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Water Fountain in Iron and Aluminium Cast Utensils

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Abstract:- Iron has been the most ridiculed material (main and auxiliary) in the production of water fountains generally. Its use has been questionable, because of its ability to easily rust when it comes into contact with water and oxygen. However, iron is a material that is relatively strong and elegant in looks when manipulated in art forms such as ornamental furniture. This is the primary motivation for engaging iron as a fountain material. To think of auxiliary materials, the diversification fountain materials also again influenced the choice of the aluminium utensils, because they have forms that can easily be employed in the production of fountains. This study is a material based design that employed iron with Aluminium cast utensils as the main materials. in this regard, the properties of aluminium and iron that make them suitable for the production of water fountains were duly analysed to inform the design. Also the functional and aesthetic properties of selected aluminium utensil were also assessed to underpin the design. This was followed by the well informed selection of appropriate finishes that have the right preservative properties for the iron. The design ensued from series of sketches through to a selected final plan the informed and directed the construction of the fountain. The aluminium cast utensils and types of iron were sample purposively according to the dictates of the design. The study resulted in a well fabricated indoor water fountain using the two materials namely iron and the Aluminium cast utensils. In conclusion, this study has been able to identify and creatively adapted some Iron forms and Aluminium Cast Utensils, guided by selected literature for the production of a fountain. The design communicates a number of reasons and avenues that feeds iron into fountain production. The study also suggests that, the use of iron and the aluminium cast utensils in good for fountain production especially when their properties and finishes are holistically factored.

Keywords:- *Aluminium Cast Utensils, Fountain, Design, Iron, Construction.*

I. INTRODUCTION

The bad labelling iron has gained when fountain production is concerned in spite of the numerous fabricability properties is the main drive for this study. According to dimension thru art (2016), "metals, whether it's copper, brass, bronze, iron or steel, have always been the materials for artist throughout the centuries to test and stretch their imaginations. Black (2012), base of the experience with iron and other matels expressed the importance of metal fabrication in various types of construction. Funk (nd).on material and finishes finishing suggests that finishes is one of the means of making a material completely versatile.

Furthermore, aluminium is a highly versatile metal meaning it can be processed to be thin, lightweight, bendable and even crushable by human hands. Besides in is one of the strong and durable materials in construction. (The Aluminium Association. 2020). Scientifically, aluminium to steel welding has not been possible but, but are creative approaches to them. Armao (2012), in his aluminium workshop, suggests possibilities of welding aluminium to steel

Water fountains bring a sample of nature's flowing water into our built environment - from hotel atrium to living room. They add visual and audible interest to any setting and remind us of the waterfalls, creeks, and oceans we love. Fountains by Material. (2008)

The Aluminium Cast Utensils industry according to Yusif, (2015) and (Hannah, 2015) employs raw aluminium cans and aluminium ingots in their production. These utensils do have forms that are essential in fountain production in terms of its conical, cylindrical and half sphere shapes that can contain water.

Meaningful conclusions were however drawn on how iron and Aluminium Cast Utensils can integrate into a fountain. Only that certain procedures and measures must duly be observed especially with the jointing and finishing of the materials. The objective of this study was to identify the properties, possibilities and appropriate finishes based on which a design of a water fountain can be executed. The fountain type considered by this study is an indoor wall fountain.

Moreover, the consideration and the use of these two materials will be of benefit to the respective founders and artisans toward the improvement of their economic standards. This is expected to go a long way to contribute to the achievement of the sustainable development goal eight which talks about decent work and Economic growth. This may result in an increment in the patronage of the utensils especially when such fountains are of higher demand. This will keep our local founders in business; serve as a source of employment for most artisans especially in the casting and fabrication industry.

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II. MATERIALS AND METHODS

With reference to literature about iron, its strength and type were essential in the production of the water fountain. Descriptively, the iron in question is wrought iron with a smooth surface and preferably a less rusty one. This was to take out all factors that will defeat the purpose of this study with relation to rust.

