

DESIGN AND FABRICATION OF FILIGREE BUST

OF

OSAGYEFO DR. KWAME NKRUMAH

BY

KNUST

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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

Filigree making involves curling, twisting, plaiting fine pliable thread of precious metals and arranging them in a particular design and fixing them by soldering. Items that are normally made in filigree appear delicate and their designs intricate. The complex weaves and twists of the fragile metal work of filigree introduce space in what would otherwise be opaque object. This aspect of filigree limits the kind of items that one can produce using the technique. To overcome this limitation and expand the spectrum of artefacts that this technique can be used for, the researcher designed and fabricated bust of Osagyefo Dr. Kwame Nkrumah, the first president of Republic of Ghana using this ancient jewellery technique. The researcher investigated the filigree technique to determine whether or not the confinement of filigree technique to jewellery-scaled designs is arbitrary and therefore could be breached. The results of this study indicate that by selecting the appropriate material and workshop practices, it is possible to produce any jewellery or artefacts using the filigree technique irrespective of the design and size of the object. On the question of whether it is possible to design and fabricate a photorealistic object using the filigree technique, the results of the research indicate that it is possible. The filigree bust (plate 45) of Osagyefo Dr. Kwame Nkrumah Ghana's first president, using filigree technique is the evidence.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Filigree technique had been used by jewellers to produce jewellery and jewellery-scaled items for very long time. Works that are produced with this technique have enhanced and unique aesthetic and functional values as compared to other metal forming techniques. Apart from the jewellery made for daily or occasional use, most of the ornaments and regalia of Chiefs and Kings are made in filigree, entirely or in part.

The prime motivation for this research stems from the fact that it appears contemporary jewellers have less interest in producing filigree artefacts due to the cumbersome, time consuming and very delicate nature of the technique.

The quest to enrich and expand the kind of artefacts that are produced using this ancient jewellery making technique, informed the basis for the design and fabrication of a filigree bust of Osagyefo Dr. Kwame Nkrumah.

1.2 Statement of the Problem

Filigree is an ancient jewellery technique that involves the use of plain and twisted wire with or without sheet metal as support base to produce very delicate hand crafted jewellery and small artefacts. Works that are produced with this technique are unique and authentic, since they cannot easily be duplicated or mass produced by industrial casting methods or any other mass production methods.

Briceño (2010) opined that, the fine art of filigree is just that: – fine. The delicately entwined wires have patterns and an intricacy more familiar in the natural world of vines and twines than the man-made world of precious jewellery. The complex weaves and twists of its fragile metal work introduce space in what would otherwise be ‘opaque’. (The fine art of jewellery, [http://news.anu.edu.au/2012](http://news.anu.edu.au/2012/20/14/the-fine-art-of-filigree)

/20/14/the-fine-art-of-filigree) (Accessed, 05/05/2011)

The complicated nature of this technique limits jewellers and metalsmiths in the kind of design and size of works that they normally produce in filigree which is mainly jewellery and jewellery-scaled items. To overcome these limitations and expand the spectrum of artefacts that this technique can be used for, the researcher designed and fabricated bust of Osagyefo Dr. Kwame Nkrumah, the first president of Republic of Ghana, using this ancient jewellery technique of filigree which is mainly used for making jewellery-scaled items.

1.2 Objectives

The objectives of this research were:

1. To determine whether the confinement of this technique (filigree) to jewellery-scaled design and sizes is unfounded and could be breached so that jewellers or

metalsmiths will be able to produce any jewellery or artefact using this technique irrespective of the design or the size.

2. To design and fabricate a bust of Osagyefo Dr. Kwame Nkrumah, Ghana's first president, using filigree technique.

1.3 Significance of the Study

The researcher intended to enrich and expand the kind of artefacts that are produced using this ancient jewellery making technique, by developing production-based module for use as production guide for jewellers and metalsmiths. The module will help to develop the skills of those who want to venture into this new area of metalsmithing. Moreover, this study will address itself to educators, specifically jewellers and sculptors, that, they may gain valuable insight on the use of filigree technique to produce other artefacts other than jewellery and jeweller-scaled items.

Successful execution of the study has created an avenue for employments for jewellers, now that the price of precious metals and gemstones are moving higher and higher, which has caused a lot of jewellery shops to fold up because many people are not able to afford the precious jewellery.

1.4 Research Methodology

The researcher accomplished the objectives of the research through Historical Research Design (Leedy & Ormrod, 2009) and Studio-Based Research (Marshall 2010). The researcher reviewed and analysed articles, research papers, journals, newspapers, conference presentations, interviews, and relevant websites on filigree. The researcher also reviewed information on Osagyefo Dr. Kwame Nkrumah, Sculpture, Computer-Aided-Manufacturing (CAM), Computer- Aided-

Design (CAD), and other jewellery and metalsmithing production techniques. Two experimental filigree artefacts were made.

1.5 Facilities available for the Research

Main research tools for the research are:

1. Libraries and its resources (KNUST main library, College of Art and Social Sciences, Ghana Library Board, Kumasi and Accra)
2. The computer and its software, such as Microsoft Word, Excel, Corel Draw Rhinos, Matrix, Photoshop, PowerPoint, internet etc.
3. Studios of Metal, Sculpture and Ceramics Sections, CASS-KNUST.

1.6 Delimitation

This study was limited to the use of jewellery making technique of filigree to produce Kwame Nkrumah's bust. The main materials used were copper, silver solder and wood.

1.7 Limitation

Some of the difficulties encountered by the researcher which in a way hindered the smooth execution of the research are:

1. The researcher's lack of skills about sculpting photorealistic artefacts, which posed great challenge. This made him seek assistance from a colleague M.F.A. Sculpture Student to sculpt Kwame Nkrumah's bust in cement. Even though he was able to help, the time spent on the cement bust caused a lot of inconveniences to both of us thereby delaying the progress of the research.

2. Funding: the materials and consumables (such as: LPG, emery paper, acid, silver, etc.) used were quite expensive, this prevented the researcher from doing more experimental works before the actual work.

3. Lack of some jewellery and metalsmithing tools and equipment at studios of the Metal Section, made the research a bit difficult and expensive. For instance, had the Section made available electric milling machine, motorised drawing system, good electric or gas furnace, the researcher could have produced his own copper wires for the work, thereby reducing the cost of purchasing it from the open market. Also, had the Section had a laser welding facility, joining the filigree wires would have been easier as compared to soldering.



CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

Review of related literature was conducted under these thematic areas.

- The man Osagyefo Dr. Kwame Nkrumah
- Statues
- Busts
- Filigree technique in jewellery making
- Other jewellery and metalsmithing techniques that were relevant to the research.

There are so many ways in which historical events, occasions and prominent personalities are remembered. This remembrance may be in the form of photographs, videos, paintings, statues, (including busts) or the naming of important national monuments after them.

2.2. Osagyefo Dr. Kwame Nkrumah

Anytime one got the opportunity to talk about His Excellency Osagyefo Dr. Kwame Nkrumah, architect of Ghana's independence and the moving spirit behind Pan Africanist thought and activism, one got inspired and fired up by the vision of an unfinished agenda initiated by a patriot for all time. This sentiment was expressed in a statement made by His Excellency John Dramani Mahama (The Vice-President of the Republic of Ghana) on sponsorship speech night for Kwame Nkrumah centenary celebration on Monday, August 24, 2009 at the State House, Accra. On

his part the chairman of the planning committee Professor Akilakpa Sawyer had this to say: “Today we honour the man who has been the moving spirit behind our nation and whose vision for Africa and the black race has never been in doubt”. (<http://kwamenkrumahcentenary/vicepresident-speech.html>) (Accessed, 10/06/2011)

To re-echo the popular adage: “A nation that does not honour its heroes is not worth dying for” and to demonstrate appreciation for Osagyefo’s efforts, many monuments (both national and international) have been named after Osagyefo Kwame Nkrumah (Plate 7), Ghana’s first president.

These include:

- Nkrumah Hall at the University of Dar es Salaam in Dar es Salaam, Tanzania (plate 1).
- Kwame Nkrumah University of Science and Technology, Kumasi (plate 2)
- Kwame Nkrumah FPSO, of the Jubilee Partners (Group of Companies Producing oil in Commercial Quantities in Ghana) (Plate 3)
- Kwame Nkrumah Mausoleum and Memorial Park, Accra (Plate 4).
- Kwame Nkrumah Circle, Accra (Plate 5).
- Kwame Nkrumah Complex, Institute of African Studies, University of Ghana Legon-Accra (Plate 6).
- Kwame Nkrumah Hall, University of Cape Coast, Cape Coast.



Plate1: Nkrumah Hall at the University of Dar es Salaam in Dar es Salaam, Tanzania (http://www.blackhistoryheroes.blogspot.com/2010/09/kwame_nkrumah.htm) (Accessed 07/10/2011)



Plate 2: Kwame Nkrumah University of Science and Technology, Kumasi



Plate 3: Kwame Nkrumah FPSO, of the Jubilee Partners



Plate 4: Kwame Nkrumah Mausoleum -Accra



Plate 5: Kwame Nkrumah Circle, Accra



Plate 6: Kwame Nkrumah Complex, Institute of African Studies, University of Ghana
Legon-Accra



Plate 7: Osagyefo Dr. Kwame Nkrumah

Available information indicates that Kwame Francis Nwia Kofie Nkrumah who later became known as **Kwame Nkrumah** (Plate 7) was born at Nkroful in the Western Region, on 21st September 1909 to Nwia Kofi Ngonloma (father) and Madam Nyaniba (mother). He died on the 27th April 1972. Nkrumah is reported to have had his elementary education at Roman Catholic School in Half-Assini, and continued to Achimota School, Accra where he had his secondary school education in 1930. He started a career in teaching and taught at the Roman Catholic Junior School in Elmina and Axim from 1930 to 1935.

In 1935 he left the then Gold Coast for the United States of America to pursue a Bachelor of Arts degree at the Lincoln University, Pennsylvania. He graduated in 1939. The same year Nkrumah pledged to the Mu Chapter of Phi Beta Sigma Fraternity Inc, and received Bachelor of Sacred Theology (STB) in 1942. Kwame Nkrumah earned a Master of Science in Education degree from the University of Pennsylvania in 1942 and Master of Arts in Philosophy degree the following year. He taught Political Science at the Lincoln University.

As an undergraduate at Lincoln he participated in at least one student theatre production and published an essay on European Government in Africa in the student newspaper, “The Lincolnian”. Nkrumah was awarded honorary doctorate degrees from Lincoln University, Moscow State University and Cairo University.

