Doctor, MIC is another unique service of your Ticonium Laboratory. A magazine you can read with interest, with pleasure, and with profit.
home since 1947 for Dr. Sumter Smith Arrnin, one of "gold OLD dental hygiene," to refine his training. By the time Rodgers graduated in 1968, Arrnin's relentless campaign to sell American dentistry on plaque control was having its effect on the UT Dental Branch curriculum and Rodgers and his class came away exposed, if not always "sold," on the technique's value.

Rodgers was a graduate who was sold, though he didn't exactly know how he was going to implement his intentions. "I learned mostly in dental school," he says, "but I wasn't sure that the patients and Rodgers and his class came away exposed, if not remotely suggest themselves. He wanted to guide the patient in a manner that would allow him to do his diagnosing as much as possible.

The Preventive Program
Yet he had no intention of building a "sales" technique based on any modification that might remotely suggest itself. He wanted to guide the patient in a manner that would allow him to do his diagnosing as much as possible.

With slow, even, regular strokes passing over the root surfaces of the teeth, root surfaces are rubbed off the patient to get him involved, Rodgers decided. His commitment to the potential for relief of pain, anxiety, and patient comfort in the cause of preventive dentistry would permit him to do no less, he now says.

The True Believer
"You have to convince yourself that prevention really works," Rodgers says. "You have to convince yourself one way or the other — and do it totally. Or you don't do it at all."

The Rodgerses acted on their convictions. Among the instructions they gave to the architect who designed their quarters in Richmond's trendy Promenade Shopping Center was a request for a "control lab" — meaning plaque control. It was installed, and Dr. and Mrs. Rodgers began to make use of it from the moment the doors opened in April, 1971.

During those first few months, he hesitated to come "toothbrushing" as an insult to their intelligence. They think they know how to brush, and they do, to a certain extent," Rodgers says. The route they chose initially was an indirect one. He thoroughly demonstrated the use of plaque-staining disclosing tablets and the hygienic techniques when patients came in for their regular six-month cleanings.

"Then we let them go and assumed that they knew how to do it," Rodgers says. "But when they came back the next time, we came to find out that they did not know how. Very few of them had maintained their brushing and flossing techniques and very few of them, if they were still doing it, were doing it correctly."

So much for the indirect approach, Rodgers decided. If trying to induce a patient to save his teeth and "$first of all," Rodgers says, "we have them in for an examination. During that examination, you are poking around with instruments, of course, so I just pick up a little piece of floss and run it between their teeth and try to work it out with a big hunk of plaque on it. Usually, I try to take this plaque from an area with some kind of pathology involved, such as a groove. If their gums bleed a little then I draw this plaque from that area — trying not to flip it off the floss. Then I stick it up my nose and make an ugly face. Wow! 'Smell of that,' I tell the patient. What do you think of that?"

"Of course, it has a terrible odor. I ask, 'Do you know what that is?' Some say, 'Food.' And I ask if food smells like that when they eat it. 'Well, no,' I explain. 'This isn't food, it's plaque, bacteria that are on your teeth.' We show them some pictures of what it's like, or if you have a microscope in your office you can take a scraping and let them see it. We don't have a microscope because of the expense, but we plan to get one. Then I tell the patient that this is what is causing his problems — it's bacteria that is causing your gums to hurt and bleed and it's causing cavities."

"Then I ask, 'Would you like to know how to get this off your teeth?' Most will say yes. At this point it's a good idea to use a film strip. This will save you the talking — I tend to talk too much a lot of times about the pathology of dental plaque. You need to

Microscopic Wound
A study of the wound produced by ultrasonic coagulation in soft tissue curettage has been conducted by Ewen in animals and humans to observe the immediate and subsequent effects at the clinical and microscopic levels.

With ultrasonic curette currettage epithelial removal was minimized and white strips of tissue emerged. Bleeding was minimal and/or less noticeable due to the presence of water irrigation, and surface injury to the free marginal gingiva negligible. The currettal epithelium was either coagulated, shredded, or missing. The underlying corium showed typical fusion of collagenous connective tissue bundles. The coagulated surface stained darkly, similar to necrotic or burned (electro-surgery) tissue. Collagen bundles were forced apart, condensed in appearance, or fused into diffuse masses. The nuclei of the fibroblastic cells were pyknotic or irregularly condensed, and hence hyperchromatic.

Within three to five weeks complete healing took place and no difference could be detected microscopically between gingival tissue treated with hand curette and that treated with ultrasonic curette.

While the removal of epithelium cannot be explained solely on the basis of coagulation by heat, separation may be due to the accumulation of energy at the interface of the basement membrane and underlying connective tissue. The shearing effect from a change in the direction of the sound waves at the interface (the plane or depth at which the sound waves disperse) will improve the patient's health and retain the natural dentition for a long time.

