Development of The Modern Hand Held Electromechanical Adjusting instrument

by Scott B. Shephard, D.C.

The history of the hand held, electromechanical adjusting instrument (EMAI) cannot be told without a discussion of how and why mechanized adjusting tools were originally developed. For over 5000 years the force required to manipulate the spine was provided by the hands, arms and upper body of the practitioner. A unique contribution by chiropractic to the safe and effective delivery of manipulation was the concept of a discrete, rapid, short thrust into the spine. Chiropractors call this type of manipulation an adjustment, a term more in keeping with the goal of increased precision of the manipulation. The hand delivered adjustment remains the prevalent form of manipulation in modern chiropractic practice today.

A departure from traditionally applied manual treatment began early in the twentieth century. Much like how the wheel advanced man’s ability to move objects across terrain, the advent of mechanical and motorized tools transformed man’s ability to perform work. The conversion of electrical power to a kinetic thrusting force is accomplished by the modern solenoid. The helical coil device and name were first invented by French physicist Andre-Marie Ampere. When electricity is passed through the coil a controlled magnetic field is created. One of the ways that this energy field can be directed is to produce linear motion, or in the case of the medical or construction device, a forward thrust. Historically, in chiropractic application, the precision of a thrust’s direction, magnitude, and its amplitude are directly correlated to the variables of efficacy and safety. In this sense, the solenoid was a near perfect technological development for the modern chiropractic device.

Clinicians in the early part of the century began to design and build therapeutic devices that could generate force for various applications in the treatment of the human condition. Innovations were occurring not only in chiropractic, but also in dentistry, orthopedics and various surgical specialties. Many common procedures in the allied health fields require substantial physical strength, and with the adoption of electrical and pneumatic technologies, instrumentation of many of these procedures became possible. This allowed practitioners with physical limitations to provide more treatment for more patients. Additionally, practitioners with injuries or physical disabilities quickly became interested in adopting the new technology. Other efforts with early developers were more patient-centric. In chiropractic, these efforts were directed at developing methods to more effectively and safely adjust the human spine. Concurrent with the industrial revolution, these developments in health care were consistent with a popular cultural trend of bringing ideas and inventions to the marketplace.

Few early devices would grab the attention of chiropractors until the conversion of the Union Broach tool in 1973. With the gradual adoption of the device by large numbers of chiropractors, other unexpected benefits would surface: these included elevated patient safety, efficacy, efficiencies in load application and force control,
and the opportunity to safely treat the aged, new born, post surgical and acute patients. However, the primary impetus for its use remained in helping doctors with disabilities. Senior members of the profession who wished to extend their work life into a forth or fifth decade, or those who had early retirement forced upon them--after decades of manual adjusting--now could employ a mechanical device to extend their careers.

THE PRECURSOR

The promoter of the earliest version of the first mass-produced chiropractic adjusting instrument was a chiropractor named Warren C. Lee from Redwood Falls, Minnesota. Dr. Lee’s device consisted of a rubber grommet affixed to the end of dental impact hammer that was manufactured by the Union Broach Company of New Jersey. The original thrusting tool was invented by David Reiter in 1946, with a United States patent being filed in the same year. It was coined by Mr. Reiter as a “surgical instrument with mallet action.” The benefits of the tool as presented in the patent application include “the provision of an improved surgical instrument having a simple, positive and inexpensive operating mechanism” and also “capable of being employed as a dental mallet to impart successive blows to a reciprocal tool.” In fact, the purpose of David Reiter’s tool was to provide a hammer like blow during surgical procedures. It’s principal use was in dentistry, to split the 5th molar into smaller parts during extraction.

The purpose of Dr. Lee’s modification of the Broach tool was to take the place of a traditional Vanrumpt style manipulation.

Manual manipulation has been the golden standard of force application associated with chiropractic since the late nineteenth century. By 1975, Dr. Lee’s new device was being produced and distributed widely. The Union
Broach mallet would eventually be adopted and marketed by a second chiropractor, Arlan W. Fuhr, D.C.

Dr. Fuhr had been a patient of Dr. Lee’s as a young teenager and his health was so dramatically affected by Dr. Lee’s treatment that a young Arlan Fuhr was then motivated to become a chiropractor. Ten years later he would go to work for Dr. Lee as his associate. In 1970, the two busy practitioners began to both suffer from elbow tendonitis from repetitive thrusting in the VanRumpt fashion. It was at this time that the doctors began to look for another way to generate a thrust. A local dentist Dr. Stava gave Dr. Lee a Reiter surgical mallet and the first David Reiter mallet conversion was complete. This would prove over time to be a historical landmark in the history of the chiropractic profession.

Dr. Fuhr would distribute the Broach tool under a new name called the Activator™. According to a historical narrative composed by patent attorney Jonathan S. Kahan in 1997, he wrote:

“Dr. Fuhr was among those who developed the original Activator device in the 1970s. Dr. Fuhr modified a dental mallet that was used for splitting impacted wisdom teeth. He replaced the scalpel at the end of the dental mallet with a brake shoe rivet and attached a door stop to the rivet. Union Broach, Inc. marketed this device for Dr. Fuhr under the name ‘Activator’ from that time until late 1976.

In 1976, Dr. Fuhr discontinued his relationship with the Union Broach Company and formed his new company, Activator Methods™. An improved internal mechanism was developed by Dr. Fuhr and a new US patent was secured. A Swiss-American firm began manufacturing the Activator device in the fall of 1976.