Nkrumah increasingly was drawn into politics, and as a result, further studied socialist literature, notably Karl Marx, Vladimir I. Lenin and writings of Marcus Garvey, the Black American leader of the 1920's. Eventually Nkrumah came to describe himself as a non-denominational Christian and a Marxist socialist. He also immersed himself in political work, reorganising and becoming president of the African Students Organisation of the United States and Canada. He left the United States in May 1945 for England where he organised the 5th Pan-African Congress in Manchester. (Kwame Nkrumah Biography, <http://www.biography.com/people/kwame-nkrumah-942127>) (Accessed 19/02/2011)

2.2.1 Politics

Nkrumah generally took on a non-aligned Marxist perspective on economics. He was of the opinion that capitalism had maligning effects and that it was going to impact negatively on the development of Africa for a long time. Although he was clear on distancing himself from the African socialism of many of his contemporaries, Nkrumah argued that socialism was the system that would best accommodate the changes that capitalism had brought, while still respecting African values. He specifically addressed these issues and his policies in a 1967 essay entitled ‘African Socialism Revisited’.

Nkrumah attempted to rapidly industrialise Ghana's economy. He believed that if Ghana escaped the colonial trade system by reducing dependence on foreign capital, technologies and material goods, she could truly be independent. However, over spending on capital projects caused the country to be driven deeply into debt estimated at, as much as \$1 billion dollars by the time he was ousted in 1966. (http://en.m.wikipedia.org/wiki/Kwame_Nkrumah) (Accessed 10/01/2011).

2.2.2 Decline and Fall

Nkrumah introduced the Trade Union Act which made strikes illegal. When he suspected that his opponents in parliament were plotting against him, he wrote the Preventive Detention Act (PDA) that made it possible for his administration to arrest and detain anyone charged with treason without due process of law in the judicial system. Prisoners were often held without trial and their only method of recourse was personal appeal to Nkrumah himself. When railway workers and teachers went on strike in 1961, Nkrumah is said to have ordered their arrest including that of some opposition politicians under the Trade Union Act of 1958. While Nkrumah had organised strikes a few years earlier, he became opposed to industrial democracy because to him it conflicted with rapid industrial development.

This to others was seen as double standard on the side of Nkrumah. He told the Trade Union that their days as advocates for the safety and just compensation of miners were over and that their new job was to work with management to mobilise human resources. Wages were to give way to patriotic duty because the good of the nation superseded the good of individual workers, Nkrumah's administration contended. (Kwame Nkrumah, [http://en.wikipedia.org/wiki/Kwame_Nkrumah#](http://en.wikipedia.org/wiki/Kwame_Nkrumah#Decline_and_fall)

[Decline_and_fall](http://en.wikipedia.org/wiki/Kwame_Nkrumah#Decline_and_fall)) (Accessed 07/10/2011)

2.2.3 Nkrumah's Legacy

Nkrumah is said to have taken the position that it was only through industrialisation and not agriculture that Ghana and the rest of independent Africa could catch up with the developed nations of the world. Rural development was said to have been neglected in this effort while he concentrated industrialisation in the urban areas.

2.2.3.1 International

Nkrumah is credited with the following deeds:

1. He began the move to dismantle colonial rule in Africa.
2. He advocated Pan-Africanism to fight neo-colonialism on the continent.
3. He was the architect of the formation of the Organisation of Africa Unity (OAU) which metamorphosed into the Africa Union (AU).

Nkrumah as a result of his achievements became a symbol of hope and emancipation for black people and all oppressed people everywhere in the world.

(Founders day is CPP Day of Action, <http://elections.peacefmonline.com/politicts/201209/135966.php?story=100&>) (Accessed, 07/10/2011)

2.2.3.2 Economics

Economic achievements of Nkrumah's era include the following:

1. Nkrumah's government built factories and industries in Ghana, the Tema City and Harbour, as well as new roads and expanded the Civil Service.
2. The government constructed the Akosombo Dam ostensibly to provide electricity for both Ghana and the neighbouring states.

3. Nkrumah broke the monopoly of the multinational corporations in the Ghanaian economy through nationalisation policies. He created more jobs in the economy and increased wages.
4. He set up Ghana's premier shipping line, The Black Star Line.

2.2.3.3 Social infrastructure under Nkrumah

Among the achievement on the social front, Nkrumah built new hospitals and provided pipe borne water to various towns and villages, encouraged and financed sports to introduce Ghana to the world and assisted Africans to take charge of their own affairs and reclaim their dignity in the World, although some social inequalities persisted in Ghana.

2.2.3.4 Education under Nkrumah

Osagyefo maintained the colonial educational structures geared toward European degrees and values. He introduced free basic education for all children in Ghana by abolishing school fees at this level. He expanded education by building more schools to increase enrolment. It is believed that by the time Nkrumah was moved out of office, his government had established nine thousand nine hundred and ninety eight (9,988) primary and secondary schools, (such as Ghana National College, Dormaa, Tema, Labone, Winneba, Apam and Oda Secondary Schools among others), forty-seven (47) Teacher Training Colleges including those at Fosu, Enchi, Berekum and Specialist Training College, Winneba. Eleven technical schools were also provided by his government. Nkrumah also built two (2) universities: Cape-Coast University (UCC), and the Kwame Nkrumah University of Science and

Technology (KNUST) Kumasi and improved the facilities of University of Ghana (UG) at Legon in Accra. (Daily Graphic (2009) Nkrumah's Educational Legacy

(<http://www.modernghana.com/news/239452/1/nkrumah039s-educational-legacy.html>)

(Accessed 10/01/2011)

2.3 Transforming a two-dimensional (2D) image into three-dimensional (3D)

Image

There are two ways in which a two dimensional image can be transformed into three dimensional image. These are: traditional sculpture and digital sculpture.

2.3.1 Traditional Sculpture

Sculpture is a work of art which is created by shaping or combining hard and soft materials such as stone, metals, glass, wood, clay, textiles, plastics, polymers, etc. Materials may be worked by removal, (carving), construction and assemblage (fabrication), firing (hardened) moulding or casting. Surface decoration such as paint may be applied to enhance the aesthetic of the sculpture piece. Sculpture has been described as one of the plastic arts because it can involve the use of materials that can be moulded or modulated.

Sculpture is thought to be one of the truest forms of art, perhaps because it is tangible and may be in relief (Plate 8) or in the round (Plate 9). A piece of sculpture can be seen and felt. Whenever a sculptor is working one can see the way in which he/she uses his/her hands or tools to fashion his/her forms. Sculpture seems to absorb energy in a way that a painting does not, perhaps because the hands of the sculptor have shaped the materials or because there is power in sharing physical space with a solid form.

2.3.1.1 Relief Sculpture

Relief Sculpture (Plate 8) is a type of sculpture in which figures and/or other design elements are just barely more prominent than the overall flat background. Relief sculptures are most of the times integrated with architectural structures such as church building, cathedrals and public building. A relief sculpture is characterised according to the depth of the projection from the flat surface. There are three types all with Italian names: Alto, Mezzo and Basso Rilievo.

Alto rilievo: (high relief) is a three dimensional image done on a two dimensional surface. This type of sculpture is normally carved deeply enough to suggest that the motifs are separated completely from the background.

Mezzo rilievo: (middle relief) is a type of relief in which the sculptural objects are projected in the half-round, which means the half of their volume is imbedded and the other half is projected from the surface.

Basso rilievo: (low relief or bas-relief), comprises sculptural figures or objects that project less than half of their true depth from the background plane.



Plate 8: an example of relief sculpture

2.3.1.2 Sculpture in the Round

Sculpture in the round (Plate 9) is a three-dimensional work of art that is meant to be viewed on all sides, and is surrounded entirely by space.



Plate 9: an example of sculpture in the round

2.3.2.1 Digital Sculpting

Digital Sculpting (Plates 10 and 11) or 3D sculpting is the use of software that offers tools to push, pull, smooth, grab, pinch or otherwise manipulate a digital object as if it was made of a real-life substance such as clay. Geometries are used in digital sculpting programmes to represent the model. Each of the geometry used, offers different benefits and limitations. The majority of digital sculpting tools on the market use mesh-based geometry, in which an object is represented by interconnected surface mesh polygons that can be pushed and pulled around. Other digital sculpting tools use voxel-based geometry in which the volume of the object is the basic element. Material can be added and removed, much like sculpting in clay. Still other tools make use of more than the basic geometry representation. A bit of mesh-based programmes are that they support sculpting at multiple resolutions on a single model.

Digital sculpting can often be used to create difficult or impossible detail, which traditional sculpting can not create, this makes it preferable for achieving photorealism. Examples of digital sculpting software include: 3D- Coat, Aart form curvy 3D, Blender, CB models pro, Free form, Modo, Mudbox, Sculptris, Rhinos, Matrix, Artcam etc.



Plate 10: Dumount E. (2007) Milon de Croton
<http://www.scott-eaton/2010/digital-sculpture-study-milon-de-croton#more-70> (Accessed, 10/06/2012)



Plate 11: Takahashi (2008) Q&A with digital arts guru Lorne Lanning: Will we learn to appreciate digital art as a profession and a business?
<http://venturebeat.com/2008/08/23with-lorne-lanning-will-we-learn-to-appreciate-digital-art/> (Accessed 10/06/2012)

2.3.2.2 Virtual Sculpting

Virtual Sculpting is the tentative beginnings of sculpture that can be controlled by the perception of the viewer. Virtual sculpture artists are immersed in the digital world. They are not to be confused with digital sculpture artists, who use computer-aided-design (CAD) to create physical objects. The other wonderful thing about virtual artwork is the detailed learning experience that it affords fans and gallery visitors. The appearance of virtual sculpture make some people feel that digital art is created by Computer-Aided- Manufacture (CAM). (The Rise of Virtual Sculptor-Noupe, <http://www.noupe.com/showcases/the-rise-of-the-virtual-sculptor>) htm) (Accessed 02/10/2011)

2.3.3 Three ways of creating three-dimensional (3D) models

Polygonal, Curve modelling and Digital sculpting are three ways of creating three-dimensional model.

1. Polygonal Modelling: Vertices are connected by line segments to form a polygonal mesh. Polygons are planar and can only approximate curved surfaces using many polygons.
2. Curve modelling: Surfaces are defined by curves, which are influenced by weighted control points. The curve follows (but does not necessarily interpolate) the points. Increasing the weight for a point will pull the curve closer to that point.
3. Digital sculpting is the use of software that offers tools to push, pull, smooth, grab, pinch or otherwise manipulate a digital object as if it was made of a real-life substance such as clay.

