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Presenting a new multi-functional adobe for health systems

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[3]*(IFIA Inv. Member, Verification Number: IR2020MAR010ACXM)*
[4]*(IFIA Inv. Member, Verification Number IR2020MAR013DCXM)*
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ABSTRACT:Adobe bricks (mud bricks) are made of earth with a fairly high content of clay and straw. Adobe bricks are only sun-dried, not fired. Many old historic buildings and even many current buildings around the world are made of adobe which is a durable, economical, and environmentally friendly material. There are different types of adobe with different structures. In this study, we will present a new multi-functional adobe with US patent publication number 2011/0203197 A1 with various benefits for the health system. This adobe due to the type of arrangement can prevent the transmission of harmful waves from MRI, CT scan, and radiation therapy rooms in hospitals. On the other hand, it can be used as a powerful tool to prevent the transmission of sound waves in medical centers. In addition, its portability and different sizes are other advantages that allow this type of Adobe to be used in emergency situations, such as the development of a medical center in times of Covid19.

KEYWORDS: Multi-functional adobe, Waves Insulation, Sound Insulation, Health Systems.

I. INTRODUCTION

Adobes are dried mud or unburned bricks that have been used for thousands of years in the construction of dwellings and other structures. Even today most people in the world use mud brick construction. The term adobe is generally used to describe various building materials made of earth and the techniques for using these materials. Most often it refers to sun-dried brick, currently the most widely used in the United States, but puddled earth material, mud plastered logs or branches, cut soil horizons, and even rammed-earth construction also can be identified as adobe. As a general rule, any structure that has been made with earth or mud as the main building material is considered adobe [1]. There are several studies on adobe quality improvement, their applications and their benefits. Here is a brief summary of some of those studies.

In Southern Peru, the challenge of detecting archaeological adobe structures was addressed using Quick Bird imagery [2]. Daudon et al., indicated that the discrete element method for adobe construction can be useful for places where transportation is difficult [3]. Some studies indicate the advantages and disadvantages of adobe, the main advantages of which are simple and inexpensive construction technology, excellent thermal and acoustic properties. However, adobe installations are vulnerable to the effects of natural phenomena such as earthquakes, rain and floods [4, 5]. On the other hand, some researchers have focused on improving the adobe structure. They considered the composition of the fiber in previous adobe materials. In fact, they claim that rammed earth building materials are often vulnerable to cracking due to excessive drying shrinkage deformation due to the high fine particle content. Therefore, it is possible to advantageously add fibrous materials, not only to reduce such crack formation, but also to improve mechanical performance [6- 10]. Savary et al, studied improving the properties of the adobe material by

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processing the laser material. They demonstrated that the laser shock treatment operation can be exploited to analyse the extent of the change in mechanical strength and moisture resistance of the rammed earth material and, ultimately, to test its applicability to build heritage [11]. Farajnia et al, indicated the efficiency of ureolytic bacteria isolated from historic adobe structures in the production of biological bricks. In this study, 25 soil samples were collected from historic adobe structures and deserts in the central provinces of Iran. The samples were screened for urease-producing bacteria in order to find native bacteria and to assess the possibilities of producing biologically cemented bricks [12].

The gap in the literature has shown that there is no study on the benefits of adobe for all types of buildings, including hospitals. The main objective of this study is that we have introduced a new type of adobe that can be used in emergency situations like some field hospitals do. The main advantage of this invention is the simple arrangement of the adobe blocks due to their puzzle shape and easy transportation. This advantage allows adobe blocks to absorb magnetic currents in hospital MRI, CT scan and radiotherapy rooms and not to penetrate outside of rooms. On the other hand, this type of adobe blocks can be used as sound insulation in hospital walls so that patients can rest in better conditions. In addition, in an emergency, buildings can be structured in no time with these adobe blocks.

The rest of the article is organized as follows:
Section 2 gave the methodology of multifunctional structures in adobe. The conclusion is presented in section 3. Finally, the certificates of all medals and awards are appended.