A survey was also conducted on the utensils. During this survey, the aluminium cast utensils were also carefully assessed based on the intentions of the project or be constructed. This survey purposively sampled the workable utensils for the production of indoor water fountains. Figure 1 and 2 below shows the workable utensils and the non-workable ones. this includes their description and the part of the fountain they can be employed in.

Storing bowl: comes in a small, medium and large sizes. They come with lids and are almost conical in shape with the base flat. This kind of utensil is suitable for the stand and basin of an indoor water fountain.

The Pan: comes in small, medium and large sizes. They are half oval in shape. This kind of utensil is suitable for the basin of an indoor water fountain.

The Lid: comes in the sizes of the pots. This kind of utensil part is suitable distributors of an indoor water fountain.

The Pot: they come in 17 different sizes (1/2 to 30) they come with lids and are almost oval in shape. This kind of utensil is suitable for the stand and basin of an indoor water

Ladles and spoon: comes in small, medium and large sizes. They come with half round and half oval respectively. This kind of utensil is suitable for the distributors and basin of an indoor water fountain.

Fig 1:- The useful utensils in indoor fountain production and their description.

The Baker: comes in medium and large sizes. They are round in form. This kind of utensil is not suitable for an indoor water fountain, because it is flat and has man holes that do not follow the fall or water movement flow sequence in a fountain.

The Mortar: comes in one sizes. They are in form of a vase. This kind of utensil is not suitable for an indoor water fountain, because it has a fixed size and its form only create just one side of a fountain part which is the collector or basin.

Fig 2:- The non-applicable utensil for indoor water fountains.

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➢ Design process

The analysis of the two materials influenced five different concepts which developed according to flow mechanisms as shown in figure 3. Concept C was selected with the use of the Matrix importance rating method. This dealt with some characteristics of the fountain. E.g. affordability, attractiveness, sustainability and some few essential ones as outlined in table 1.

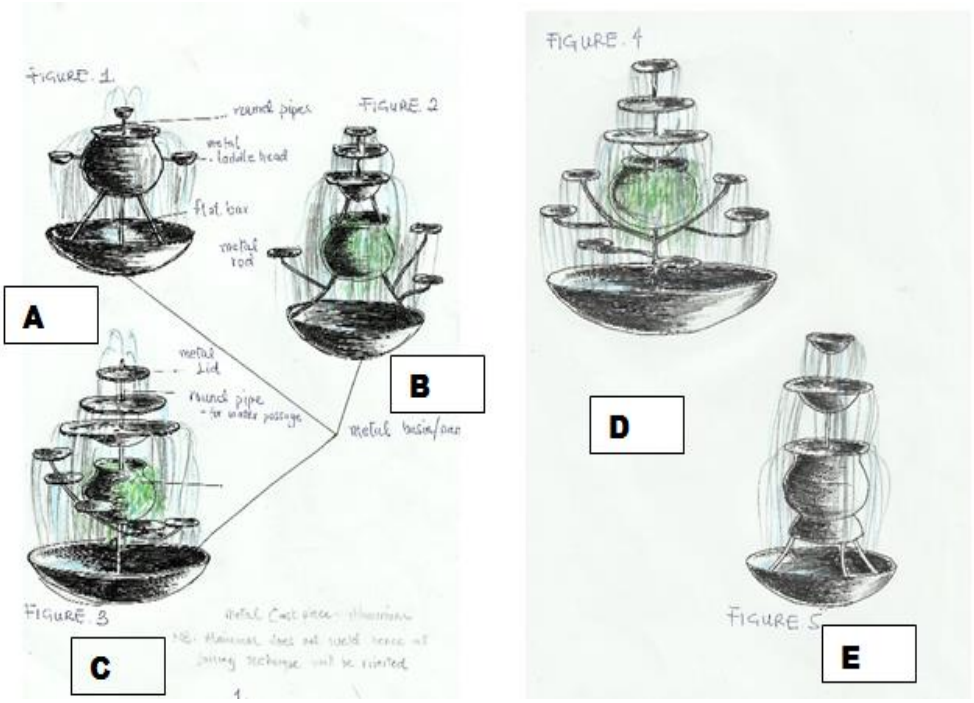

Fig 3:- The fountain concepts developed.

