings and Adinkra symbols. The yellowish brass symbols are in contrast with the dominant brownish copper colour of the spider's body.

The word ‘Ananse’ is an Akan name given to the spider and ‘Kronkron’ also an Akan word means holy. Therefore, the name ‘Ananse Kronkron’ means ‘Holy Spider’. Though Ananse is seen in folklore as having a questionable character and the thought of ‘Ananse’ or a spider in real life brings to mind a negative perception because of the web it creates on the walls of buildings making the walls look scruffy.

The artist wanted to project the good virtue Ananse displayed in his tales which is his ability to use his wisdom to surmount his foes who were bigger and stronger than himself making him survive in a hostile world. Also the spider sconce is rather going to beautify or give illumination to the wall of a building instead of cob webs hence the name Ananse Kronkron. Ananse Kronkron signifies a positive mind set in the midst of hardship which is a virtue we need as Ghanaians and for that matter Africans.

Fig. 4. 2: Wall sconce (Ananse Kronkron)

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4.2.3 Table lamp–Xorse

'Xorse' which means faith in "ewe" is the name of the table lamp. The lamp measures 530mm × 270mm. It was made in two parts: the shade which envelopes the bulb and the stand which has the bulb holder fixed at the top of its central portion. The lamp stand was fabricated from round galvanised steel pipe of 40mm in diameter and steel plate of 2mm thickness. The shade was fabricated from copper rods for the armature and the weaving around the armature was with flat twisted wires for the top and bottom portions and smooth wire for the middle portion. This selection was deliberately done to create variation in texture. The weaving techniques employed for the creation of the shade are the plain and the twining weave techniques as used in basketry. The lower edge of the shade has 33 dangling charms. The charms are made up of Adinkra symbols and glass beads. Out of the 33 charms, 16 of them are brass Adinkra symbols namely, “Nyame dua”, “Nsoromma”, “Nyame biribi wosoro” and “Nyame nnwu na mawu”. The rest are rectangular glass beads of the following colours: red, shade blue and light green. The charms were incorporated so that the table lamp can be identified as one of a Ghanaian origin. The cylindrical stand of the table lamp is spray-painted in matte black while the shade is oxidized and lacquered. The table lamp has a circular form when viewed from all angles, and can be said to be symmetrically balance. The circular nature of the lamp can also be said to connote the presence of God. In addition, the Adinkra symbols that have been used as embellishment to support the idea of faith that the artist has in God. For example, “Nyame Biribiwosoro” (there is something in the heavens) optimises the faith of the creator of the art piece.

Fig. 4. 3: Table lamp (Xorse)

CHAPTER FIVE SUMMARY OF FINDING, CONCLUSION AND RECOMMENDATIONS

The previous chapter dealt with the discussion and interpretation of results of the project work. This current chapter deals with the summary, conclusion and recommendation of the project.

5.1 Summary

Over the years, complex industrial techniques ranging from processes such as metal stamping, embossing, casting, spinning and extrusion, to simple but intricate studio based techniques such as chasing, repousse and some form of wire working in the form of filigree have been the norm for jewellers and metalsmiths with regards to their fabrication techniques. Though these techniques are being used extensively by some metalsmiths, a technique such as wire weaving, has not been given much attention because of the claim by some that it is difficult and time demanding. So the purpose of the study was to explore the wire weaving technique in a studio setting for the production of light fittings and to bring out the limitless possibilities it has to offer metal artists who may want to engage themselves with this fabrication technique in the production of their works.

5.2 Main findings

- Wire weaving as a technique can be used to produce metal artefacts with less difficulty within a considerable length of time.
- To create desirable weaves with wire, it is important to relate the sizes of the wires to the design.

- To make weaving less tiresome and stress-free, the metal artist should adhere to good workshop practices.
- When finishing artefacts that have been made by wire weaving, processes such as sanding, grinding, filing and buffing may be skipped because the weaves tend to give the artefact's surface an aesthetically pleasing textures.
- Light fittings produced by wire weaving do not give visual textures when affixed with high wattage bulbs. Low wattage bulbs, tend to give visual textures.
- Light fittings made of broader or bigger gauges of wires produce outstanding visual textures.

5.3 Conclusion

The result of the study from the exploration stage to the production of light fittings using the wire weaving technique has revealed that wire weaving is not time demanding and difficult as it is claimed to be by some metal artists. If the mechanical properties such as the malleability, wire gauge in relation to the type of weave, are taken into consideration, the fabrication process itself becomes relatively easy and smooth. The wire weaving technique also results in intricate surface textures on the woven objects. These textures are either small or big depending on the type of weave and wire gauge. It was observed during the fabrication of the light fittings that the textures created determine the surface condition of the woven object and as such it is virtually impossible to achieve a mirror finis with respect to weaving. The presence of the textured surfaces makes finishing of woven objects much easier as there is either little or no need for filing, sanding or even buffing. Finally, the researcher will like to state that the light fittings produced using the wire weaving technique are for utilitarian and decorative purposes and should be seen as such.

5.4 Recommendation

Based on the findings of the study, the researcher recommends the following:

- Wire weaving technique should be considered and used by jewellers and metalsmiths because it can be used to produce aesthetically appealing metal artefacts with less difficulty within a considerable length of time.
- Good workshop practices such as frequent annealing of wire and metal strips should be adhered to, so that the manipulation of the weaves becomes less tiresome during weaving process.
- Metal artists who want to venture into production of metal articles using wire weaving should not finish their works using processes like sanding, grinding, filing and buffing. These processes take their toll on the weave finish by levelling off the weave surface thereby deforming the weave patterns.
- The users of wire woven light fittings who desire interesting cast shadows in their rooms or surroundings should install low wattage bulbs.
- It is also recommended that to achieve outstanding visual textures, bigger gauge of wires and broader metal strips should be used in the creation of the shade for the light fittings.
- Also the results of this study forms the basis for students and metals smiths alike to further explore the wire weaving technique.

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