Preparatory Steps
The chair-side technique involves:
1. Draping the patient and placement of an absorbent towel.
2. Positioning the mandibular arch horizontally so as to assure evacuation of water flow.
3. Placing the saliva ejector — this is adequate to remove any amount of fluid collection.
4. Applying 2 per cent topical lidocaine to achieve superficial soft tissue anesthesia.
5. Setting the amount of power on medium and depressing the foot-control to adjust the handpiece with water; inserting the specific scaler insert and tuning the instrument by arriving at the greatest level of "hissing."
6. "Bursting" of the strong fluid jet at the very tip of the insert when properly tuned.
7. Cutting the tip over the accretions until they dislodge from the tooth surface.
8. Directing the tip of the instrument perpendicularly to the long axis of the tooth is not advised, as this will generate notches cementum and dentin.
9. "Wetting" the front surface of the mirror with a surface tension reducing agent (clear dip) and/or water available at the insert tip in order to provide adequate reflective surface and visibility during indirect vision.
10. Depressing the foot-control for long periods of time, since sporadic on-and-off motion is wasted time and motion, noisy and irritable, as well as damaging to the equipment.
11. Depending upon the severity of the calculus present, the time interval should occupy between 20 minutes and 45 minutes for a full complement of teeth.
12. Sterilizing the tip by first wiping with 70 per cent alcohol and placing in cold sterilization; then, prior to its next use, actuating the tip in the cold sterilizer for 10 seconds to assure microbial death via ultrasound.

Conclusion
In conclusion, one should value the possible limitations of this modality, especially in the perception of the potential of ultrasonic waves. Since the ultrasonic instruments are contraindicated for clinical use on young, growing tissues, treatment of children should be avoided. Osteous tissue should be kept at a respectable distance under ultrasonic treatment, one should avoid underlining bone in order to prevent local ostelitis and sequestration.

With the aforementioned material to serve as a guide, this modality may be added to the office armamentarium under the realization that it be used with discretion and respect.

Only calculus recognition, skillful removal on a regular basis, and allocation of sufficient working time will improve the overall health and retain the natural dentition for a longer time.

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The Theory and Rationale

Behind Ultrasonic Scaling

by Frank R. Pfau, D.D.S.

It is possible to debride tooth surfaces and encourage healing of periodontal lesions by producing clean, smooth, and even surfaces through the use of ultrasonic vibrations applied to appropriate instruments. Thus, ultrasonic vibrations can scale, planse, rub, and abrade teeth to free them of calculus, plaque, food debris, stain, and affected cementum. Ultrasonic scaling is a particularly useful technique in the treatment of the following:

(a) Marginal gingivitis—calculus and plaque removal
(b) Pre- and post-surgical scaling
(c) Acute necrotizing ulcerative gingivitis—bacterial and necrotic tissue removal
(d) Dilantin hyperplasia—circumferential calculus removal
(e) Intra-oral prophylaxis—circumferential calculus removal

All instruments have some effect on tooth surfaces, but the general opinion is that currents leave the tooth surface smoother than any other type of instrument. It has been pointed out by Melling that dentists do not take sufficient time to hand scale the teeth properly.1 The routine and thorough removal of calculus is to keep the irritation at a level that the tissues can tolerate. There is a great value to be realized by hand scaling. Therefore, it becomes germane to first develop an understanding of the instrument to complement the scaling aid in manipulation of the ultrasonic device. The various unit models marketed by manufacturers represent a sudden transition from manual instrumentation. It is hoped that one can justify the operation of ultrasonic instruments after analyzing the microscopic observations to be elucidated below.

When a coil of copper wire is wound around a plastic cylinder and alternating current flows through the coil from an oscillating electric current supplied by a generator, a magnetic field is created. In the application of ultrasonic energy to periodontal instrumentation a magnetostriuctive transducer producing about 25,000 vibrations per second is employed. The magnetostriuctive transducer or insert, lying within the cylinder and bathed in flowing water, contracts in step with the current vibrations. When the current goes from maximum to zero at the end of an alternation, the insert (transducer) returns to its original size.2 These changes in shape provoke an amplitude of vibration which expresses itself as reciprocal motion, the fundamental element in ultrasonic instrumentation. The amplitude represents the traveling distance of the ‘working end’ of the periodontal tool which approximates .0015 cm.

