Health Technology Transfer Center
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Teaser Memorandum

Catholic University Industry Academic Cooperation Foundation

Radio Frequency Coil Unit, Head Fixing Unit and Magnetic Resonance Imaging System Having The Same for Use of Dental Clinic

Executive Summary

□ **Simple Organization History**

Catholic University Industry Academic Cooperation Foundation was established in April 2004. Seoul City Government supported, Industry Academic Cooperation Foundation Activation Support Project was selected in August 2005. Ministry of Education, Science and Technology supported, University Institute Leading Technology Transfer Task Force Organization Support Project participated from July 2006 to present.
Ministry of Commerce, Industry and Energy supported, University Unemployed Technology Development and Transfer Project was selected in January 2007. Institute's Intellectual Property Right Acquisition Consulting Project progresses from 2008 to present.

□ **Major Pipelines and Technologies**

- Neurobiology : Study on disease occurrence mechanism and treatment of brain nerve disease
- Medical Cell Biology : Study on cell modification and cell signal transfer/development of epigenetic predictor
- Immunobiology : Study on therapeutic method of immune disease
- Molecular Lifecaring Medicine : Development of therapeutic method using adult stem cell/Molecular biological basic study on tumor occurrence and treatment
- Tumor biology : Study on cancer genomics using microarray
- Mecidal Physical Engineering : Development of new functional high medicine imaging technology

Industry Sector: Medical Devices/ Diagnostics/ Diagnostics Imaging

Therapeutic Target: Dental Clinic

State of Development: Early Stage

Key Technology Highlights

□ **Magnetic resonance imaging system for use of dental clinic**

A RF coil unit, a head fixing unit and a magnetic resonance imaging system having the same for use of dental clinic are provided to take magnetic resonance (MR) images of soft tissue such as teethridge and dental nerve tissue as well as teeth and dentary bone, making it possible to reduce the MR imaging costs, improve convenience and accuracy of MR imaging and decrease the size of MR imaging devices.

□ **RF Coil Unit**

The RF coil unit comprises a RF coil, and a support frame structure which supports the RF coil, and is formed as a shape corresponding to the contact portion selected from teeth, teethridge and a face portion where the teeth and teethridge are located.

□ **MRI System**

The MRI system comprises an inspection table with a cradle; a magnetic structure having a first and second polar structures to form an imaging space; and the RF coil unit.

Proposal Abstract

Catholic University Industry Academic Cooperation Foundation has a valuable technology for the dental clinic equipments and would like to find out interested parties on the development collaboration or non-exclusive or exclusive licensing agreement for this technology.

■ IP Owner Summary

The Catholic University of Korea Industry-Academic Cooperation Foundation

■ Personal Description of Researcher

□ **Name:** CHOI, Bo-Young

□ **Present Position:** Professor

□ **Major:** Nuclear Magnetic Resonance Spectroscopy

□ **Research interest:** Magnetic resonance imaging (MRI) system

□ **Office address:** Department of Medical Engineering, Medical College of Catholic University, Seoul, Republic of Korea

■ Market Feasibility

□ **Korean and Global market size:**

- Korean dental equipment market reached $2.7 billion in 2009, and the global dental eqiupment market is estimated to be $26 billion by 2014.

□ **Korean and Global market opportunity (competitors and competing product):**

Companies with strong presence in the industry such as Sybron, Biolase Technology Inc., Dentsply, and Young Innovations are the major competitors.

■ Trend & Partnership

□ **Future outlook and trends related to technology:**

- High demand for high accuracy, low cost and comfortable dental imaging devices

□ **Technology Transfer and Commercialization conditions:**

- It is the policy of the Catholic University Industry Academic Cooperation Foundation to treat all individuals, faculty, staff and students equally with respect to their rights as inventors of discoveries, inventions, or patents.

□ **Type of business relationship sought (including licensing availability):**

- development collaboration, or non-exclusive or exclusive licensing agreement

Technology Overview

■ Technology Platform

The MRI system of Catholic University Industry Academic Cooperation Foundation has been developed to resolve problems of the prior dental clinic devices including CT imaging device, panorama imaging device and cephalo imaging device, and improve prior MRI devices. The core technology of Catholic University Industry Academic Cooperation Foundation is to provide a RF coil unit, a head fixing unit and a magnetic resonance imaging (MRI) system having the same for use of dental clinic capable of performing magnetic resonance (MR) imaging of soft tissue such as teethridge and dental nerve tissue as well as teeth and dentary bone.

■ Background and unmet needs

The prior dental inspection devices such as CT imaging device and panorama imaging device have an advantage to rapidly obtain images of teeth status. However, they also have a disadvantage of not able to obtain sufficient anatomical images of soft tissue such as teethridge and dental nerve tissue. The MRI device makes it possible to obtain sufficient anatomical images of soft tissue such as teethridge and dental nerve tissue. However, MRI devices are not generally used for dental diagnosis including inspection of soft tissue such as teethridge and dental nerve tissue due to the inspection complication, device size and device expensiveness.