CRITERIA	IMPORTANCE RATING %	CONCEPT A %	CONCEPT B %	CONCEPT C %	CONCEPT D %	CONCEPT E %
AFFORDABILITY	**10%**	9	8	8	5	6
ATTRACTIVENESS	**20%**	14	15	19	19	17
SUSTAINABILITY	**7%**	4	6	6	6	5
STRENGHT	**15%**	8	6	10	11	10
FUNCTIONABILITY	**28%**	20	23	27	5	15
WEIGHT (LIGHT)	**10%**	8	6	5	6	7
SIZE (BULKY)	**10%**	2	6	7	6	6
TOTAL	100%	65%	70%	**82%**	78%	66%

Table 1:- Importance Rating

After the importance rating, Concept C was chosen and develpded with a stand and lamp (figure 4). The final concept is also presented in figure 5 relation the picture of the chosen utensils. this concept was further exploded and detailed to guide the production process as shown in figure 6 and 7. this was done to confirm the compatibility of the form to the design. figure 8 also shows the explode views of the lamp.

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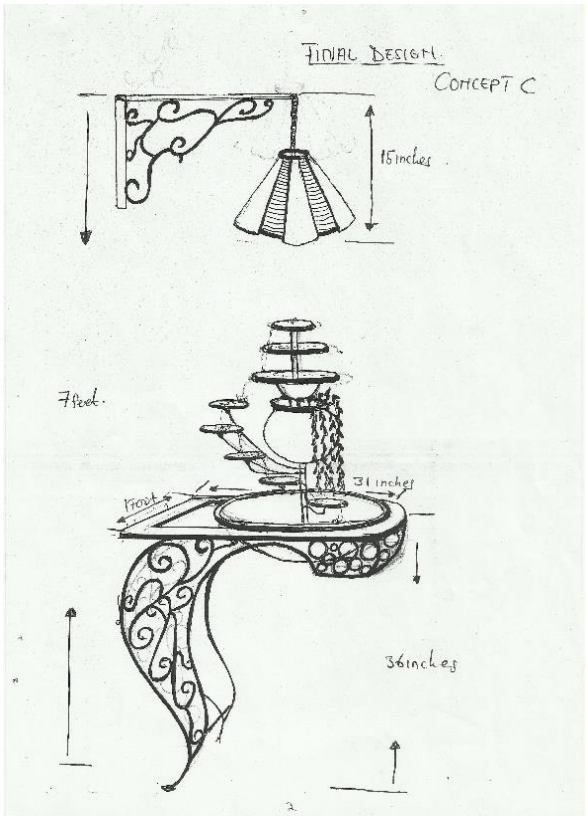