2.3.4 Three-dimensional printing

Three-dimensional printing is a form of additive manufacturing technology where a three-dimensional object is created by laying down successive layers of material. Three-dimensional printer offer product developers the ability to print parts and assemblies made of several materials with mechanical and physical properties in a single build process. CC by 2.5, 3D Printing (n.d) <http://mashable.com/category/3d-printing/> (Accessed 20/10/2011)

2.4 Statues

A statue is usually defined as a sculpture in the round (3D) representing a person(s), an animal or event. It is normally full length as opposed to a bust; its primary concern is representational. Statues depict what cannot always be said in words. Every person may have a different interpretation or emotional response when viewing one of the many great sculptural monuments.

Statues are created to send a universal message about an event, a feeling or a person, Table 1 shows ten most famous statues in the world. Statues may serve as a country's great monument or landmark, and may be commissioned to commemorate the life of an influential person or an important national event. England's Nelson Column was built to remember the fallen hero, Admiral Horatio Nelson. The pointing Lenin Statue was built to commemorate the 1917 October Russian Revolution Speech given by Vladimir Lenin outside the Finland Rail Terminal. The statue is located at St Petersburg, Russia. (Pointing Lenin statue, <http://www.garden-fountains.com/famous-statues/lenin.htm>) (Accessed 04/11/2011)

Commemorative statues do not merely serve as a remembrance of an influential person or event but also to remind the public of a specific moment of time where greatness transpired. The statues of Justice Fred Poku Sakodie, Mrs. Justice Cecilia Koranteng-Addow and Justice Kwadwo Agyei Agyapong located on the premises of the Supreme Court of Ghana in Accra were commissioned on 30th June, 2004 by the Ghana Bar Association to commemorate the 23rd anniversary of the killing of these three High Court Judges. The judges were believed to have been martyred on 23rd June, 1982. A day considered by some as the darkest day in the history of Ghana's judicial system.

Sometimes, statues are representative of an artist's vision and are therefore simply created for art's sake. Statues are used as public art, (outdoor or indoor) for the enjoyment and probably the edification of passers-by. Similar to the automobile industry, the statuary industry has many makes, styles and replications. Aside the image and aspects of a statue, the materials used to create such works of art vary. These include: marble, bronze, concrete/cement, resin, fibre glass. Other sculptural media include wood, stone, clay, sand, ice, balloons, iron, steel, paper, soap, chocolate, butter, ice snow, etc.

In 1986 when the 100th anniversary of the Statue of Liberty located at the entrance of New York harbour was marked, over 12million people participated in the three day celebration: an indication that, statues erected in commemoration of an important event, in rare occasions, become historic and inspire historic events.

Examples of most famous statues in the world include:

No	NAME OF STATUE	LOCATION	SCULPTOR	DATE
1	The Statue of David	Galleria dell'Accademia-Italy	Michelangelo	1501-1504
2	The Venus de Milo	Venus de Milo House- France	Alxadros	10-100BC
3	The Thinker	Museum of Decorative Art-Paris	Auguste Rodin	Unknown
4	Caesar Augustus	Vatican Museum-Rome	Julius Caesar	1 st Century
5	The Kiss	Plan Museum of Art-Paris	Auguste Rodin	1889
6	The Pieta	St Peter's Basilica, Rome	Michelangelo	1498
7	Hermes	Archaeological Museum, Olympia	Praxitel	343BC
8	Julius Caesar	In the Rhone River-France	Unknown	46BC
9	Savannah Bird Girl	Bonaventure Cemetery – Georgia	Sylvia Shaw	1936
10	The Discuss Thrower	Museo Nazionale Romano	Rome Myron	5 th & 4 th C

Table 1: Famous sculptures and statues, <http://www.statue.com/famous-sculpture.html>

(Accessed 27/03/2011)

2.4.1 The Statue of Liberty

One example of statues which attract attention worldwide is “Lady Liberty” (Plates 12 and 13). It stands at the entrance of New York harbour, and is a statue of a woman holding a book and a torch. Liberty enlightening the world was a gift from the people of France to the United State of America to commemorate American’s 100th independence anniversary. The statue is one of the most universal symbols of political freedom and democracy. A design patent for the statue was issued by United States’ Patent Office on February 18, 1879. On Lady Liberty’s tablet is inscribed July 4, 1776, the day of Americans independence from Britain. Also inscribed on the base of the statue is an excerpt from Emma Lazarus’ poem, The New Colossus: “Give me your tired, your poor, your huddled masses yearning to breathe free, the wretched refuse of your teeming shore. Send these, the homeless, tempest-tost to me, I lift my lamp beside the golden door”. (Lazarus, 1883)

Fabrication of the Liberty statue began in 1875 and was dedicated in 1886. The Liberty Statue which stands about over one hundred and fifty two feet is considered the tallest metal statue ever made. The material used is copper sheet and was fabricated by Architect and Sculptor Bartholdi. The statue was dedicated by President Grover Cleveland and it became a national monument in 1924. (French-at-a-touch (n.d) Statue of Liberty's History II, Statue of Liberty Facts <http://www.french-art-a-touch.com/statue-of-liberty/statue-of-liberty.htm>) (Accessed 12/02/2011)

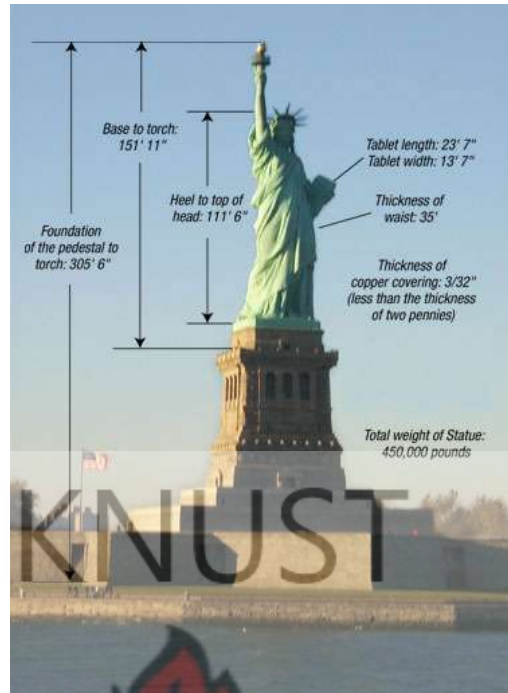


Plate 12: Statue of Liberty with some basic information about the statue (http://www.statueofliberty.org/Fun_Facts.html) (Accessed 07/10/2011)



Plate 13: Statue of Liberty

2.4.2. Bust

A bust is a three dimensional sculpture piece usually comprising the head and chest of a person and they are usually made to represent an influential person. It is believed that Egypt and ancient Greece were the areas where busts were first made. Busts made in these areas, were from the head down to the chest (The Great Encyclopaedia 3rd Edition, 1970-1979). The Ancient Romans used the busts as a distinct portrait and normally added a base to such artefacts. Sculptors such as: F.I. Shudin and S.I. Galberg from Russia, N.A. Andreer, V.I. Mukhina and N.V. Tomskiin all from Soviet are considered as those who created the renaissance and first modern busts. When one turns to the art of Western Europe, artists such as Donatello, Desideriorda, Settignano, G.L. Benuini, J.A. Houdon, A. Rodin, C. Despiau, and others were the pioneers in busts making.

The need and relevance of bust to a nation are enormous. It enables new generations to acquaint themselves with personalities who had contributed in diverse ways to the development of their country. A Decree of the Presidium of the Supreme Soviet of USSR (1939) allowing the country to commission a monumental portrait bust for two and three dimensional heroes of the Soviet Union, is an example of how important such sculpture is to a nation. (The Great Encyclopaedia, 3rd Edition 1970-79, http://encyclopaedia2.thefreedic/_/dict.aspx?word=Bust) (Accessed 15/01/2011)

To the Soviet Union (Russia) two or three dimensional heroes are those individuals or collective who have rendered an outstanding services to their state. These may be in the form of furthering communism, state or enhancing the defences of Soviet Union, exemplary service in the armed forces, promoting friendship and cooperation between people and strengthening peace and also meritorious service to

the state. Depending on one's commitments in achieving the above mentioned activities, he/she is considered to be a two or three dimensional hero. Such heroes are awarded with either The Order of Linin or Order of the October Revolution.

(Hero of Soviet Union, http://en.wikipedia.org/Hero_of_the_Soviet_Union)

(Accessed 04/11/2011)

2.4.2.1 Nefertiti

One bust which the researcher found worthy of consideration and relevant to the research is the iconic bust of Nefertiti (Plate 14) meaning, 'the beautiful one has come' is one of the world's most famous busts. This bust made about 3,300 years ago is the bust of the great royal wife of the Egyptian Pharaoh Akhenaten and is one ancient Egyptian work that has been copied by many. Nefertiti is not only one of the most famous ancient women but also an icon of female beauty even today. Thutmose is said to be the sculptor who executed the Nefertiti bust out of limestone and stucco in 1345 BC. Paterson T. (2009) Beauty of 'Nile' unmasked- Wrinkles and all (www.independent.co.uk/News/world/Africa/beauty-of-nile-unmasked-wrinkle-and-all-1658989) (Accessed 04/11/2011)

Nefertiti bust was discovered at the workshop of Thutmose at Amarna, Egypt by a German archaeological team lead by Ludwig Borchardt in 1912. The bust has been on display at the Neues Museum since World War II. The Nefertiti bust has been kept in various places over the years such as: a Salt Mine in Merkers – Kieselbach, and the Dahlem museum in Charlottenburg. The Nefertiti bust has symbolic cultural importance to the people of Berlin and Egypt. Due to its importance, the Egyptians, have made many efforts to have the Nefertiti bust

repatriated to Egypt but all efforts have been in vain. This has engendered a very “big bone of contention” between Egypt and the Germany.



Plate 14: Bust of Nefertiti

2.5 Filigree

Filigree is the main jewellery technique on which this research was carried. Filigree is a term in jewellery making which involves, the process of using twisted and plain wires to create delicate and intricate design. The process of making filigree involves curling, twisting, plaiting of fine pliable thread of precious metals and arranging them in a particular design by soldering. Items that are normally made of filigree include rings, pins, pendants, earring, bracelet, bangle, etc.

2.5.1 History of Filigree

Various accounts have been given as to the origin of the word filigree. Many believe that the word was derived from the Italian word: “filigrana” which originated from the Latin word “filum”, meaning a thread of wire and “granum” meaning grains or bead. Cosby C. (2010), What is Filigree? Antique Wedding Rings at Ten Two Three Estate Jewelry (<http://www.tentwothree.com/what-is-filigree.htm>) (Accessed

15/02/2011)

This account has been disputed by people like Professor Skeat who believes that this is not the case, because that assertion cannot be found in Du Cange.