Ultrasonic waves traveling any distance and reaching an interface or junctional surface are dissipated in the form of heat. This is reduced by running water which is expelled at the working end through a metal tube. In a liquid medium these waves agitate its molecules, thereby drawing out of solution gasses which have been previously dissolved or entrapped. The released bubbles burst open with tremendous local pressure; this bubbling action or cavitation enhances the cleansing action in the gingival crevice. Finally, the motion of a tip depends upon its design: pure reciprocal motion produces knocking and hammering; elliptical motion produces scraping and cutting. Sonic energy, then, is made up of waves that mechanically hammer, knock, scrape or cut, and that produce cavitation (bubbling action) and generate heat through absorption. The heat generated in the magnetostriuctive transducer is relatively high; this loss of energy in the form of heat is termed ‘hysteresis loss.’

Ultrasonic instruments are reciprocal action devices which move in a push and pull. Since the vibrations are sufficient to dislodge deposits, it is preferable that for gross scaling they remain dull to avoid inadvertent planing of root surfaces. Root planing is accomplished by using the convex or rounded surfaces of vibrating ultrasonic tools lightly and quickly over the areas to be polished.

The Rodgerses agree about the most essential quality for a control nurse: enthusiasm. “You need somebody who has been through your control program per-

[Image by Richard Pruitt]
Develop Your Professional Potential
by Ernest W. Fair

Perhaps you feel, every now and then, that you are not getting as far ahead in the profession as you should. Not making the progress that you or your colleagues believe you are capable of. This is a feeling that we all experience, no matter where we stand on the dental-practice ladder. There are boosts you can generate on your own which may lift you up a number of rungs higher in a short time. Here are some of them.

• Find one new approach in your practice this year and fully and carefully develop it. Concentration on this one approach, made after careful selection, assures a good chance of its being realized.

• Try to avoid copying what the other fellow is doing. Neither his objective nor his "style" may suit you. However, study what he accomplishes; it may help you develop ideas of your own.

• You are never too old to learn about the newest developments in dentistry—and to use them to advantage.

• Such developments provide valuable assistance in extending one's own capabilities. To deny their use is to deny yourself opportunities to attain your full potential.

• Keep some time open every week for investigation of additional moves you might make along lines that you are not now covering regularly.

• There must be open and free periods for such steps, regular blocks of time, not just spare moments that may—or may not—arise during the working day.

• No matter how worthwhile your efforts may be at present, don't allow them to develop contentment for the status quo. This has been the downfall of many a professional man, for attrition in a practice is always present and unless steps are taken continuously to counter this loss full potential is almost impossible to obtain.

• Keep in mind that attitude exists, good avenues to advancement are almost automatically closed. It also leads to a sense of personal satisfaction that precludes realization of one's potential; there are no additional fields to conquer, so expending any more effort in whatever direction would be a waste of time.

• Know what is going on in dentistry all of the time.

• Keep out all of your lines of contact and have them open so that you can fully utilize them every day of your working life.

Much of the potential any doctor will achieve, and when he will achieve it, will come from his knowledge of what is happening in his field and as it happens.

Associate with the men who still have ambition, men with like ambitions.

Plan the financial side of your life in order to expand your practice.

Stay up-to-date in the techniques, equipment, methods, systems, and operations that you use in your practice. Solid attachment to old ways invariably welds an individual firmly to the old ways they typify. Where this happens, the level of achievement he has reached in his professional life is always well below the potential he could have obtained if he had not done so.

Listen to everyone. The new idea you need may come from anyone at any time. No man ever reaches his full potential without assistance from the ideas of many other human beings surrounding him in his daily life. His skill at developing these ideas determines the extent of his achievement.

Be a "nut" about your personal health. Carelessness in this area has voided the full potential of many a doctor—sometimes permanently.

Build a solid base from which to grow. The shaky one will require every spare moment of one's life to keep it alive, and leave little or nothing for growth. Once you realize you are going to need the help of other people in your profession, you will be ready and anxious to help them—if only to be sure you will receive the assistance you must have.

Finally, get rid of any and all feelings you may have about limitations on what you can achieve. Accept them only after experience proves them to be right. Then reach out, more and more, for the goals you can achieve.

TIC, JANUARY 1973

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Editor's Note
Dr. Teitelbaum is co-author, with cartoonist Don Johnson, of the cartoon/anatomical dictionary, Mangled Medicine, just published by Medical Economics Company. The clever, handsome book is aimed primarily at those who have studied medicine or anatomy.

CONTINUING EDUCATION
The Journal of Dental Education states that six states now make continuing education a requirement for relicensure of dentists. Eighteen other states are investigating the revision of state practice acts with continuing education requirements in mind. Dr. Erik Olsen, Executive Director of the Academy of General Dentistry, says: "The current emphasis on improving the quality of oral health care and the delivery system makes it incumbent on the dental school to deliver high quality health care throughout their entire predoctoral and postdoctoral careers." It was his opinion that continuing education was equal to, if not greater than, undergraduate education.