Fig 4: Final concept

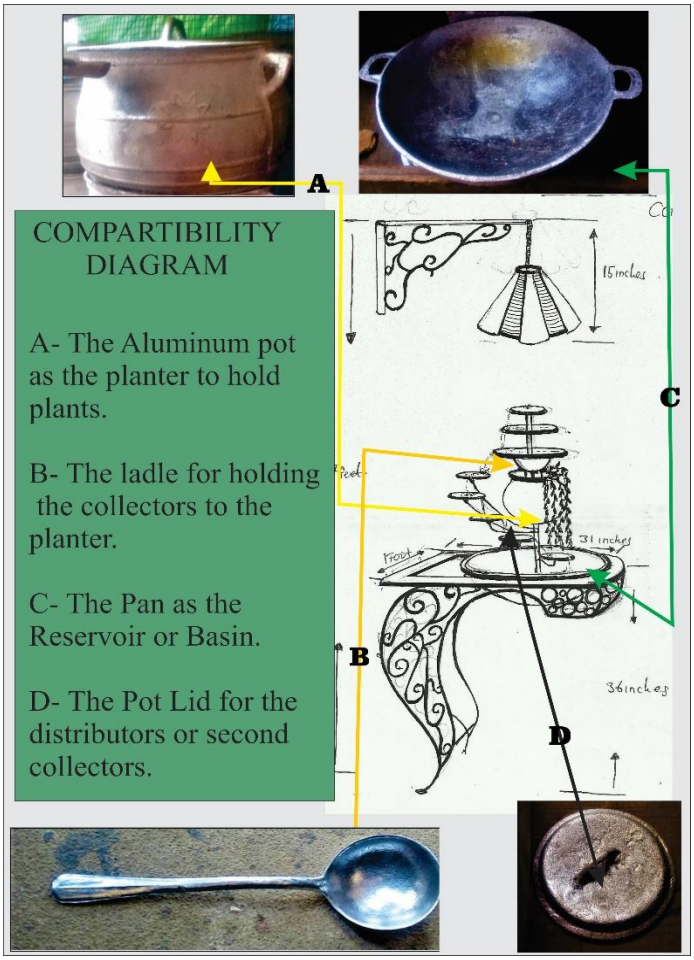

Fig 5:- The Compatibility diagram showing the application of the utensils and iron for the final piece.

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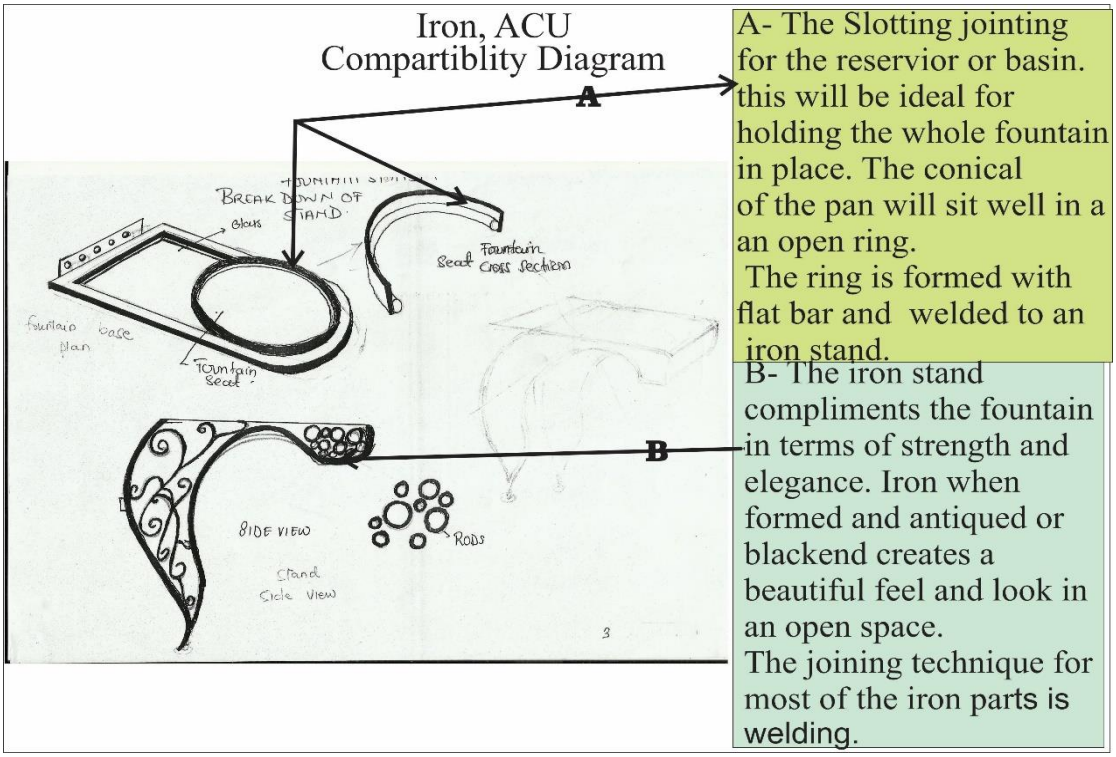

Fig 6:- A Compatibility diagram showing the stand and the ACU fusion.