Filigree is rather believed to be of a modern origin. Professor Skeat opined that filigree is derived from the Spanish word “Filigrana”, which connotes “Filar” to spin and “grana” the grain or fibre of a material. (Wikipedia (2008) Filigree, (<http://en.wikipedia.org/wiki/Filigree>) (Accessed 15/02/2011)

“Joure” jewellery is another form of jewellery technique which people sometimes confuse with filigree. While filigree involves soldering threads of wire to form a design motif, joure jewellery is done by drilling, punching, or cutting holes on a sheet of metal to form the designs. Another jewellery technique that was practised by the Pre-Hispanic cultures is the use of droplets or beads of gold to create designs. The effects of these works also look like filigree but in actual fact they were not filigree. There were other wire works that were produced by the Indians and Egyptians. These include “Trichinopily chain” in India and Cloisonné works in Egypt.

The development of wire works reached its peak in the Greek and Etruscan cultures in the 6th and 3rd centuries BC, after initial developments. This makes Etruscans and Greeks the first people to have produced filigree jewellery. The evidence of this claim could be deduced from the kind of jewellery produced in Greece and Etruria during this period. Apart from the jewellery that they made purposefully for graves, all other forms of their jewellery had some component of filigree (Castellani, 1861). At a Phoenician site (Cyprus and Sardinia) were found ornaments with patterns of gold wire laid with great delicacy on a gold ground.

These included ornaments made in tiny pieces of precious metals such as earrings. Flower forms of geometric design, made in filigree can also be found in museums in Italy and Britain. Wikipedia (2008) Filigree, (<http://en.wikipedia.org/wiki/Filigree>) (Accessed 15/02/2011)

There is no doubt that filigree has been one of the oldest and most beautiful art forms known to man. This level of finess is the result of over millennia of developing ancient technique and styles of vanished civilisation.

The making of filigree jewellery declined after sometime, but later in the 10th and 11th centuries, the technique resurfaced in the north of Europe (Saxons, Britons and Celts). These people were very skilful in many aspects of metalwork, especially jewellery production. One place where intricately designed filigree jewellery was made more than anywhere else in the history of filigree making is Ireland. The Ardagh Chalice (Plates 15, 16 and 17) and the Tora brooch (Plate 18, is a ring fastener with pin) are examples of filigree work made in Ireland in the 10th and 11th centuries. (Cyndies Studio Design (n.d) History of Filigree (<http://cyndiestudiodesigns.com/filigreehistory.html>) (Accessed, 20/5/2012)



Plate 15: Ardagh Chalice (<http://www.myguideireland.com/early-gaelic-ireland-and-medieval-ireland>) (Accessed 07/10/2011)



Plate 16: Ardagh "Celtic Chalice & Bowl Paten" (http://www.oconnorscatholicssupply.com/artistic-silver-artistic-silver-c-2_5062_5064.html) (Accessed 07/10/2011)



Plate 17: The inside of Ardagh Chalice (http://www.serenityknitting.co.uk/Interview_with_richard_rutt/default.aspx) (Accessed 07/10/2011)



Plate 18: Tora Brooch (<http://www.politics.ie/forum/history/46147-ireland-golden-isle.html>) (Accessed 07/10/2011)

2.5.1.1 The Renaissance and Filigree

The word Renaissance means rebirth. The Renaissance era is historically applied to the period, from 15th to 16th centuries AD. This was the period in which values of ancient Greek and Roman jewellers were made to bear on modern world artists and artisans. It is said to have been spearheaded by the Italians. The type of filigree they made in this era matched very well with their dresses. Before the Renaissance period the jewellery made was of solemn religious themes. These were transformed to

classical and naturalistic themes. Filigree, enamel, and faceted gemstones were sometimes combined to produce unique jewellery pieces such as pendants, brooches, necklace, chains, etc. The use of precious metal in handcrafted jewellery changed briefly in the 17th Century as a result of the entry of faceted gemstones that were being developed, and jewellery set with gemstones became the preferred choice. SilverShake (n.d) Renaissance and Filigree, ([http://silvershake.com/store/filigree/](http://silvershake.com/store/filigree/silver-jewellery-renaissance.html)

[silver-jewellery-renaissance.html](http://silvershake.com/store/filigree/silver-jewellery-renaissance.html)) (Accessed, 07/10/2011)

2.5.1.2 The Era of Mass Production in the 18th Century

The industrial development that occurred in the 18th century shifted the attention from expensive handcrafted jewellery incorporating precious and semi-precious metals and gemstones which were expensive, to jewellery that was mass produced which was less expensive. Non-precious materials such as cast iron, steel and other base metal alloys were used in mass production. The mass production of jewellery did not require skilled artisans so the cost of production was cheaper thus resulting in low priced jewellery. Towards the end of 19th century the art of handcrafted jewellery was brought back by jewellers like Peter Carl Faberge who was a jeweller to the Russia Tsar. He was a specialist in construction of colours and metal. One of his works is a design that he made by combining gold filigree with alexandrite, a gemstone named after Tsar Alexander in 1830.

Filigree in the 19th century was dominated by the ornaments of Victorian Society. Figures of girls with dreaming expressions, swirling hair, dragon flies peacocks and stylised floral themes were used as motifs to design their ornaments. (Cyndies Studio Design (n.d) History of Filigree (<http://cyndiestudiodesigns.com/>

filigreehistory.html) (Accessed, 20/5/2012)

2.5.1.3 Art Deco

Art Deco is a style of design that was popular in the 1920's and 1930's marked by stylised forms and geometric designs adapted to mass production.

The period saw filigree jewellery reaching its highest era of popularity. The romanticism and detail of antique filigree jewellery were made popular up to the present day. The ideas associated with this type of jewellery at the time enabled the people to include them in their wedding and engagement rings. Their rings were made by winding a plain wire around white gold bands.

In India filigree jewellery was also widely used. They called it "Tarkash". Pure silver was the material mainly used by the Indians to produce their filigree work. Their wires were made by hammering a wire ingot on anvil, it was then passed through a drawing machine, after that the two thinnest wires were heated and wound around a rotating wheel machine called "Charkha". The twisted wire was flattened to become a single wire. The flattened wires were cut into pieces and then bent and soldered into different shapes and forms to create their design motifs.

Indians did not make only body adornments in filigree; they also made other decorative and functional objects such as boxes, trays, bowls, spoon, vases with flowers, purse, show pieces, plate, etc. using filigree technique. It is reported that Greeks influenced jewellery styles of Orissa and Andhra Pradesh in ancient times. These areas of India have maintained some of these influences in their beautiful styles. SilverShake (n.d) Renaissance and Filigree, (<http://silvershake.com/store/filigree/silver-jewellery-renaissance.html>) (Accessed, 07/10/2011)

2.5.2 Types of Filigree

There are four main types of filigree, these are:

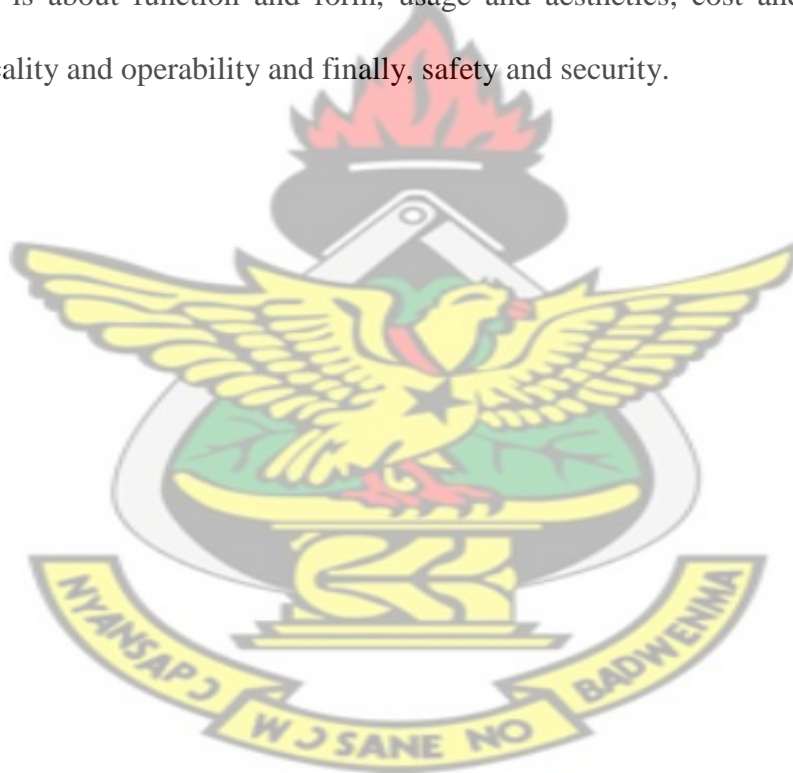
1. Openwork filigree: structures of the designs are built without any support at the base or ground and it is generally constructed with heavy wire. Soldering is done to hold the design together.
2. Ground support: this type involves the use of surface support usually a sheet of metal. The design is constructed with the wire soldered on the background.
3. The third type is made up of a combination of the openwork and ground support. With this type of filigree, various joining techniques such as soldering, split rivets, rivet bezels or claws are employed.
4. Last but not least, is the technique of adding other materials such as enamel or gemstone to fill in-between wires. (Cosby C. (2010) What is Filigree? Antique Wedding Rings at Ten Two Three Estate Jewelry (<http://www.tentwothree.com/what-is-filigree.htm>) (Accessed 15/02/2011) and Untracht (1982)

2.6 Design

There are countless definitions of design, as might be expected of such a broadly creative endeavour. Some categorise design, with the aim of explaining how different it is from, or how related it is to other activities, while others by so doing try to inspire good design. Sir George Cox, a former Chairman of UK'S Design Council, defined design in simplest term as captured in the "Cox Review" as the link between creativity and innovation. It is design that shapes ideas to become practical and attractive propositions for users or consumers. Design may simply be described as creativity deployed to a specific end. (Hunter M. (n.d) What design is and why it

matters (<http://www.designcouncil.org.uk/about-design/what-design-is-why-it-matters/>) (Accessed 10/02/2012)

Design is integral to whatever one does - it should be about telling the designer what one wants and how he/she wants to utilise it, to allow the designer to work out the best way of meeting that need. If someone says he/she needs a bracelet, and he or she is given a bangle, it is likely to be impractical for his/her needs even though the bangle is also a piece of jewellery for the wrist. The jewellery designer may offer a beautiful looking bangle, but it has to go beyond that - the concept of design is about function and form, usage and aesthetics, cost and supportability, practicality and operability and finally, safety and security.



CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Design

This research focused, among other things, how jewellers and metalsmiths could apply the filigree technique to produce metal artefacts (such as sculpture) other than jewellery and also how jewellers and metalsmiths could integrate the technique in their everyday line of manufacturing. The researcher accomplished the objectives of the research through Historical Research Design. (Leedy & Ormrod, 2009) and Studio-Based Research (Marshall 2010)

3.1.1 Historical Research

These aspect of the work included review and analysis of: articles, research papers, journals, newspapers, conference presentations, interviews, relevant websites on filigree and other metalsmithing techniques. The researcher also reviewed information on Osagyefo Dr. Kwame Nkrumah, Sculpture, Computer-Aided-Manufacturing (CAM), Computer-Aided-Design (CAD), and other jewellery and metalsmithing production techniques. The information gathered helped the researcher to get deeper understanding of both past and prevailing practices on the filigree technique. It also helped the researcher to clarify and appreciate the opinions and views of eminent and learned academicians, leading jewellers, businessmen and others, thereby providing ideas for the future development of the jewellery and metalsmithing sector.

3.1.2 Studio-Based Research

Studio-based research typically involves the production of artwork and written component. The imaginative and intellectual works undertaken by artists are considered to be forms of research (Marshall 2010) and they are evaluated based on these five factors:

1. Description of the subject matter of the artefact produced.
2. Identification of iconography.
3. Notation on the impact of selected media and the methods of production.
4. Principles of art and the organisation of visual elements such as line, colour, space, texture, movement, time and composition.
5. Description of style and or process.

The researcher adapted jewellery-based production processes to fabricate the project and obtained a result which is purely a sculpture piece (filigree bust). The filigree technique used for producing the artefact offers a lot of advantages to the artist as compared to other methods that could have been used. These advantages include material saving and weight reduction. Techniques like chasing and repoussage, electroforming, fabrication and casting would have resulted in a heavier work, requiring a lot more metal.

3.1.2.1 Description of subject matter of Kwame Nkrumah filigree bust

Two important questions that one may ask if he or she comes into contact with the project are: why Kwame Nkrumah and why filigree bust. One may immediately think that Kwame Nkrumah was selected because he happened to be

the one under whose reign as president, established, the Kwame Nkrumah University of Science and Technology. This answer may not be far from the truth, but the other consideration that was taken into account is the novelty of the project in the field of jewellery and metalsmithing, in that, the researcher aimed to achieve three dimensional photorealism which is seldom an objective in jewellery making and metalsmithing.

In choosing Kwame Nkrumah as the subject, the researcher took into consideration his local and global stature since he is a known personality both locally and internationally. At the end of production it was the expectation of the researcher that anybody at all who encounters the finished bust will be able to identify the personality with ease.

To begin with, two experimental filigree works were made. One of them was a flower vase (Plate 19) in the form of sphere 16 ½ cm in diameter. The second experiment was a relief figure (Plate 20). These experiments paved the way and facilitated the researcher's application of the filigree technique to the fabrication of the bust of Kwame Nkrumah.



Plate 19: first experiment (Flower Vase)



Plate 20: second experiment (relief filigree head)

3.2 Materials and Methods

This segment deals with the materials, tools, equipment and methods employed to design and fabricate the filigree bust of Osagyefo Dr. Kwame Nkrumah.

3.2.1 Materials

Four kinds of metals and wood were used in producing the filigree bust. The metals include: copper, silver, zinc and brass.

3.2.1.1 Notation on the impact of selected media

In selecting the media for fabricating the filigree bust, the researcher took into consideration the following: requirements of the filigree technique, size of the bust and the application of the soldering process. The researcher settled on copper wire as the most appropriate material for the work. This was informed by: the availability of the material, the ability of the metal to withstand high temperature and the cost of the material.

3.2.1.2 Copper

Copper (plate 21) is a chemical element with the chemical symbol Cu (from Latin: *cuprum*) and an atomic number of 29. It is a ductile metal with very high thermal and electrical conductivity. The melting point of copper is 2562 °C, it is soft and malleable; a freshly exposed surface has a reddish-orange colour. It is used mainly as a conductor of heat and electricity, a building material, and a constituent of various metal alloys. Copper wire was the main metal that was used to fabricate the entire filigree bust.

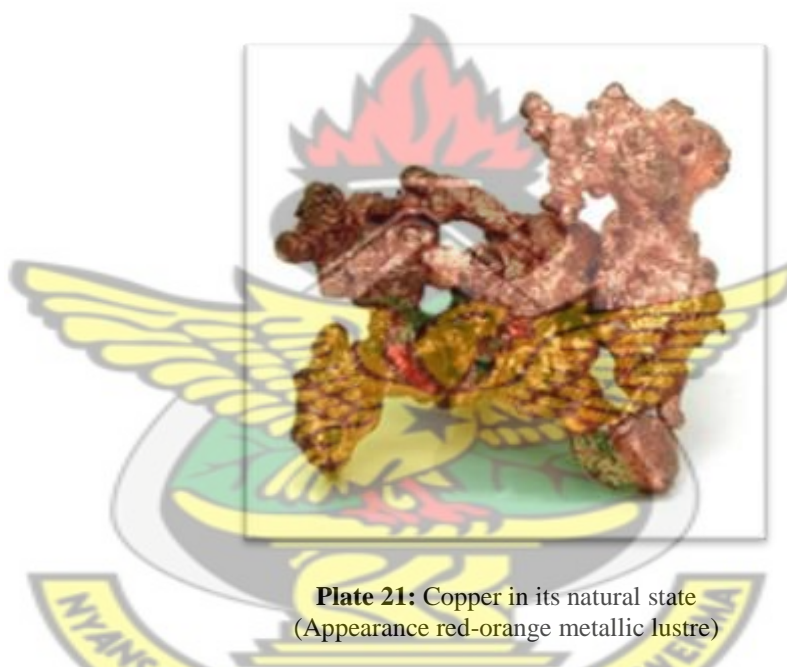


Plate 21: Copper in its natural state
(Appearance red-orange metallic lustre)

3.2.1.3 Silver

Silver (plate 22) is a metallic chemical element with the chemical symbol Ag (Latin: *argentum*, Indo-European root “arg”- for grey or shining) and an atomic number of 47. The melting point of silver is 961.78 °C, it is a soft, white, lustrous and transition metal. Silver has the highest electrical conductivity of any element and the highest thermal conductivity of any metal. The metal occurs naturally in its pure, free form (native silver), and in minerals such as argentite and chlorargyrite. Most silver is produced as a by product of copper, gold, lead, and zinc refining.

Silver has long been valued as a precious metal, and is used as an investment, to make ornaments, jewellery, high-value tableware, utensils (hence the term silverware), and currency coins. Today, silver is also used in electrical contacts and conductors, in mirrors and in catalysis of chemical reactions. Silver was used to prepare silver solder (for soldering) and also to electroplate the filigree bust.



Plate 22: Silver in its natural form
(Appearance lustrous white metal)

3.2.1.4 Zinc

Zinc (from German: *Zink*), or spelter (which may also refer to zinc alloys), is a metallic chemical element with chemical symbol Zn and atomic number of 30. The melting point of zinc is 419.5 °C. Zinc is, in some respects, chemically similar to magnesium, because its ion is of similar size. Zinc is the 24th most abundant element in the earth's crust and has five stable isotopes. The most common zinc ore is sphalerite (zinc blende), a zinc sulphide mineral. Zinc was used as an ingredient to prepare the silver solder, because of its low melting point it enables the silver solder to flow well and faster.

3.2.1.5 Brass

Brass is an alloy of copper and zinc; the proportions of zinc and copper can be varied to create a range of brasses with varying properties. Brass is a substitutional alloy. It is used for decoration on the account of its bright gold-like appearance; for applications where low friction is required such as locks, gears, bearings, doorknobs, ammunition, and valves; for plumbing and electrical applications; and extensively in musical instruments such as horns and bells for its acoustic properties. Brass has higher malleability than bronze or zinc. The relatively low melting point of brass 900 to 940 °C, depending on alloy composition and its flow characteristics make it a relatively easy material to cast. By varying the proportions of copper and zinc, the properties of the brass can be changed, allowing for hard and soft brasses. Today almost 90% of all brass alloys is said to be recycled. Because brass is not ferromagnetic, it can be separated from ferrous scrap by passing the scrap near a powerful magnet. Brass was also used as an ingredient to prepare the silver solder,

3.3 Tools

The following tools were used to execute the project: Chasing Hammer, pliers (round nose, bent chain, flush cutter), nylon hammer, metal ruler, shears, tweezers, dead blow, peddinghaus, stakes and anvil, electronic digital callipers, files (smooth and rough), adjustable saw frame and blades, dividers, digital scale and soldering kits.

3.4 Equipment

Equipment used for the project include: bench anvil, rolling mill, soldering table, gas cylinder, work bench and stool.

3.5 Copper wire

Three sizes of copper wires (Plate 23) were used: 16ga, 23ga and 25ga for the profile frames and the twisted wire for filling. The researcher procured the copper wire from the market without difficulty as all the sizes of copper wires were readily available there. This enabled the researcher to circumvent the searching for scrap copper for processing into required sizes of wire for the work. Approximately 2 kilos of the 23ga, 2.5 kilos of 25ga and 2.5 kilos of 17ga were directly purchased and used.



Plate 23: Copper wire the raw material for the project

3.5.1 Preparation of Filigree wire

The copper wire passed through four stages (plates 24) to become ready for use. These included:

1. Burning off the lacquer coated on the copper wire.
2. Twisting
3. Milling to flatten the twisted wire.
4. Annealing, pickling and rinsing.

An average length of 240cm of the copper wire was cut at a time and the lacquer coating was burnt before twisting. Three methods can be used to twist wire: hand drill, rotary motor and table top and wood block. Twisted wire for the entire work was done using the table top and wood block method.

Twisting was done by bringing the ends of the wires together to form a double strand, half the original length. The loop end of the double strand was hand twisted a little. The twisted part was placed firmly onto the table and the untwisted part of the wire was held in the left hand at a distance of about one foot. A small wood block held in the right hand was then rubbed over the twisted portion to roll and twist the two strands. As the twisting progressed the twisted portion was drawn away to position the untwisted portion for twisting. An intermediate annealing was done to soften the wire. This process continued until the entire strand was twisted.

