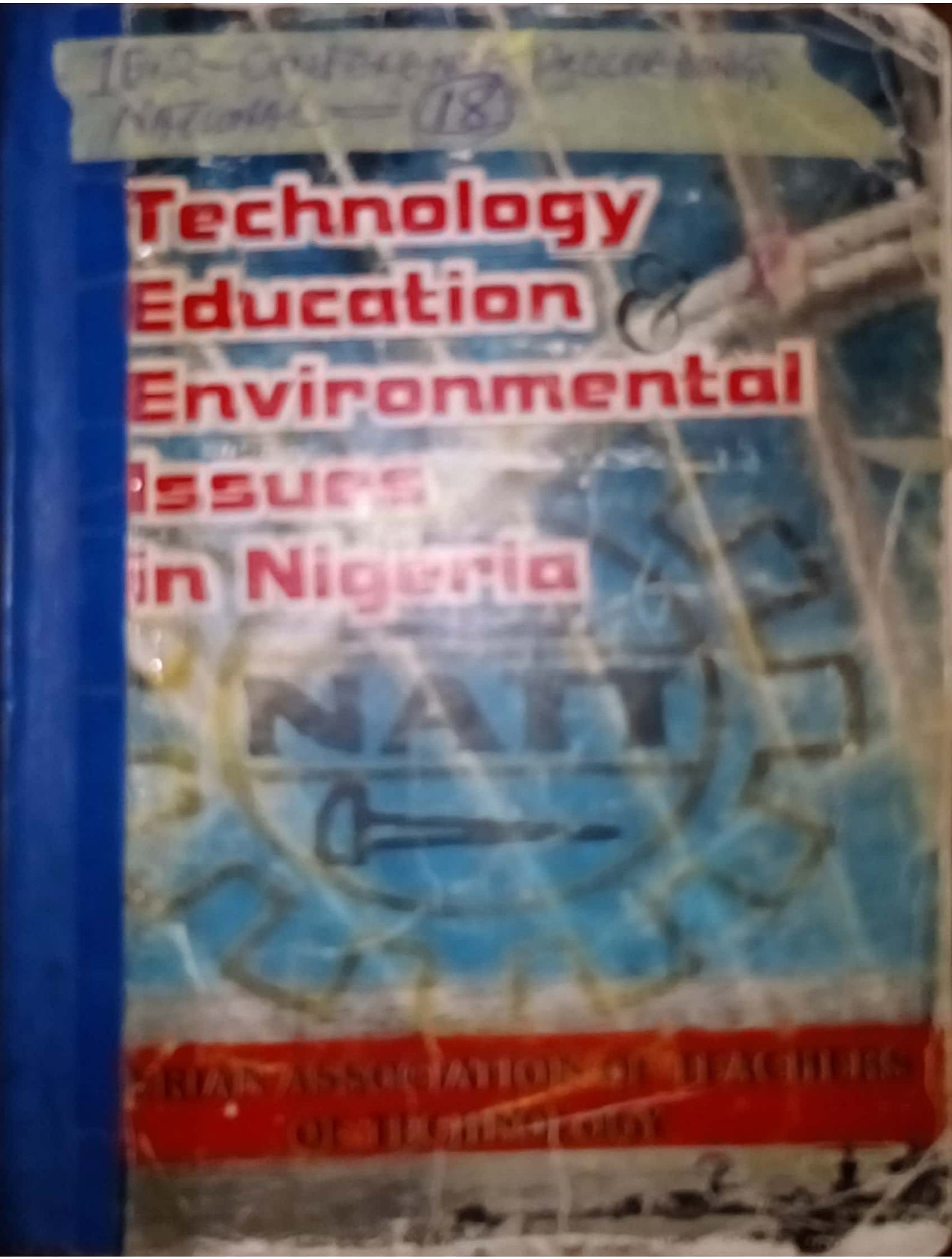
Technology Education & Environmental Issues in Nigeria



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CONTENTS

SECTION B:
TECHNOLOGY EDUCATION AND ENVIRONMENTAL RESOURCES MANAGEMENT IN NIGERIA.

DESIGN AND FABRICATION OF ENVIRONMENT FRIENDLY MANUAL BLACK-SMITH'S FORGE

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ABSTRACT

This paper presents the result of a practical work carried out to fabricate manual Blacksmith's forge for convenience of local Blacksmith and benefits of rural community. The design specification was solely based on the available local materials. Angular mild steel bars (50 x 50mm); mild steel plate (1mm thick) cut to standard and clay serving as refractory material were the major materials used for it's fabrication. The angular bars were welded mild steel sheets riveted and clay bricks were built in the chamber. The result shows that the fabricated Black-smith's forge had greater efficiency as compared to labour intensive bellow used by Black-smiths and that it can also be adapted for melting of some non-ferrous metals for casting purposes.