II. METHODOLOGY OF MULTIFUNCTIONAL ADOBE

Adobe bricks are rectangular prisms small enough that they can individually air dry quickly without breaking. It is an ancient building material usually made of sand, clay, and well-compacted straw or grass mixed with moisture, shaped into bricks and dried or baked naturally. Among the different types of adobe, the multi-functional adobe with the **US patent publication number 2011/0203197 A1** can be used in emergency situations, such as the field hospital, due to the variety of shapes, sizes, dimensions, and the use of different composite materials in the manufacture of adobe. One of the most important reasons for this is a quick and easy arrangement in a short time with minimal cost. Actually, these adobe blocks are very inexpensive and have no size and dimension limitation. This advantage allows adobe manufacturers to produce adobe blocks in different sizes according to the needs of the consumers. Another advantage of this new multifunctional adobe is that due to the shape of the layout, they can be used as different types of insulation, including magnetic field insulation, electric field insulation, insulation of the electromagnetic field, the isolation of the radiation field. The use of this adobe inside hospital walls leads to the absorption of harmful waves in MRI, CT scans, and radiotherapy rooms. On the other hand, it can be used as soundproofing in various buildings including medical centres. Fig 1 shows the basic form of the multi-functional adobe and its arrangement method.

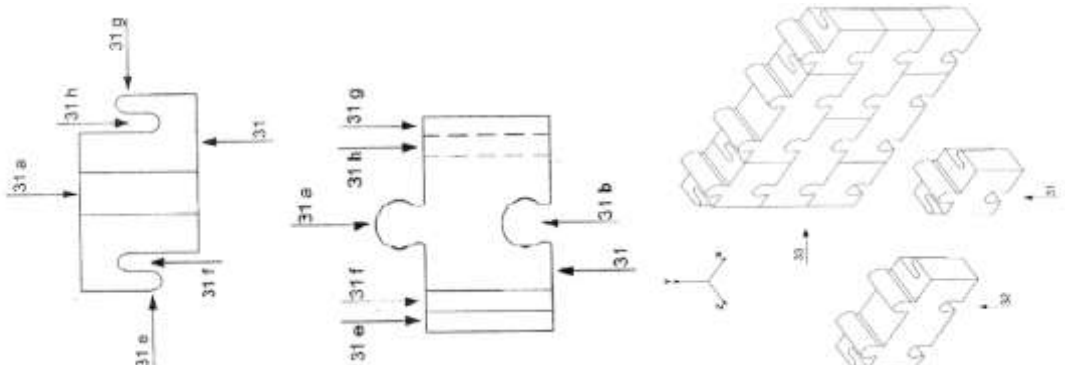

Fig. 1. The basic form of the multi-functional adobe

As can be seen in figure 1, due to the easy and complete arrangement of the adobes into each other and the possibility of building them in different sizes, they can be used in very urgent times

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such as the construction of medical centers in different places. One of the most applicable sections that can be used by this facility is the expansion of medical centres during the period of Covid-19 prevalence.Fig 2 illustrates the multi-functional adobe manufactured in small dimensions.

Fig. 2. The multi-functional adobe

Another advantage that leads to increased use of these adobes is that this structure does not need cement. This advantage reduces the environmental pollution caused by cement.
It should be noted that, in the appendix, the certifications of all the awards and medals are indicated.

III. CONCLUSION

Adobe is a material used for construction that is made of organic materials such as earth, clay, straw, and so on. In this study, we have introduced a new multi-fictional adobe that can be used for making various structures including hospitals and medical centers in emergency times. The most important advantage of this adobe is that it can be applied to absorb harmful waves from MRI, CT scans, and radiotherapy in hospitals and medical centers. Moreover, the use of it is useful as sound insulation in medical centers for better patient rest. It takes little time for a structure of different sizes and dimensions and is so inexpensive.

