

Patent No. 1

Federal Republic of Nigeria

Patent No.: RP: 16173

Date of Patent: 6 April 2005

Igbeka at al.

Date of sealing: 25 August 2005

Title: Briquetting of Wood and Agricultural Wastes for Energy Production

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Summary

The saw milling industry in Nigeria currently generates as much as 1.72 million cubic meters of wood waste annually. Sawdust constitutes the bulk of these residues. Sawdust disposal constitutes a major problem with pollution and fire hazards as it attracts little or no significant commercial value. It is either disposed off by way of incineration at mill sites thus causing environmental pollution or partly used as fuel in local stoves for domestic cooking. The practice is environmentally unfriendly. There is the need to develop appropriate technology for processing the sawdust into higher-grade products such as briquettes for cooking and heating purposes. On the other hand, the energy crisis in Nigeria has been a great concern for many decades. Depletion of fossil fuel deposits, threat of supply instability, and rising petroleum prices are the main drive for reactivation of interest in fuel wood.

A multidisciplinary research team drawn from three (3) departments of the University of Ibadan: Mechanical Engineering, Agricultural and Environmental Engineering, and Forestry and wildlife was constituted as one of the University Mission Research (UMR) to develop a sustainable and indigenous technology for processing of sawdust and agricultural wastes into briquettes for cooking and heating. The objectives of the project were to: (1) design and fabricate a manually operated sawdust briquetting machine to be used in rural areas where there is no electricity supply, (2) design and fabricate a motorized sawdust briquetting machine to be used in urban areas where there is electricity supply, (3) produce stable sawdust briquettes with locally sourced binding agents, (4) develop suitable stove configurations for combusting the briquettes.

The binding properties of different locally sourced artificial binding agents such as cassava starch, corn starch, coco-yam starch, Kaya gum, and plant resin at different concentrations have been investigated at binding temperatures to determine the optimum process parameters required for producing stable briquettes of different sawdust and agricultural wastes. Different compaction mechanisms such as: screw press, ring-die press, and piston-die press were investigated. Different configurations of the stove required to burn the briquettes with efficient heat release without smoke were also investigated.

The research effort of the team has led to the determination of optimum process parameters required for production of stable and combustible briquettes of different sawdust and agricultural wastes and required machinery have been designed and fabricated locally. A commercial scale manually operated briquetting machine with capacity of 1.0 tonne/day has been designed and constructed. A motorized model with capacity of 1.0 tonne/hr and suitable stove configurations for burning the briquettes were also designed and fabricated using locally sourced materials.

This project was one of the projects exhibited by the University of Ibadan at the National University Commission (NUC) exhibition at Abuja and during the 60th Anniversary exhibition.

This project has shown the way forward in generating wealth from wastes, environmental improvement, employment generation, energy security and poverty alleviation. The University is currently seeking for investors for full scale commercialisation of the project.



FEDERAL REPUBLIC OF NIGERIA

Patents and Designs Decree 1970
(1970No. 60)

PATENT No. RP:16173.....

PATENTS FORM NO. 4

Date of Patent: 6/04/2005.....

Date of Sealing: 25/8/2005.....

Olusegun Obasanjo President of the Federal Republic of Nigeria and
Commander in-Chief of the Armed Forces.

AS a request for the grant of a patent has been made by THE UNIVERSITY OF
OF. JOSEPH C. IGBEKA/PROF. LABODE POPOOLA/PROF. S.S. AJAYI/ PTO
sole use and advantage of an invention for

"USING OF WOOD AND AGRICULTURAL WASTES FOR ENERGY PRODUCTION"
AND WHEREAS the Federal Government being willing to encourage all
inventions which may be for the public good, is pleased to accede to the request:

I, THEREFORE, that I do by this instrument give and grant unto the person
named and any successor (s), executor (s), administrator(s) and assigns (s)
any of whom are herein after referred to as the patentee) my especial
full power, sole privilege, and authority, that the patentee or any agent
of the patentee may subject to the conditions and provisions prescribed by
law in that behalf made, order for the time being in force at all, times hereafter during the term of
years mentioned, make, use, exercise and vend the said invention throughout
the Federal Republic of Nigeria, and that the patentee shall have and enjoy the whole
sole advantage from time to time accruing by reason of the said invention during
the term of twenty years from the date first above written of this instrument. AND to
the extent that the patentee may have and enjoy the sole use and exercise and the full
benefit of the said invention-I do by this instrument strictly command all citizens of
the Federal Republic of Nigeria that they do not at any time during the continuance of
the term of the said invention either directly or indirectly make use of or put in practice the said
invention or in any wise imitate the same, without the written consent, licence or
agreement of the patentee, on pain of incurring such penalties as may be justly
inflicted on offenders, and of being answerable to the patentee according to law
for damages thereby occasioned:

IT IS ENJOINED ALWAYS that this patent shall be revocable on any of the
grounds mentioned in the Decree to time by law prescribed as grounds for revoking patents granted
by me and the patent shall be revoked and made void accordingly:

but nothing herein contained shall prevent the granting of
such considerations as they may by law be granted.

MADE this day of

Sept.

Two thousand & five

Registrar of Patents and Designs



Ref. No. 152/2005

Federal Ministry of Commerce & Tourism
Commercial Law Division
Patents Registry,
Garki - Abuja

Date: 11/11/2005

UNIVERSITY OF IBADAN/UMR
UNIVERSITY RESEARCH
IBADAN NIGERIA - NIGERIA

Sir,

I hereby acknowledge the receipt of your letter/application Ref. No. 152/2005
dated 11/11/2005 including the following documents:-

- 1. Form 1A ✓
- 2. Form 1D
- 3. Form 2
- 4. Form of Assignment
- 5. Form 3 in duplicate ✓
- 6. Specification in duplicate
- 7. Certified copy of specification
- 8. Drawings

relating to an application by THE UNIVERSITY OF IBADAN / PROF. JOSEPH IGBERA / PROF. CAROL PBOOLA / PROF. S. S. AJAYI / DR. MUSA A. OLUKUNLE / DR. ABEL O. OLORUNNICOLA / DR. ABDULGANYI RAS / DR. E. R. AFRIFA / DR. DAVID A. IYANKE NIG. INST. TECHNOLOGY
the grant of a Patent for an invention in respect of BRIEFING OF WIND AS AN APPROPRIATE MEANS FOR ENERGY PRODUCTION

I am also informing you that the application has provisionally been allocated the official Filing
11/11/2005 and official application number 152/2005

Amounts marked have been

Yours faithfully,

Registrar of Patents & Designs
Commercial Law Division
Patents Registry,
Garki - Abuja