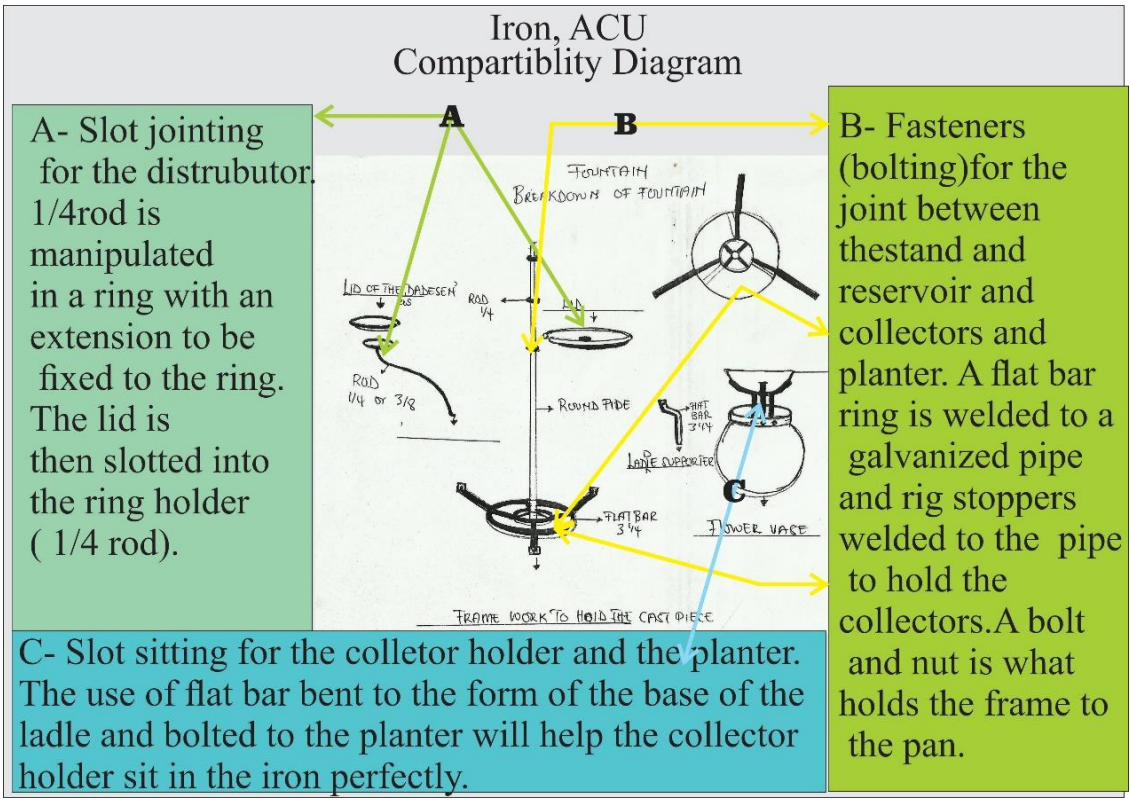

Fig 7:- A Compatibility diagram of the fountain.