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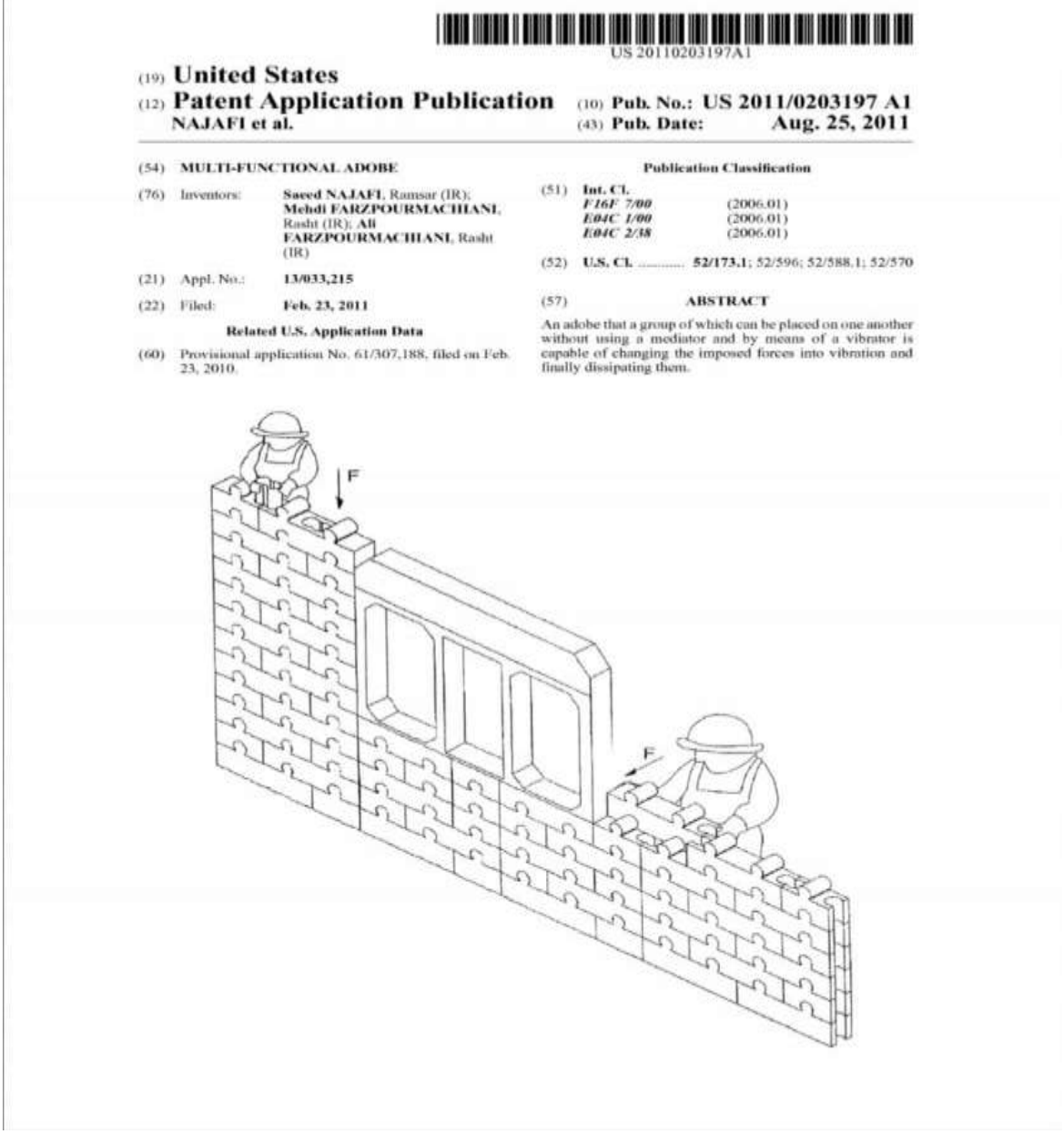
Appendix

A. US Patent application publication



US 20110203197A1

(19) **United States**

(12) **Patent Application Publication**

NAJAFI et al.

