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Fabrication of Axel (Potter's) Kick Wheel for the Production of Ceramics

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Abstract The wheel is simple equipment which every studio potter desires. There is no complete ceramics studio or workshop without a potter's wheel. Suffice to say that the potter's wheel is an important icon in the pottery studio and in the making of pottery products. The implication of this is that the potter's wheel is indispensable ceramic equipment necessary in the ceramics processing. Unfortunately, though, observations in some established ceramic units in most of our tertiary institutions and some pottery homes today has revealed the absence of some of the vital equipment's for pottery making, in which the potter's wheel is one. This could be adduced to the high cost of procuring such equipment. Recently however, in the quest for self–reliance, most potters have taken to fabrication of local machinery and equipment. In that same manner therefore, this paper documents an illustrated step-by-step approach in the designing and fabrication of a simple potter's kick wheel using the motor axel at a minimum of cost. The fabrication was completed and the equipment was subjected to a vigorous test by using it to produce some ceramic wares, and it was found to be very effective. This document will therefore serve as a call to potential potters from developing countries to attempt fabrication of equipment necessary for the ceramic studios. It finally concludes by recommending the equipment to every ceramic studio, pottery homes and to individual potters.

Keywords Fabrication, Axel, Kick wheel, Studio potters and Production

1. Introduction

The quest for the fabrication of local machinery and equipment as well as self-reliant and self-sufficiency advocacy, has compelled many developing countries such as Nigeria where power energy "Electricity" is not guarantee to power ceramics equipment anytime, including researchers in the universities, to go into fabrications of some vital and/ necessary equipment's. This is evident in the various workshops, conferences, seminars and even in final year student's project works in the Universities. The potter's wheel is one of such projects. The wheel is simple equipment which every studio potter desires. A simple manual wheel may have just the wheel head and a flywheel, suspended on a rigid wooden or metal stand and is being operated with the hand or foot. The wheel head necessarily has to be heavy to enable the machine gather enough momentum for the required speed during the operation. In the wards of Leach (1976. 67), he says, the wheel "--- consist of a wheel-head, or disk, which revolves with considerable momentum and smooth control of speed and is driven by hand or foot, or by gear. The momentum is obtained from either a heavy wheel-head or from a fly wheel."

However, some of the wheels have always been associated with one problem or the other. The electric wheel has not been a total solution to the potter's problem in this regard because of the epileptic power supply in our various communities today. One of the goals of embarking on a manual potter's wheel is to "ensure that its adaptability shall adequately provide efficiency even in the absence of electricity, making it a dependable source for production of pottery wares" (Agberia 1999:18).

The non-availability of the potter's wheel in the ceramic studio has therefore posed a big challenge to the potter and as such, demands for urgent solution. Attempts are therefore made to construct a potter's wheel using the motor axel, to alleviate the potters challenge in the quest for a reliable wheel that will stand the test of time for his pottery production. In the words of Norton (1956. 21), he says "The wheel is the tool of the potter, allowing him to use his skill to quickly produce beautifully shaped pieces, so that they have the freshness and vitality of quick sketches". The wheel is an indispensable and useful tool in the ceramic studio for the production of hollowed ceramic wares, and at the same time its presence enriches the studio environment.

Previously however, the axel wheel has been designed by the researcher but with a difference in the operating system;

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which he regards as being cumbersome, hence the new. In the old design, it was constructed such that it was operated by two persons. While one person is turning the wheel, the other is modeling on the wheel head. (See plate 1). This is somewhat difficult as there could be occasional break in concentration and coordination between the two persons.

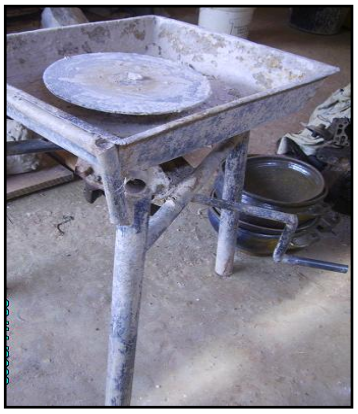

Plate 1. Hand Turning Axel Potter's Wheel

But in this new design, the foot pedal has been incorporated so that the machine could be operated by one person. In so doing, the coordination between the leg, the hand and the brain of the same person is assured.