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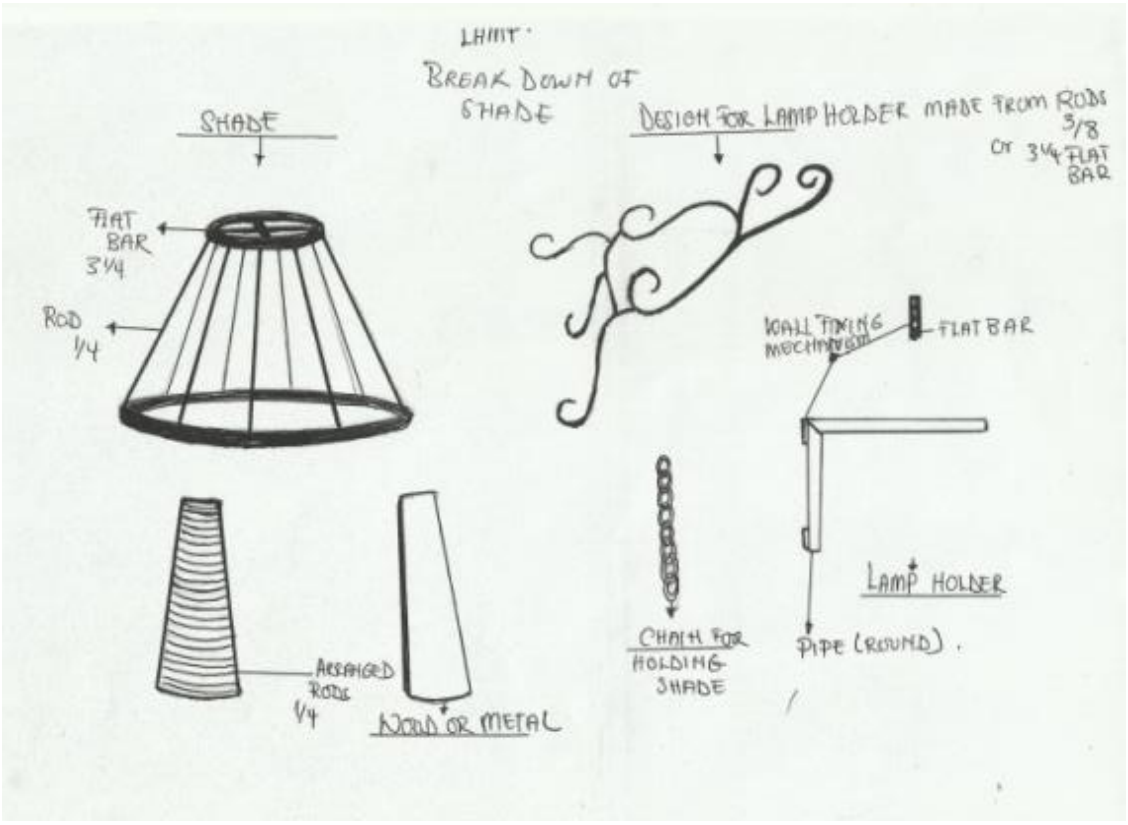

Fig 8:- Exploded view of the lamp.

➢ Working Process

The working process was divided into two parts namely, the conventional and creative processes. The conventional centred on the basic forming processes from measuring, cutting, forming and assembling. The creative parts also centred on the flow arrangement, the flora or foliage placement, finishing and presentation. The conventional process are as follows:

- Drafting of the design.
- Measuring and cutting of the materials into the various parts.
- Forming of the iron into the required shapes.
- Assembling the parts together.
- testing and correcting the flow of the water
- Addition of minor details that forms part of the work
- Surface preparation for finishing
- Application of final finishes (acrylic paints).
- Final Arrangement of the various sections.
- Mounting

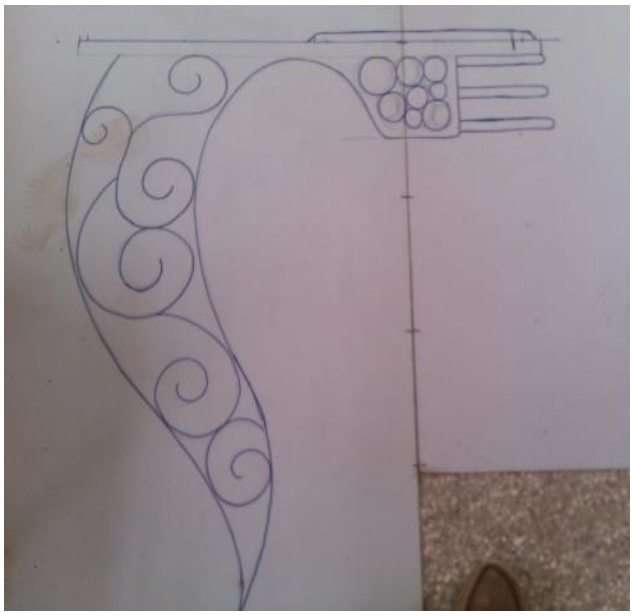

Fig 9:- A drafting for the iron stand.

➢ *Drafting of the design*

For the sake of precision and accuracy, it is required to do an actual size drafting to match the forming process (figure 9).

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- *Measuring and cutting of the materials into the various parts*

Measuring of the members of the construction prior to cutting is required to avoid wastage. this is shown in figures 10 and 11.