The wire at this juncture became ready for the next stage of the process which is flattening. Two options were available to the researcher. These were: hand-hammering and roll-milling. The researcher opted for the roll-milling process because of its ability to ensure uniform dimensions. The plattens of the rolling mill were adjusted to ensure that the desired thickness was achieved.



A.



B.



C.



D.

Plates 24 (A-D): the four stages through which the cooper wire passed to become ready for use

3.6 Solder preparation

The same solder composition (78% silver and 22% brass) was used for the frames and filigree sheets. For the frames, the solder was milled flat and cut into paillons while for the filigree sheet it was filed into powder (plates 25 and 26).



Plate 25: solder fixed in a hand vice, ready for filing



Plate 26: powdered solder after the solder was filed

CHAPTER FOUR

DESIGN, FABRICATION AND FINISHING OF KWAME

NKRUMAH FILIGREE BUST

4. 1 Design

Although the project at hand culminates in the production of a filigree bust of a specific person (Kwame Nkrumah), the need for the application of design methodology was paramount. There was the need to construct components and then assemble them together to form a whole: the bust. This left the researcher no option than to find suitable format and arrangement that will allow the different segments and sections to seamlessly come together to form a single work of art. The areas that attracted the researcher's designing attention were the bigger frames and the smaller units as well as the fitting of flatten twisted wires into these frames.

With the assistance of a colleague M.F.A. Sculpture Student the researcher modelled the bust of Kwame Nkrumah in clay and later cast it in cement (Plate 27).



Plate 27: cement model of Kwame Nkrumah

4.2 Fabrication process

The process of fabricating the filigree bust involved: construction of frames, fitting the frames with twisted wire, soldering, piercing, embossing and assembling of parts.

4.2.1 Construction of frames

The process of fabrication began with construction of bigger frame components in 2mm square copper wires after which the bigger frames were partitioned into smaller units (plate 28). The frames were annealed to make them malleable.



Plate 28: the frame for some part of the face

4.2.2 Fitting twisted wire into frame

The frames were filled with the twisted wire to fit firmly in the frames. The twisted wire made from 25ga copper wire was used to fill the frames for the face, while the one from 23ga was used to fill frames for the rest of the body. Three main styles were used. Linear (densely packed twisted wire: plate 29), coiling part of the wire (locally known as 9, 9: plate 30) and last but not least complete coil (plate 31). Pliers, tweezers and cutters were used to fix the wires inside the frame.

The twisted wires were fitted inside the frames straight, curve and diagonal in order to trap the twisted wire well in the frame. Once an area was fitted with the twisted wire, it was then cut and next area was taken up, the wire was then manipulated in the frame to depict the designs. Fitting square and rectangular frames were difficult especially getting the first three twisted wires to hold firmly in the frame. The 25gauge wire was a bit of a problem. The researcher fitted the initial three or so wire by soldering them together outside the frame before transferring them into the frame and soldering their ends to the frame. This paved the way for the rest of the frame filling to continue. In some instances the work was soldered after every 5 or 8 wires were fitted.





Plate 29: Linear Fitting (densely packed twisted wires)



Plate 30: nine nine (9, 9) fitting



Plate 31: coiled fitting

4.2.3 Soldering

Soldering is a process in which two or more metal items are joined together by melting a filler metal (solder) into the joint. The filler metal usually has a lower melting point than the work piece. The work as an openwork filigree presented a unique wire-to-wire soldering situation. The framed filigree units were prepared for soldering by placing them on a flat block of charcoal. Some of the pieces were lifted with tweezers onto the charcoal block while others assembled on glass were slid onto the charcoal block. The charcoal block was chosen as support for the soldering because of its highly refractory nature and its heat retaining ability which helps the solder to quickly reach its melting temperature.

In preparing the powder solder for soldering, two approaches were used:

1. Mixture of borax, water and finely powdered solder was prepared into a thin paste. Some of the paste was spread on the work especially the junctions of the frames and their contact point. Flame was moved constantly on the work to bring the metal up to soldering temperature evenly to avoid melting the wires.

2. The second approach was carried out by mixing the powdered solder with dry borax without water. Using a bristle brush, a borax solution was first applied to the work after which the dry mixture of powdered solder and borax was sprinkled on the entire work. A moderately neutral flame was used in soldering by carefully moving it over the work to ensure effective melting and flowing of the solder.

4.2.4 Piercing

Piercing is the process of using a saw frame with a very fine blade to cut out intricate shapes or motif from a sheet of metal. The cement model was divided and marked out into many segments. The shapes of the segments were picked one after the other and pierced on the filigree sheet (plates 32 and 33).

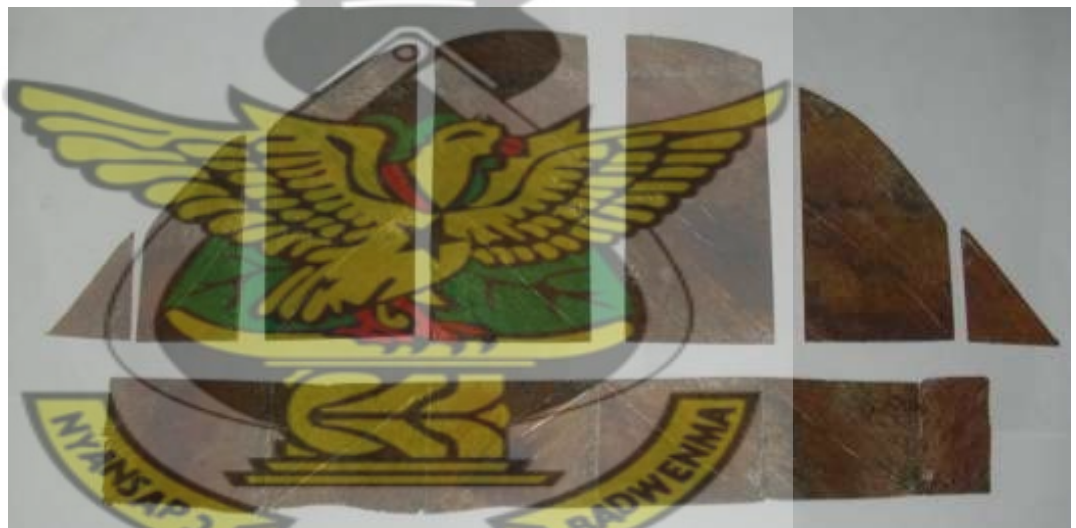


Plate 32: pierced filigree segments for the forehead



Plates 33 (A-D): pierced filigree segments for the eye brow

4.2.5 Embossing

Embossing refers to the creation of an impression of some kind of design, decoration, lettering or pattern on another surface such as paper, cloth, metal or even leather, in the form of a relief. In embossing, the pressing pushes up the surface of the material and adds a new dimension to the material by way of volume. Sheet metal embossing is utilized for producing raised or sunken designs or relief on sheet metal.

After piercing the various segments out from the filigree sheet, they were placed on the corresponding portion of the cement model, and then hit with a mallet to cause the filigree segment (plates 34) to assume the shape and form of the parts of the cement model. This process was repeated again and again to shape and form all segments of the bust.



Plates 34 (A- C): embossed filigree segments of the forehead

4.2.6 Joining the parts of the components

Joining may be defined as the process of bringing two or more surfaces into intimate contact in order to establish continuity of a field across the resulting interface. The surfaces to be joined must be prepared so that they mate perfectly well with one another.

The filigree bust was constructed in components and later assembled together to form the Kwame Nkrumah bust. These components include: the head, the neck and the costume. Each component was made of different parts, for instance the head is made up of the face (forehead, eyes, nose, lips, cheeks, ears and chin) and the hair. The costume is made up of the jumper and the cloth.

The filigree segments that were pierced and embossed were joined one after the other in a controlled process to construct the individual parts of the components which were assembled to form the Kwame Nkrumah bust. For example plates 35 indicate the various levels used to assemble the hair.

During the joining of the parts, some gaps (plates 35G, 36A and 36B) appeared in between some areas; these were as a result of embossing the filigree segments prior to joining. Some gaps also occurred as a result of the twisted wires not being well soldered in the frame. The gaps were filled with some of the filigree sheet or twisted wire to seal the gaps.



Plates 35 (A-H): stages of assembling the hair segments



Plates 36(A-C): three stages used to join the forehead and eye brow

4.2.7 Assembling the components to form the Kwame Nkrumah bust

After constructing all the components for the bust, the face and the front part of the neck (plate 37A) were soldered together to obtain plate 37B. The figure in plate 37B labelled now as plate 38A was then joined to the costume (jumper and cloth, (plate 38B)) to form the front part of the bust (plate 38C).



Plates 37 (A & B): face and front part of the neck joined together



A.



B.

KNUST



C.

Plates 38 (A-C): front of the bust assembled

The hair (plate 39A) was attached to the back (plate 39B) of the neck and then joined to the costume to form the back of the bust (plate 40).



A.



B.



C.



D.

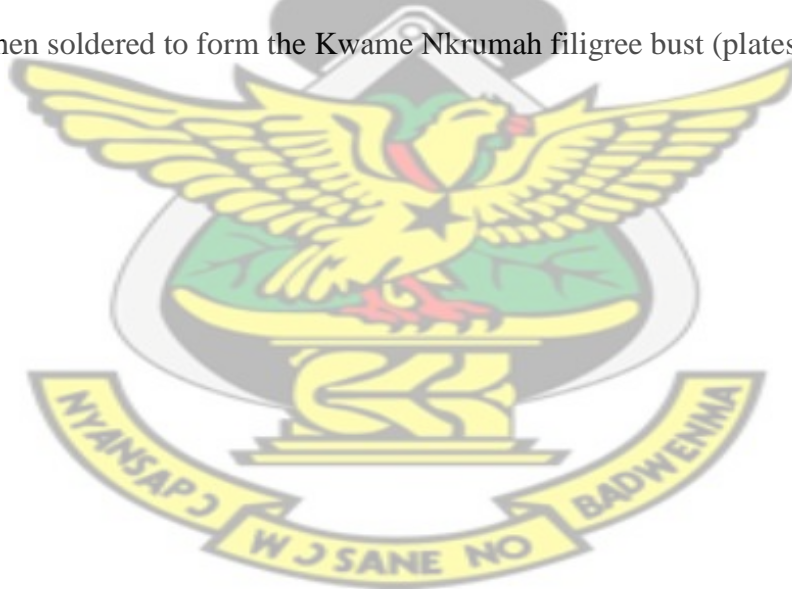


Plates 39 (A-D): stages of joining the hair to the back of the neck and
E is the back of the costume