THE USE OF ELECTRICITY

Herbert S. Freeman, D.C. was born in Bronx, New York in 1931. After a successful amateur career in competitive weight lifting, Herb Freeman moved to Los Angeles in 1950 to begin a career in professional wrestling. After 10 years on the wrestling circuit he broke his neck coming off the top of a ring post and ended up with dystrophy of the muscles of his left arm. With no remedy obtained by conventional means, he turned to a chiropractor and after months of treatment his strength and mass returned. So impressed by his experience, he entered chiropractic school and in turn would start his private practice in 1963. After eleven years of manual adjusting, Herb began to look for another way to adjust the spine.

When Dr. Freeman heard about Dr. Lee’s work and reputation, he traveled to Denver with Oregon chiropractors Dan Beeson and John Ahibin to meet and study with him. The year was 1973 and Dr. Freeman’s interest was to investigate the Union Broach conversion and see if the new instrument would im-
prove on his care and delivery. Dr. Freeman was disappointed when discovering that the issue of bruising was not resolved with the converted dental tool. Dr. Freeman knew bruising occurred in patients who were using blood thinners and other medications that made bleeding a risk, and he was pursuing a solution to this side effect of mallet adjusting.

In the spring of 1974, Oregon chiropractor Alan Beardall told Dr. Freeman about Dr. Fuhr’s improved Activator device and along with Dr. Emery Wayman they invited Dr. Fuhr to come to Oregon and be the keynote speaker at the Oregon Association of Chiropractic Physician’s annual convention. Dr. Fuhr’s lecture created excitement amongst many Oregon chiropractors about the possible role a hand held thrusting tool could have in a chiropractor’s office.

Later in the same year, Dr. Freeman was in a discussion with Dr. Wayman regarding the echymosis issue and the hard impulse to the body. Two weeks later, Dr. Wayman visited Herb’s office in Keiser, Oregon where he presented a commercially available, electric staple gun that he had modified in his garage. To Dr. Freeman’s delight, the motorized instrument immediately performed in terms of positive change in the character of the spinal lesion and it caused no bruising. Dr. Freeman was also impressed by Dr. Wayman’s effort to work with what little materials he had available in order to solve the bruising problem. Dr. Wayman’s prototype was the first hand held, electromechanical adjusting instrument (EMAI) used to adjust the human spine.

Interest quickly grew amongst Dr. Freeman’s colleagues and before long there was a demand for more of the EMAI prototypes. The problem was, however, that Dr. Wayman announced that he was not interested in large scale production. In response to the growing demand, Dr. Freeman and his colleague Ronald Crockett, D.C. set out to find a way to build their own device. After a local search for a fabricator, they found an electronic engineer and inventor, Ed Miller, from Salem, Oregon. After
meeting with Mr. Miller, it was clear that there was a reasonable likelihood that they could build their own device from the ground up. Doctors Freeman and Crockett described the features that would be required and Mr. Miller wanted to know if they wanted the device powered by air, electricity or spring power. In the end, an electrical powered, single thrust prototype was fabricated. Mr. Miller’s first derivation became the predecessor of the device now known as the Arthrostim™. The first generation Arthrostim, unlike the converted staple gun, was designed from the outset to be directed towards treatment of the human spine. The device was also equipped with an adjustable setting to control the amplitude of the shaft’s thrust.

In 1981, twelve prototypes were built and put into use by Doctors Freeman, Crockett and several of their colleagues. Early ideas surrounding the new business included leaving manufacturing tasks to Mr. Miller and treatment protocols and any training to Dr. Freeman. The name of the new instrument was coined by an associate of Dr. Freeman’s, giving reference to the fact that the tool’s treatment, originally, was directed towards the synovial joint and the effect on the joint was both a thrust and a stimulation.

The first generation of Arthrostim displayed obvious features that set it apart from other adjusting tools. It’s innovative features made it one of a kind: electrically powered finger trigger actuation, single recoil thrust--and the fact that it was light weight and durable in event that it was dropped, which had been a problem with the Wayman prototypes. The new instrument was used in the Freeman Clinic for 6 years where it would ultimately be replaced by IMPAC’s second generation design.

THE SECOND GENERATION  
Arthrostim™

In July of 1988, Dr. Freeman was contacted by two Pennsylvania chiropractors Rick Wiegand and Ed Blumenthal. They were interested in the Arthrostim and asked if they could visit and study with him. When they arrived they had a device of their own, a hand held device designed and built by California inventor and chiropractor, Thomas W. Wing. The device was called the ‘Tsunami’ because it was intended to generate and magnify a wave of mechanical energy in the body. Dr. Freeman was very interested in the device and tried it experimentally, however he was unconvinced that the results produced were any better than the first generation Arthrostim.
Although the initial testing was a disappointment, two weeks later Ed Miller and Dr. Wiegand returned to Dr. Freeman’s clinic. Ed presented a new feature on a second generation prototype of the Arthrostim. It had the percussive quality of the Tsunami delivered through the piston shaft mechanism. When Dr. Freeman tried the new instrument he was impressed by the comparison of changes before and after treatment. A significant effect was noticed in a patient’s spinal mechanics and associated tension by using the repetitive thrusting device.

In 1992 Ed Miller’s company, IMPAC, received FDA 510K clearance for the new Arthrostim. This allowed Mr. Miller to market it widely. IMPAC has found enormous success in the chiropractic market with the Arthrostim and other related equipment and accessories. Today the Arthrostim is considered by many to be the most advanced and durable mechanized adjusting instrument in the world.

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Be sure and check out Dr. Shephard’s short video demonstration on our FaceBook page. Simply type in ‘Shephard Chiropractic’ in FaceBook’s search window and then click on the video . . .