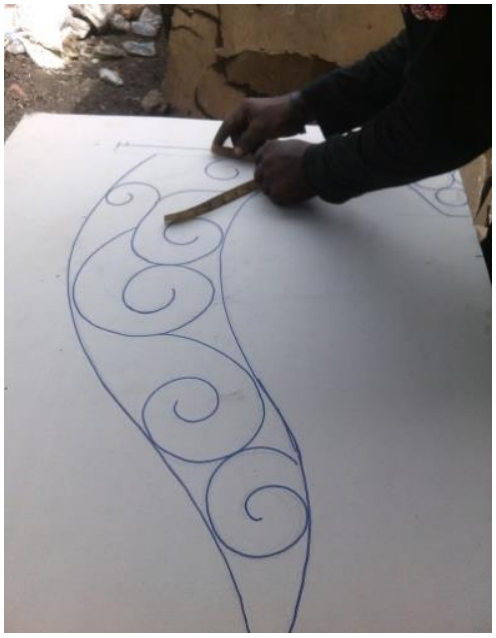

Fig 10:- measuring the design area for cutting.

Fig 11:- Rod cutting for bending.

- *Forming of the iron into the required shapes*

The forming was done through forging, using the draft as a guide as seen in figures 12 and 13. However the rectangular pipe was sawn in regular intervals and bent over a flat bar ring as shown in figure 14 and 15.

Fig 12:- bending of the rods.

Fig 13:- check for accuracy.

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Fig 14:- Ring holder for the basin

Fig 15:- Creating the top seat for the fountain

- *Assembling the parts together (the stand, lamp and fountain frame) respectively*

The members of the respective parts of the fountain were then put together a attain the three parts by arc welding (See figure 16). Figure 17 shows the assembly of the water flow frame of the fountain.

Fig 16:- joining by welding the members together

Fig 17:- assembled fountain part.

- *Testing and correcting the flow of the water*

Series of flow tests were executed to correct the flow defects resulting from the construction (figure 18).

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Fig 18:- series of flow test.

➢ *Addition of minor details that forms part of the work*

Minor details like the water sprouts (figure 19) that form part of the work are added. The pump was adjusted to suit the type of fountain as shown in figure 20.


Fig 19:- A sprout from galvanised pipe.


Fig 20:- the altered pump.

➢ *Surface preparation for finishing*

Auto filler was applied to the surfaces of the metals and sanded a achieve evenness in the forms and connection as seen in figure 21 towards a good finish. Iron oxide paint was then used to preserve the surface (figure 22). The parts were then sprayed with a matt black enamel paint to give them a matt leather background effect as seen in figure 23.


Fig 21:- Auto filler filled and sanded surfaces


Fig 22:- The application of iron oxide paint (antirust).

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Fig 23:- Black matte painted background effect

➢ *Application of final finishes (acrylic paints).*

Application of final finishes entailed gold and silver brushing of acrylic base metallic paint as shown in figure 24.


Fig 24:- Metallic acrylic paint application (Silver and Gold)

➢ *Final Arrangement of the various sections*

The stand, the lamp and Fountain component were finally assemble and test mounted to confirm its function ability and looks.


Fig 25:- Assembled three parts (the stand, the lamp and Fountain).

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➢ *Mounting of the final work*

With the use of a hand drill holes were created in the wall to harness a wall plug for the mountain. The wall plug was then passed through a drilled hole in the metal and to the wall and tightened to keep it firm on the wall. The final work was mounted in an office to preserve it. This is shown in figure 26.

Fig 26:- The final piece mounted in a office

III. RESULTS AND DISCUSSIONS

The final fountain was elegant with relatively lighter weight. it produced serene sounds at the flow of the water. The fountain with light produces a beautiful effect at night. In addition to this effect, the sand casting effect on the aluminium surfaces lustre well with special light distribution effect. Figure 27 shows the resultant final work with a summary of the some essential physical properties. These pertains to the pattern of the flow of the water; the sounds it produces; light reflection; strength and elegance.