■ Discovery and Achievements

The MRI system can reduce the maintenance cost as compared to prior MRI systems which employ super-conductive magnets since their first and second polar structures are comprised of N pole and S pole permanent magnets, respectively. The MRI system also makes it possible for a subject to be inspected comfortably since it is sufficient to inspect the subject by locating the only head of the subject to be inspected on the imaging space without locating the whole body of the subject to the closed inspection table of MRI device. The MRI system can prevent detection of incorrect signal due to movement of the subject to be inspected during inspection by using the head fixing unit, thereby obtaining more accurate MR images. The MRI system can provide the subject with improved inspection convenience by supplying the cradle to the subject, so that the subject can be conveniently inspected while sitting at the cradle which is moving upward and downward during the inspection.

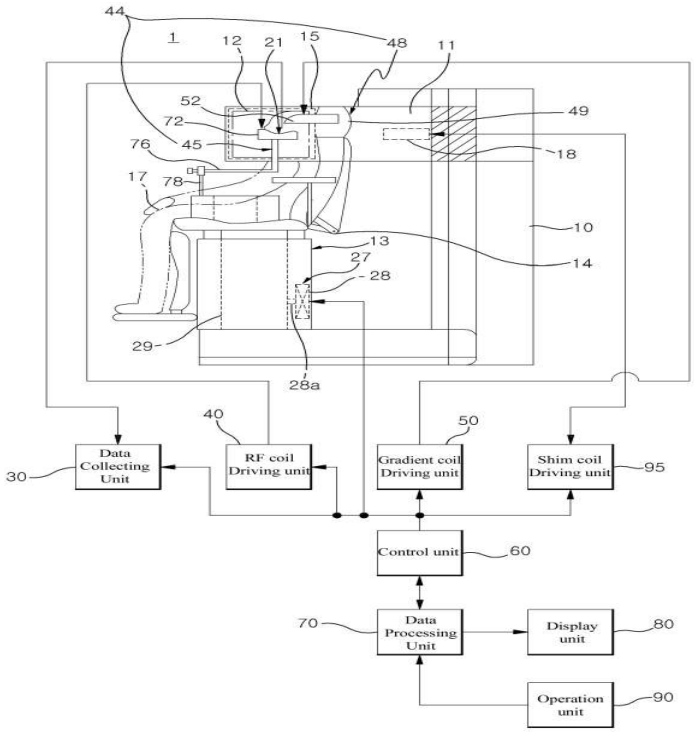

Fig. 1. Block diagram of the MRI System

10 - inspection table, 12 - magnetic structure, 15 - gradient coil unit, 18 - shim coil unit, 21 - RF coil unit, 44 - head fixing unit, 27 - elevation unit.

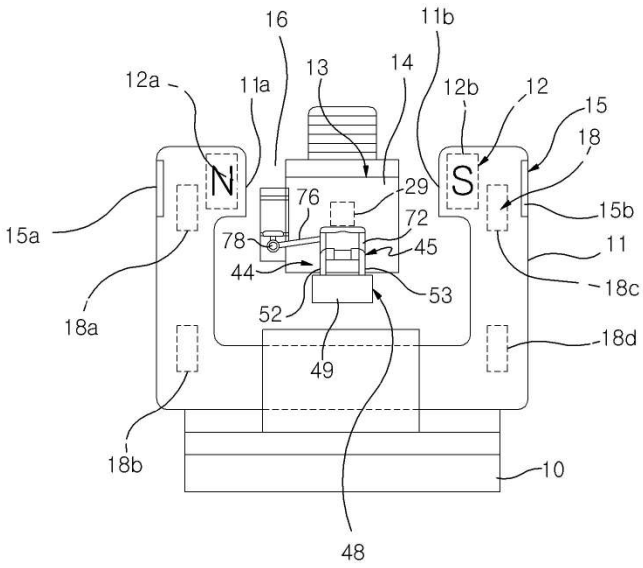

Fig. 2. Plane figure of MRI System

The inspection table (10) has a cradle (13) where a subject to be inspected is sitting during inspection. The cradle (13) may be elevated by an elevation unit(27) so that the inspected portion of the subject is elevated. The cradle (13) may also be moved in the front or rear direction to regulate the position and posture of the subject. The magnet structure (12) consists of a first and second polar structures (12a, 12b), which may face each other, and be located away from about 30 cm or less so that the size of the MRI system is minimized, and the maintenance costs are decreased.

Patents and Publications

Country	Patent, Publication or Appln. No.	Status	Description
Korea	10-2010-0004874	Under Examination	Radio frequency coil unit, head fixing unit and magnetic resonance imaging system having the same for use of dental clinic