The heavy wheel head used in this new design is able to combine the function of both the flywheel and the wheel head. Because of this, a little kicking of the foot pedal could register a speed high enough for the wheel to gain the required momentum for the potter to work with. Primmer (1974. 193-194), posits that the weight of the flywheel (or the wheel head) "gave the necessary momentum and the potter was able to vary the speed with his foot. He went further to add "---it is difficult to achieve the necessary speed and pressure if the weight of the flywheel is insufficient." Therefore, the weight of the wheel head and/or flywheel plays a very vital role in the functioning of the potter's kick wheel. The introduction of the foot pedal in this new design has made it possible for the potter to operate the wheel at a speed determined by him. The efficiency of the wheel with its high speed control makes it possible for an experienced thrower to produce a good number of pots on the wheel at a stipulated time.

2. Requirements

Some of the materials required for the construction of the axel potters kick wheel are as follows-

1. Motor car axel
2. Medium size 'H' iron rod (or any other solid metal)
3. 10mm thick metal plate
4. 18-gauge galvanized pan
5. 3.8cm angle iron bar
6. 18mm bolts and nuts
7. Welding equipment.

3. Construction Procedure

The Framework: -

The framework is a three footed assembly, rigidly welded in places to support the weight of the motor axel, the lump of clay and the potter himself. The legs are constructed with a solid and robust 'H' metal rod or a 5cm galvanized pipe to attain the necessary rigidity and stability. In the wards of Primmer (1974 .194), he says "---to obtain the necessary rigidity in the framework it is best to use welded metal construction---". However, any other solid metal rod (or hard wood) could be used. This is braced together with angle iron bars to form a rigid structure for stability and durability. (Plate 2).

Other angle bars are welded to the two 'H' legs, 30cm from the top at a right angle. This will form a seating for the motor axel. (Plate 3). A seating for the splash tray is also constructed on the topmost region of the framework with angle bars to support the splash tray when it is eventually mounted. A fairly thick flat plate measuring 25cm by 25cm is also welded to the top of the third foot which will form the seat for the potter. The plate will eventually be covered with upholstery material to make it comfortable for the potter. A height of between 70cm to 75cm is adequate for the machine.

Plate 2. Framework and Stand for the Wheel

Plate 3. The Seating for the Motor Axel with the Axel Mounted

The Splash Tray: -

The splash tray is constructed with an 18-gauge galvanized metal pan. It is a square open container measuring 68cm by 68cm at the top, tapering down to a depth of 10 to12cm. It is constructed to have enough space around it to place a bowl of water and other working tools while throwing on the wheel. An opening of about 12cm by 12cm is cut at the bottom center of the tray through which the shaft of the axel will protrude to bear the wheel head. A shallow wall of about 6cm is raised around the opening with the pan, to stop water or clay slurry from spilling off the tray onto the axel and the floor during throwing. The tray therefore serves as a receptacle for both water and the clay slurry during throwing. (A large, stiff and shallow plastic bowl could also be fashioned to serve this purpose). This will be mounted on the framework before the wheel head is screwed on. (Plate 4).

Plate 4. The Splash Tray

The Foot Pedal: -

In constructing the foot pedal a 1.3cm galvanized pipe could appropriately be used. This is fashioned into a 60cm long 'L' shape and attached bellow the splash tray seating with a bolt and nut. This is suspended downwards with a hinge-like system welded to it 20cm from the top. The same size of pipe is welded to the bearing at the right hand side of the axel, and projecting about 10cm. A 5cm long flat plate is welded to the other end of this projected pipe. These two constructions are coupled and joined together loosely with a bolt and nut to allow free movement without friction. By using metal washers together with the bolt and nut at the point of their contact, this devise turns the machine freely by kicking it to and fro. (Plate 5).

Plate 5. The Assembly of the Foot Pedal

The Wheel Head: -

The wheel head is fashioned out from a 10mm thick metal plate and cut to a diameter of 30 cm. To achieve a perfect circle, the aid of a compass is required to mark out the size, and is cut with acetylene gas torch. A 20mm nut is then welded to the center of the metal plate with which it would be screwed on to the 20mm shaft bolt that protrudes from the top of the axel. The metal plate necessarily has to be thick and heavy enough. This will aid in gathering the required momentum necessary for the speed and the ease in turning the wheel. Concentric circles are also marked on the reverse side of the plate with a sharp tool. The circles are also necessary as they aid the potter during centering of clay while throwing and also during turning and dressing of his thrown pieces. This plate now functions as the wheel head. (Plate 6).