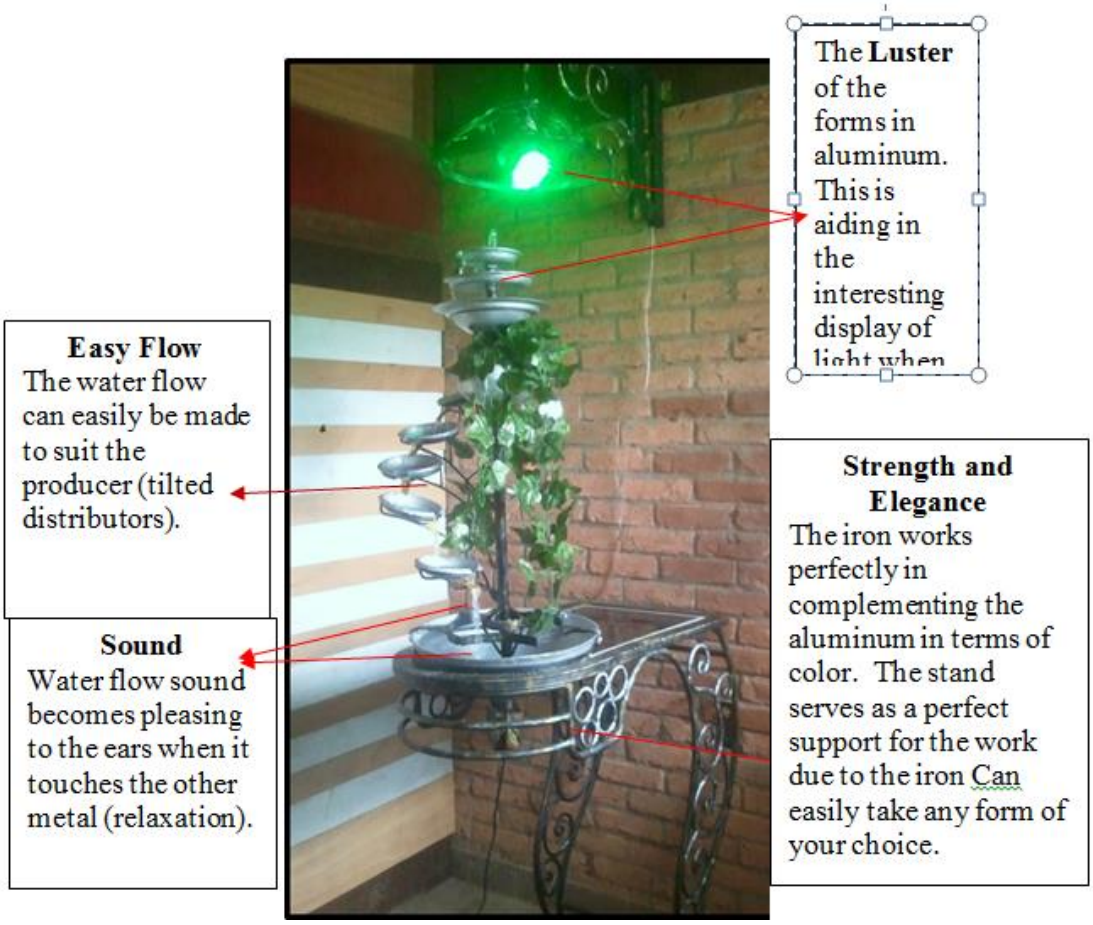

Fig 27:- The final piece showing some physical properties

The acrylic coating on the iron component makes them highly water prove with respect to the functional requirement of the fountain. also the hand applied gold patina finish has rich deep gold highlights with dark oxide undertones whereas the hand applied burnished silver patina has rich nickel silver highlights with dark oxide undertones. These blend well with stainless or nickel accessories and décor. the fountain is also embellishes with creeping floral to produce a natural green effect to calm the environment.

IV. CONCLUSIONS

In conclusion, it could be said that there are available treatment to enable iron to do well in water function related integration. The caldron lid among the local Aluminium Cast Utensils is able to conduct good water flow in fountains. Also the use of aluminium cast utensils and iron has opened an area of diversity in terms of fountain materials.

RECOMMENDATION

The research recommends research into under other situation to make it a material of choice in the art industry. it is also recommended that further experiments and explorations should be done with other locally cast materials to expand their use to bust the casting industry.

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