Plate 40: the back of the bust assembled together

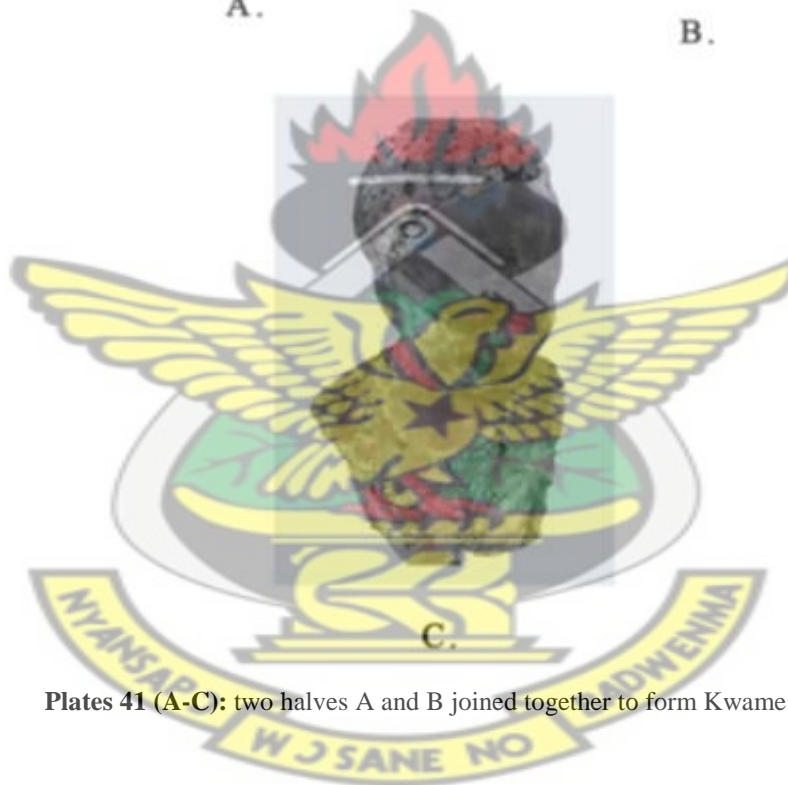
After obtaining the two halves of the filigree bust (plates 41A and 41B), they were then soldered to form the Kwame Nkrumah filigree bust (plates 41 and 42).





A.

B.



Plates 41 (A-C): two halves A and B joined together to form Kwame Nkrumah bust C



A



B



C



D

Plates 42(A-D): the four views of the Kwame Nkrumah filigree bust (Front, Back, Left and Right)

4.3 Finishing the filigree bust

Finishing refers to the removal of scratches and marks on the surface as well as the nature of the final finish, such as satin, matte or polished. The type of finish given to metalwork can transform it, so it was important to plan the finishing of the bust before and during the fabrication stages.

Various finishing techniques such as, polishing, patination and electroplating (gold, silver, nickel, and copper) were considered. The researcher settled on silver electroplating on account of availability and because of the use of powdered silver solder, some parts of the bust had already been coated with silver.

4.3.1 Electroplating

Electroplating is the application of electricity through an electrolytic cell to cause the deposition of a thin metal layer onto an electrically conductive surface. This is normally done to improve the appearance and value of items made of base metals. If an artefact is electroplated its lustre and its surface reflectivity are improved which in the long run enables the item to stay corrosion free for a long period of time. There are two methods of electroplating, they are: brush (selective) plating and tank (immersion or “dip”) plating method. Brush plating is a process used to apply localised electroplated deposits and anodised coatings, without immersing the item to be plated in a plating bath, while tank plating involves immersing the object to be plated in a solution containing dissolved salt of metal to be deposited on the item. The advantages of using brush plating are that, minimum equipment is used and it also allows plating a work in parts.

4.3.2 Silver electroplating processes (Silver Strike)

The filigree bust was silver electroplated to enhance its surface appearance and protect the base metal since it has the propensity to tarnish very fast.

The process of silver-plating the bust started with the researcher first preparing potassium silver cyanide. The materials used were: fine silver, potassium cyanide, nitric and hydrochloric acids, distilled water, stainless steel bowl, plastic container and coal port with charcoal.

4.3.3 Preparation of Silver Chloride

One ounce of fine silver was milled into very thin strips and cut into small pieces. The silver was then dissolved in nitric acid twice the weight of the silver. The dissolution was done by boiling the silver and the nitric acid in stainless steel bowl. After the entire fine silver had dissolved in the nitric acid the obtained silver nitrate solution was allowed to cool. It was then diluted with distilled water whose volume was six times the volume of the silver nitrate and poured into a tall plastic cylinder. Hydrochloric acid was then added bit by bit to the solution of dilute silver nitrate to precipitate silver chloride. After the precipitation, more distilled water was added to rinse the silver chloride until the water running off was completely acid free.

4.3.4 Preparation of Potassium Silver Cyanide with the Silver Chloride

Distilled water was poured onto the silver chloride in the plastic cylinder and then potassium cyanide was added drop by drop until all the silver chloride was dissolved completely to form potassium silver cyanide.

4.3.5 Process of electroplating the filigree bust

The most important step in the plating process was the cleaning of the bust. The bust was pickled very well, to remove foreign matters like heavy scale oxide films, rust, workshop soils and oil, grease, dirt, flux, and heat discolouration resulting from the soldering. These were removed to ensure strong adherence of electrodeposited metal to the work as improper cleaning could have lead to: non-uniform appearance of deposit, pitting of deposit, and poor adhesion of the coating.

Pickling was carried out by immersing the work in an aqueous solution of one part sulphuric acid and ten parts water. Due to the large size of the work the researcher could not pickle it at a go, but in parts. The work was subsequently rinsed under running water to remove the acid. It was then scratch brushed with detergent and ammonia.

The researcher adapted brush plating method to electroplate the filigree bust. The items that were used to electroplate are: rectifier, small plastic container with lid, foam, potassium silver cyanide and silver anode.

The improvised brush plating unit (figure 1) was done by fixing a silver anode inside the plastic container, closer to the mouth. The top of the container's lid was cut off to create opening for the foam. Little amount of potassium silver cyanide was poured into the container; foam was then placed on the silver anode to hold the potassium silver cyanide from leaking and also prevent the silver anode from having direct contact with the bust. The container was covered very tightly, with some part of the foam protruding through the hole on the lid.

The filigree bust was connected to the negative (-) terminal of the rectifier, while the silver anode was connected to the positive (+) terminal. Electric current was then applied at this point, and the current travelled from the anode through the potassium silver cyanide to the bust. The foam tipped improvised unit was moved continually over the surface of the bust to achieve a uniform deposition of silver. Plating occurred only where the foam had contact with the bust.

When current was applied, the positively charged ions moved toward the cathode resulting in silver deposition on the filigree bust. The current through the circuit was such that the rate at which the silver anode was dissolved was equal to the rate at which the filigree bust (cathode) was plated. The work was rinsed under running water, and then scratch brushed with detergent and ammonia to give it lustre. The flexible nature of the process allowed the researcher to plate the bust in parts until the entire surface was silver electroplated (plate 43).

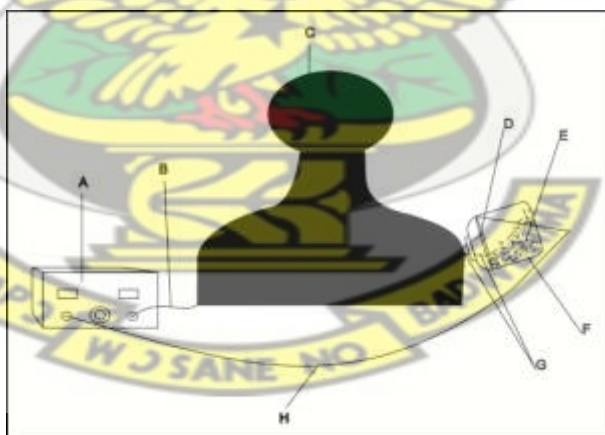


Figure 1: Diagram showing improvised brush plating process

A- Electroplater (Rectifier)

B- Terminal (-)

C- Bust (cathode)

D- Silver plate (anode)

E- Potassium silver cyanide

F- Plastic container (insulator)

G- Foam

H- Terminal (+)