INTRODUCTION

It is unfortunate that in spite of the potentials inherent in our rich traditional technologies, such as metal work, pottery, woodwork, leatherwork, artistic design e.t.c. which could have served as ideal springboard for our technological development, we still rely on the importation of finished technology from the developed countries. The fact is that Nigeria will never achieve self-reliance without technological innovations, which demand initiative, resourcefulness, hard working and management of determined effort. We must replicate and improve presently acquired technology without external assistance. The present economic predicament calls for re-examination of how well Nigeria as a nation is doing in the area of developing sound technological base.

Despite the achievement of highly sophisticated technology in the developed countries, Nigeria need to develop and promote her indigenous technology and innovations to transform her rich and varied natural resources into physical wealth. Takura, (1999) noted that this can be done through experimentation, refining, replication and commercializing technological innovations in our research institutions.

The objective of this paper therefore is to practically forward a simple device, that will replace labour intensive "bellow" used by Black-smith to heat all categories of metals especially steels to the required temperature for forging and other heat treatment processes. This work was produce by simplest production processes (cutting, rolling, riveting, welding etc) and all the materials used can be sourced locally, especially now that Ajaokuta steel company is gathering momentum on the production of steel. Hence a rural environment friendly design.

MATERIALS AND METHOD

The primary materials used in this work are mild steel (Angular, flat, sheet and rod/shaft), clay and a string of rope. Angular mild steel (50 x 50mm) totaling 12.380mm length was used for the body

the fire from gradually burning through the plates. He stressed that no lining is required for a cast iron forge.

The use of paint as a protective coating for the forge was based on the fact that it is easily available, cheap and convenient method over other types of protective coatings like vitreous enamel, electroplating, oxide coating e.t.c. This is in agreement with Aliyu (1998) who maintained that painting is very cheap and convenient method of protecting projects designed to meet rural needs.

CONCLUSION

An attempt has been made here to forward an innovation over a labour intensive bellow currently used by local Black-smiths for forging and other heat treatment processes. Based on this, economic status would be improved if this forge is put into use by the Blacksmith.

All materials used in the fabrication of the forge can be locally sourced. This makes it indigenously applicable to Nigeria situation. Also the forge could perform functions of it's electrical type used in the urban cities hence it is a replica and rural environment friendly design.

RECOMMENDATION

Based on the above, the following recommendations are adjudged to be necessary:

1. To limit the cost, producing the blower directly at the back of the forge could eliminate the stand, which accommodates the blower.
2. The future designer should provide a better way of fastening the blower to the stand instead of the welding use by this designer.
3. For future improvement, the wheels could be more standard to accommodate standard belts instead of rope used here.
4. Gears may be employed instead of using belt as means of motion transfer.
5. The designer was forced to use the available resources at his disposal, it is therefore recommended that mild steel plates of 2mm could be used for chamber coverings.
6. Wheel ratio could be increase from 1:4 to say 1:6 so that rate of blast from the tuyere is improved upon which in turn dictates it efficiency.
7. Chimney should be introduced in the subsequent design in order to transfer the fumes away from the user.

REFERENCES

Aliyu, U.B (1997) Design and construction of charcoal fired manually operated crucible furnace. Unpublished H.N.D project work Kwara State Polytechnic, Ilorin.

Amstead, B.H, Ostwald, P.F and Begeman, M.L. (1979) *Manufacturing Processes*. New York: John Wiley and sons.

Chapman, W.A.J (1982), and *Workshop Technology Part 1*, Great Britain: Edward Arnold LTD.

Gwun, J.N (1966), *Metal Work Theory For School Certificate And G.C.E.* Ibadan: spectrum books.

Gran, D.R (1976), *The Refractory Materials*. Britain: Allen press.

Obi, V.S (1995). Experimental Analysis on the refractory properties of local clay ... for furnace building. Unpublished B. Eng. project work Federal University of ... Minna.

... Tukura, H.M. (1999). strategies for incorporating technological innovations in Nigerian ... Education system in Momoh, G.D. (ed) Nigerian Association of Teachers of ... (NATT) conference proceedings. (73-77).