(10) **Pub. No.: US 2011/0203197 A1**

(43) **Pub. Date: Aug. 25, 2011**

(54) **MULTI-FUNCTIONAL ADOBE**

(76) Inventors: **Saeed NAJAFI**, Ramsar (IR); **Mehdi FARZPOURMACHIANI**, Rasht (IR); **Ali FARZPOURMACHIANI**, Rasht (IR)

(21) Appl. No.: **13/033,215**

(22) Filed: **Feb. 23, 2011**

Related U.S. Application Data

(60) Provisional application No. 61/307,188, filed on Feb. 23, 2010.

Publication Classification

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F16F 7/00 (2006.01)
E04C 1/00 (2006.01)
E04C 2/38 (2006.01)

(52) **U.S. Cl.** **52/173.1**; 52/596; 52/588.1; 52/570

(57) **ABSTRACT**

An adobe that a group of which can be placed on one another without using a mediator and by means of a vibrator is capable of changing the imposed forces into vibration and finally dissipating them.

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B. EHREN-URKUNDE/DIPLOMA- iENA Germany

EHREN-URKUNDE/DIPLOMA

iENA 2015

Internationale Fachmesse

»Ideen - Erfindungen -Neuheiten« Nürnberg

International Trade Fair

»Ideas-Inventions-New Products« Nuremberg

Mehdi Farzpourmachiani, Ali Farzpourmachiani, Saeed Najafi
University of Vienna

wird für die Teilnahme an der iENA 2015 – Internationale Fachmesse „Ideen - Erfindungen - Neuheiten" ausgezeichnet.
will be distinguished by a diploma for the participation at the International Trade Fair iENA 2015 „Ideas – Inventions – New products"

Die Erfindung / Neuheit
The invention / new product

Multi-funktionaler Lehmziegel
Multi-functional adobe

hat maßgeblich zum Erfolg der iENA 2015 beigetragen.
make significant contributions to the success of the iENA 2015.

AFAG Project Management iENA

Henning Könicke

31. Oktober 2015

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C. 6th annual international invention innovation competition in Canada/ iCAN 2021

CERTIFICATE OF AWARD

THIS CERTIFICATE IS PROUDLY PRESENTED TO

Mehdi Farzpourmachiani Simin Naghibi Masouleh
Ali Farzpourmachiani Amir Berenjkar Saeed Najafi Hamid Shatranji
Ashkan Maghsoudi Ghashghaeinejad Behnam Heidari

FOR THE ACHIEVEMENT OF

GOLD MEDAL

BY THE INVENTION · INNOVATION ENTITLED :

A method special for adobe (Multi-Functional Adobe)

AT THE 6TH ANNUAL INTERNATIONAL INVENTION
INNOVATION COMPETITION IN CANADA, iCAN 2021

ORGANIZED BY TORONTO INTERNATIONAL SOCIETY
OF INNOVATION & ADVANCED SKILLS (TISIAS)

HELD ON AUGUST 28TH, 2021 IN TORONTO, CANADA

MOUNSUE CHANG

BOB HUYBRECHTS

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D. 6th international invention innovation competition in Canada/ iCAN 2021

TISIAS

certificate of achievement

SPECIAL AWARD

Presented to

Mehdi Farzpourmachiani Simin Naghibi Masouleh
Ali Farzpourmachiani Amir Berenjkar Saeed Najafi Hamid Shatranji
Ashkan Maghsoudi Ghashghaeinejad Behnam Heidari

in recognition of excellent invention/innovation of

A method special for adobe (Multi-Functional Adobe)

exhibited and presented at

The 6th International Invention Innovation Competition in Canada
<iCAN 2021> held on August 28th, 2021 in Toronto, Canada

MOONSUK CHANG
Chairman & Chief Exhibition Officer
TISIAS – Toronto, Canada

BOB HUYBRECHTS
Chairman of the Jury
iCAN – Toronto, Canada

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E. ISIF'21/ Istanbul 2021

F. ISIF'21/ Istanbul 2021

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G. EURO Invent 2021

H. EURO Invent 2021

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I. IFIA

J. E-NNOVATE 2021

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K. E-NNOVATIVE 2021