

Cost Effective Jaw Fixation System (2013-089)

Allows Site-specific Application of Fertilizer, Reducing Waste and Enhancing Environmental Quality

Market Overview

This jaw fixation device is a patient-specific orthotic that decreases the risk of surgical complications and operating time. Each year nearly one million Americans suffer a traumatic injury that requires surgery to fix their broken or fractured jaws and over 48 thousand will develop oral cavity or oropharyngeal cancer. Due to increasing incidence of facial fractures and the demand for reconstructive surgery after accident and oral cancer removal procedures, the market for Craniomaxillofacial (CMF) Devices is expected to reach \$1.24 billion by 2020. Currently there are several clinically accepted approaches for jaw fixation, including arch bars, bone supported devices, and Ernst ligatures. These procedures correct the alignment of fractured jaw bones by stabilizing and maintaining proper anatomic positioning. However, these fixation approaches require lengthy installation procedures, cause serious risk of blood-borne pathogen exposure for the surgeon, and are uncomfortable and potentially dangerous for the patient. A Greenville Health System clinician and Clemson University researchers have developed a customized jaw fracture stabilization device which can be installed in 30 minutes or less, decrease hospital costs, and prevent damage to pediatric patient tooth root and adult teeth. Furthermore, the device significantly improve overall patient comfort and safety. The device features a custom mold of the patient's teeth and quick release mechanism for emergency situations, resulting a jaw fixation solution that can be customized in the clinic, is safer, more comfortable, and more affordable for both patients and hospitals.

Application

Fixation and repair of Mandibulo-Maxillary Fractures

Stage of Development

Validated Prototype

Advantages

- Requires simple, 30 minute installation, reducing operation time drastically
- Uses a custom molded splint design, resulting in a patient-specific fit and increased support for loose or damaged anterior teeth
- Includes a quick-release locking mechanism, allowing for loosening of the fixation for emergency situations such as choking and vomiting
- Allows for easier patient intake of nutrition by mouth and good oral hygiene

Technical Summary

A team of researchers at Clemson University, in collaboration with an oncology surgeon at the Greenville Health System, have designed a customized mandibulomaxillary fixation device that addresses the need for shorter installation procedures and increased oral health. This device is customized by using Computed Tomography (CT) scans of the fractured facial bones to create personalized fixation splints. These splints are aligned to the patient's teeth and jaw, and the locking mechanism is attached to keep the jaw secured for six weeks. The device also incorporates a quick release locking mechanism that allows the jaw to be opened for nutrition intake and in the case of an emergency such as vomiting or choking.



Figure 1: Customized Mandibulomaxillary Fracture Stabilization System with locking quick-release locking mechanism

App Type	Country	Serial No.	Patent No.	CURF Ref. Number	Inventors
Non-Provisional	United States	61/882,208 14/496,015	NA	2013-089	Robert Brown, Tyler Youngman, Natalie Patzin, John O'Donnell, Jeff Willis

About the Inventors

The **Bioengineering Department at Clemson University** is widely recognized as a pioneer in the field of biomaterials science and engineering. One of the oldest in the world, Clemson's bioengineering program was started in 1963. The Society for Biomaterials (SFB), the premier professional society for the field, began at Clemson in 1974 after a series of annual symposia. The SFB annually recognizes three outstanding researchers in the field through its Clemson Award for Contributions to the Literature, Clemson Award for Basic Research and Clemson Award for Applied Research. Clemson's Department of Bioengineering is also the curator of the C. William Hall Biomaterials Documentation Center, an international database of archived documents in biomaterials.

Dr. Robert O. Brown realized the need for a superior mandible fixation device and collaborated with a team of researchers at Clemson University to develop his idea from concept to prototypes. In addition to being Division Chief, he is the Director of Facial Plastic and Reconstructive Surgery, Co-Director of the GHS Facial Trauma Network, Attending Surgeon of Otolaryngology - Head and Neck, an Assistant Professor at the USC School of Medicine, Greenville, and LtCol, US Air Force Reserve, 59th Surgical Specialty Squadron in Texas.

For More Information

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