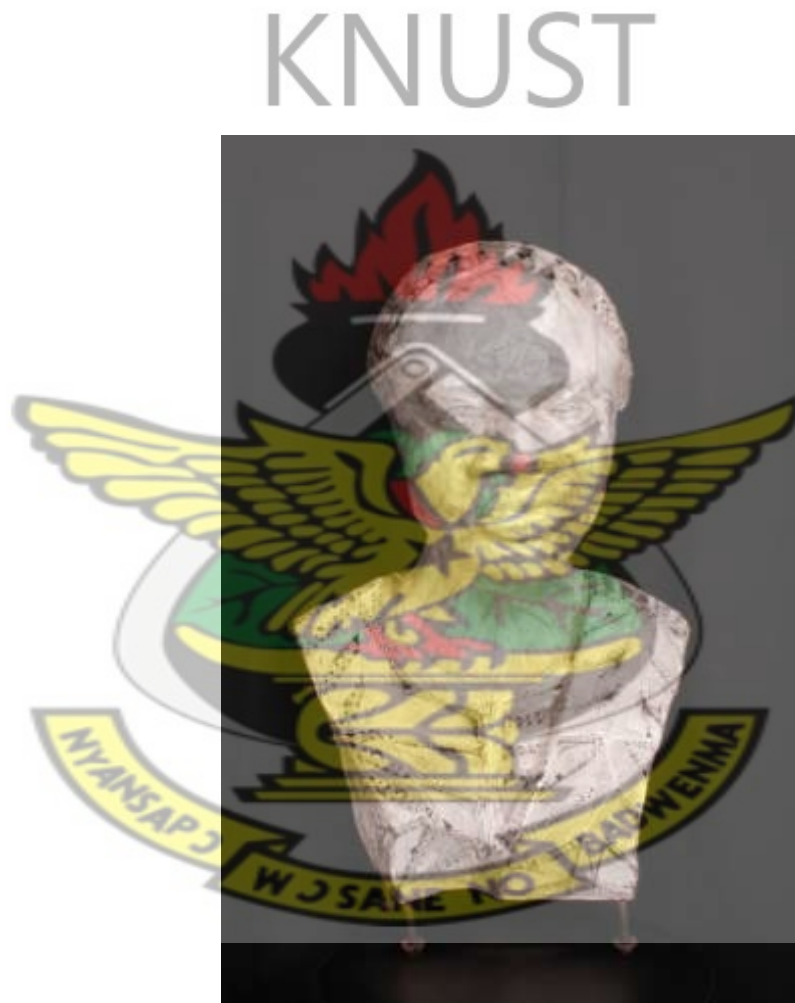


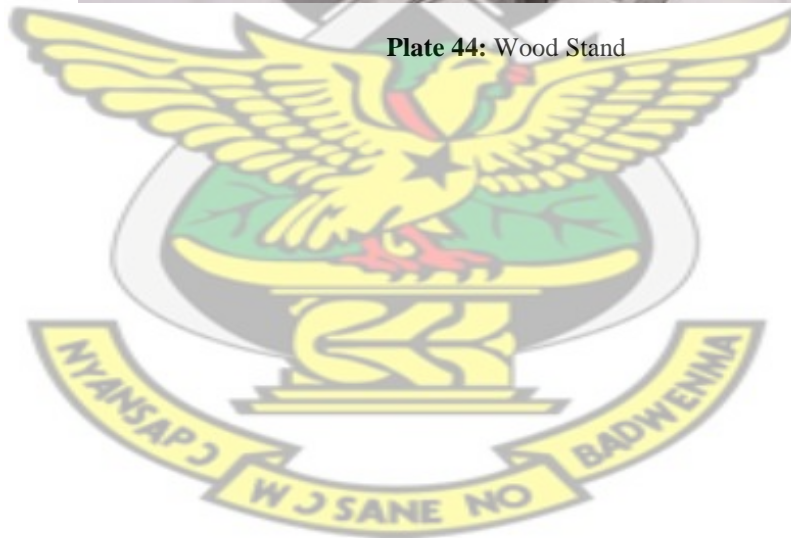
Plate 43: Silver plated filigree bust

4.4 Base

A three-step wooden stand (Plate 44) for mounting the bust was constructed and sprayed. The stand enhances the beauty of the work and also gives it stability.



Plate 44: Wood Stand



CHAPTER FIVE

RESULT AND DISCUSSION

5.1 Result

A strong relationship between filigree making, and the Greek and Etruscan cultures has been reported in the literature. These two cultures are said to have played pioneering role in the development of wire works: they are said to be the first people to have produced filigree jewellery. The literature review also did not reveal any obvious association between filigree and the sculpting of statues including busts.

This researcher set out with the aims of: (i) finding out whether or not the filigree technique which hitherto had been limited to jewellery-scaled items could be extended to sculpture-scaled items such as bust, (ii) designing and producing a bust of Osagyefo Dr. Kwame Nkrumah, Ghana's first president, using filigree technique.

The result of this study indicates that by using the appropriate material and workshop processes, it is possible to produce any artefacts using the filigree technique irrespective of the design and size. On the question of whether it is possible to design and produced photorealistic bust of Osagyefo Dr. Kwame Nkrumah, Ghana's first president, using filigree technique, the study confirms that indeed it is absolutely possible as demonstrated by the successful fabrication of the Kwame Nkrumah bust (plate 45) through the filigree technique.

Contrary to the researcher's apprehensions, this study did not encounter any significant difference between the process of producing jewellery-scaled items using filigree technique and sculpture-scaled items using the same technique. The outcome of this study corroborates the result of similar works in the field such as that of

artist/ historian Ximena Briceño, who produced among other works, a kangaroo filigree sculpture using titanium metal and laser welding. However when it comes to the issue of using filigree technique to fabricate photorealistic artefacts, this researcher did not find any related data in the literature.



Plate 45: finished Kwame Nkrumah filigree bust mounted on wood base
(47.5cm × 42.5cm × 75cm)

5.2 Discussion

It has been a wonderful experience fabricating the filigree bust of Kwame Nkrumah: a process that moved the researcher through a whole range of emotions; from doubt and despair through excitement, to exhilaration and triumph. The researcher as a practising jeweller is privy to some jewellers' and metalsmiths' perception that, it is impossible to create photorealistic artefacts or objects successfully using existing skills. This belief or perception stems from their unwillingness to explore all the possibilities that jewellery and metalsmithing processes offer.

The outcome of the research incorporated elements and principles of design by ensuring that these were not violated in relation to the way the various sections merged into the overall form of the filigree bust.

The following aspects of principles and elements of design are present on the filigree bust:

1. Lines: the visual path along which the eyes move as one contemplates the filigree bust is present in three dimensions.
2. Shape: the individual shaped segments seamlessly blend to give form to the filigree bust.
3. Texture: the twisted wire used for the work, gives surface qualities which translate into tactile illusions.
4. Space: despite the open nature of the filigree, the bust effectively occupies a positive space and is bounded by a negative space (air).
5. Balance: the distribution of the visual weight of the sections, colour, texture, and space has been effectively applied to achieve a harmonious piece. Both symmetrical

and asymmetrical balances were applied. In some instances it could be observed that the elements used on one side of the design were similar to those on the other sides, while in other instance the sides are different but still look balanced. Radial balance was also achieved such that elements were arranged around a central point as is obvious in the fabrication of the sections forming the hair.

6. Emphasis of focal point is the part of the filigree bust that is aimed at catching the viewer's attention. The researcher made the face the focal point by contrasting it with other areas through the intentional dense packing of filigree wires in the segments that formed the face.

7. The path the viewer's eye takes through the filigree bust, often leads to focal areas. Such movement is directed along lines, edges, shape and colour within the work. The contrasts in the orientation of the twisted wires give rise to movements.

8. The arrangement of the filigree wires has created visible patterns on the surface of the bust.

9. Repetition of pattern makes the filigree bust seem active and also creates unity within the artwork.

10. In the Kwame Nkrumah filigree bust, proportion refers to the size of the head compared to the rest of the body and the sizes of the components of the face such as the eyes, mouth, nose and ears. This sense of correct proportion creates a feeling of unity as all the parts relate well with each other.

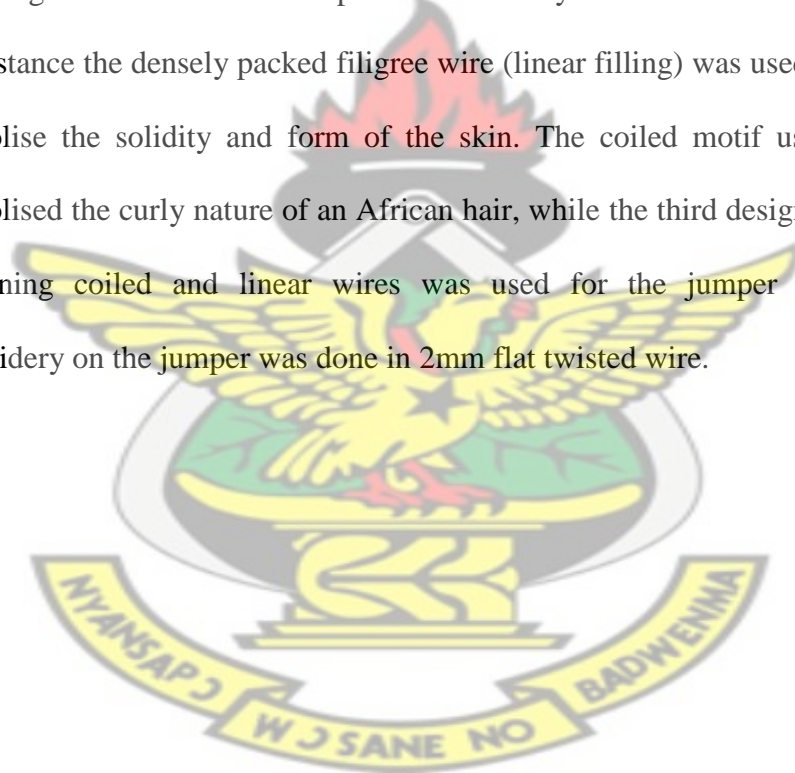
11. Rhythm was created by using more elements of design repeatedly to create a feeling of organised movement. Rhythm was kept exciting and active to get the viewer's eyes moving around the filigree bust as various elements were used.

12. The use of several elements of design in the bust was done to hold the viewer's attention and to guide the viewer's eye through the artwork.

13. Unity is the feeling of harmony between all parts of the artwork creating a sense of completeness. Nature of the bust exudes wholeness and unity of design.

5.2.1 Three significant parts of the filigree bust

The whole filigree bust was fabricated based on three significant parts which are: the hair, the skin (on the face, ear and neck) and the costume (jumper and cloth). The design motif used for each part was carefully selected to conform to the parts. For instance the densely packed filigree wire (linear filling) was used for the skin, to symbolise the solidity and form of the skin. The coiled motif used for the hair symbolised the curly nature of an African hair, while the third design motif made by combining coiled and linear wires was used for the jumper and cloth. The embroidery on the jumper was done in 2mm flat twisted wire.



CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary

This thesis has given account of the fabrication of Osagyefo Kwame Nkrumah bust, using filigree technique of jewellery making. It has provided reasons for selecting the filigree technique, discussed iconography, and the history of filigree.

As stated earlier in the statement of the problem, the fine art of filigree is just that – fine. Its delicately entwined wires have patterns and an intricacy more familiar in the natural world of vines and twines than the man-made world of precious jewellery. The complex weaves and twists of its fragile metal work introduce space in what would otherwise be “opaque” objects. The complicated nature of this technique limits jewellers and metalsmiths in the kind of design and size of works that they normally produce which is mainly jewellery and jewellery-scaled items.

The purpose of the study was to determine whether the confinement of the filigree technique to jewellery-scaled design and sizes was unfounded and could be breached so that jewellers or metalsmiths would see the possibility of producing any jewellery or artefact of their choice by using this technique irrespective of design or the size. This determination was made by designing and fabricating bust of Osagyefo Dr. Kwame Nkrumah, Ghana’s first president, using filigree technique.

6.2 Conclusion

The following conclusion can be drawn from the study,

The notion that filigree technique was confined to jewellery-scaled design and sizes is unfounded. The successful outcome of the study indicates that jewellers and metalsmiths can produce any jewellery or artefact by using the filigree technique irrespective of the design or the size.

6.3 Recommendations

This research has raised some concerns which need further investigation.

1. To establish whether it is possible to combine other jewellery or metalsmithing techniques (such as granulation, welding, casting, electroforming, etc.) to filigree technique to produce artefacts other than jewellery-scale items.
2. It is recommended that further research should be carried out to identify other procedures that can be used to produce photorealistic objects using the filigree technique such as the Osagyefo Kwame Nkrumah filigree bust without shaping on a model. This may reduce the cost and the amount of time spent when producing such artwork.

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