Plate 6. The Wheel Head

The Motor Axel: -

The axel is a motor part which could be purchased from motor spare parts market. The size varies depending on the size of the motor that uses it. The size used by motor cars and mini buses are adequate and are the recommended size for the construction of a portable potter's wheel. The axel has a top spinning head and two side bearings. These two bearings are connected to the top spinning head with cranks and a shaft. A little turn of the bearings spines the shaft at a tremendous speed. It is this shaft that bears the wheel head. The fast spinning of the shaft and the ease with which it is achieved makes the axel an ideal material for the construction of the potter's kick wheel.

Coupling the Axel (Potter's) Kick Wheel: -

On completion of the framework, the axel is then mounted on its sitting provided for it and tightly screwed down with a bolt and nut. This is followed by the coupling of the foot pedal. The splash tray is then attached next, in such a way that the shaft of the axel visibly projects from the opening that is cut at the base (center) of the tray. The wheel head is a screw-on system, so it is then screwed on the projected shaft from the axel.

The flat pan which is welded onto the top of the third foot of the frame is then covered with soft upholstery material to make it comfortable for the potter to sit on during throwing. With this the wheel is completed, assembled and ready for use. The assembled machine could be coated with high

quality enamel paint for an ideal presentation. (See Plates 7, 8a & b).

Plates 7. The Completed and Assembled Axel (Kick) Wheel

Plates 8. a & b. The Axel (Potter's) Kick Wheel

4. Features

This axel kick wheel was designed and constructed taking efficiency and economy as first priority with emphasis on the following features:

1. Ruggedness, the framework is a robust construction, finished with heavy gauge metal iron bars and rods.
2. Very minimal effort is required in kicking the foot pedal to attain the required speed for throwing.
3. The wheel is fitted with a galvanized splash tray as receptacle for both water and the clay slurry to eliminate messy working environment.
4. The potter's seat is finished with a padded upholstery material for the comfort of the potter.
5. The maintenance cost is very minimal.
6. The wheel is well engineered for rapid and reliable mass production of ceramic wares.
7. The operating mechanism is reversible. It operates both clockwise or counter clockwise for both left hand and right hand throwers.

5. Analysis, Conclusions and Recommendations

In a developing countries such as Nigeria where there is this advocacy for self-reliance and self-sufficiency in the development of machinery and equipment, it has become necessary for potters to individually fabricate various types of equipment including the potter's wheels locally to equip their various studios in order to facilitate pottery production. Constructing and managing a homemade potter's wheel is a challenging venture and most potters manage to improvise one for self sometime. Apart from the savings one makes by constructing your own equipment, like the potter's wheel, there is also the joy and satisfaction in having constructed a successful wheel and using it too. There is nothing like getting on and doing it yourself; solving problems as you go along really helps you understand the equipment, its construction, functioning and maintenance the more.

However, a great deal of thought, calculations and research has gone into the fabrication of this very efficient equipment and I hope it will go a long way to alleviate some of the challenges encountered by most potters. This wheel can conveniently compare with the electric wheel in performance as it takes very minimal effort and energy to operate. It is however very important to use the best material to construct new equipment because it pays.

The quality and ruggedness of the component parts and craftsmanship are superior and the machine is powerful enough to center upwards of 5kg of clay. It is designed for rigorous use in the studio and perfect for anyone from the beginner (armature) to professional. The necessary materials for the construction of this wheel can be purchased within any local environment. Therefore, there is the possibility of fabricating high quality potter's wheels locally for the manufacture of pottery in ceramic studios.

The wheel addresses the latest generation of production machines which is geared towards meeting a variety of important needs, including increased productivity, control and reduced energy consumption. It has been developed to meet the increasing urge for the mass production of ceramic wares. For an individual running a small pottery or a cottage ceramic industry, this machine will play an indispensable role. Products are made in few minutes with ease and for a good professional potter (thrower), he could produce quite a reasonable number of pots within a very short period, depending on his throwing speed.

Pottery can hardly be discussed completely without the knowledge or reference to throwing on the potter's wheel. The absence of a potter's wheel in a pottery studio or workshop reduces such workshop to an incomplete one. Potter's knowledge of the wheel has made it possible to conveniently mass produce ceramic wares by professional potters with ease.

This research paper therefore should serve as a call as well as a challenge to interested studio potters to pick up interest

in the fabrication of vital equipment for their own studio use, rather than resorting to purchasing from the market at exorbitant rate. It is hoped that this axel kick wheel will aid in the development of functional and practical knowledge of ceramics as well as be an eye opener to researchers in other research areas of machinery fabrication and acquisition. It will also encourage effective learning program for ceramic enthusiasts.

Plate 9. The machine is powerful enough to center large lumps of clay

Plate 10. The wheel aids mass production of wares by competent potters

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