YOUR WIFE THE WIDOW
Time and again one hears about the widow who underdoses great difficulties in managing the estate left by her husband because she was never prepared for his death. Since these tables are unanimous in showing that your wife will probably outlive you, perhaps you ought to prepare her for the eventuality of widowhood . . . and then go on living!

(1) Be sure your will is in good order. Familiarize her with its contents and where it is kept.

(2) Educate her in money matters by having her handle the household expenses with her own checking account.

(3) Keep her abreast of any changes in your estate plan. Let her know about any changes in insurance policies or investments.

(4) Be sure that your safety deposit box is in both your names if you keep your will and insurance papers there.

(5) Give your wife a list of all the people she must contact in case of your death. She should have the names and addresses of your broker, insurance agent, contact in case of your death. She should have the names and addresses of your broker, insurance agent, contact in case of your death. She should have the names and addresses of your broker, insurance agent, contact in case of your death. She should have the names and addresses of your broker, insurance agent, contact in case of your death. She should have the names and addresses of your broker, insurance agent, contact in case of your death. She should have the names and addresses of your broker, insurance agent, contact in case of your death. She should have the names and addresses of your broker, insurance agent, contact in case of your death.

(6) Keep your dental accounts in good order so all debits and credits are easy to ascertain.

(7) keep any record of your own long-playing tapes for office use. And then there is, and perhaps shall be forevermore, Musak.

Music-bearers and music-lovers have equal contempt for Musak; not only is it an alteration of the word, "music," but also an alteration of music. Music is designed with the intention of remaining appropriately in the background, filling quiet spaces in banks, restaurants, and dental offices. Well-behaved background music in the office is for mood and effect. Never should it obstruct. Never should it be listened to, and never is it for dancing.

Whether you decide to play or not to play music, you can't satisfy every ear. There's no such thing as one song for all people.

If hooked on background music, the addicts suffer withdrawal symptoms without it. They may not know what ails them, they fidget and ask, "What stopped?" This is one of several reasons why many doctors supply piped-in music or some other form of musical background.

Music Has Impact
I am convinced that music is effective—not always for good, not always for bad but effective.

A half-forgettable memory from bygone days refreshes memories. Rock of any variety: soft, soul, hard or gospel, will tickle the toes of teens. "Nearer, my God, to Thee" in a doctor's office may be either soothing or unnerving, depending on interpretation by different patients.

Trained music therapists report a variety of responses. The same melody is called sad by one person and happy by others. Some won't like it at all.

The anti-noise ecologist resents lyrical pollution and dedicates himself to removal of all music from public air. He declares that Musak's processing failed to get rid of toxic material and further maintains that music's pure beauty has been doctored to death by Musak. This crusader against aural smog might agree that there are specific times when suitable music is helpful.

Joy, sadness, and hope have been set to music. Americans sang their way through the Great Depression, expecting to find prosperity around the corner and pennies raining from heaven.

Rage, patriotism, struggle, and victory are suggested in military music. It was a potent weapon in World War II. The powerful three G's and E-flat that open Beethoven's Fifth Symphony is perhaps the most familiar four-note phrase in symphonic music. And was used during World War II as the victory slogan. Three dots and a dash correspond to "V" in the telegraph code.

About this time, the singing commercial was a howling infant. Some civilians said they'd rather face the enemy than hear the insesable blare of obnoxious commercials. Because air conditioning was a younger too, windows were open and singing commercials never stopped at the property line.

But, in America, we were able to sing louder and with more feeling than radio ads. The girl wouldn't sit under the apple tree with anyone else when he was flying into the wild blue yonder.

While we were winning the war, Musak was gaining a firmer foothold throughout the country. In time, professionals and piped-in music took over; people were rarely heard singing softly to themselves in public anymore. For better or for worse (?) man stopped singing his own songs and started doing his thing.

Today's music is still capable of creating moods.
loving, laughter, peace, and calm. It can also stimulate activity.

Here is a note of musical movement which you, too, may have experienced:

A doctor hired some carpenters; they were to be paid by the hour. During the morning, all went well. After lunch, the work progressed little, if at all. The men hit one nail in 10 squarely on the head. The other nine were badly bent, then slowly removed. They worked slower and slower with each successive hammer-blow. One man wound down completely and fell asleep.

This lack of labor gave the doctor a pain which hurt like S1.

Action was indicated, and taken. Swinging stereo—"with controls wide open, full bass, full treble, and full volume"—was the treatment.

Sleeping Beauty woke with a magic hammer that could hit nails. The doctor’s bank account was saved and everybody felt good about the whole thing.

But what about that Bubbling Beauty in your chair who can’t sit still after a ditty of champagne music with a twist of polka? How can you hit, fit, fill or drill full volume—was the treatment. "Sleeping Beauty" woke with a magic hammer that could hit nails. The doctor’s bank account was saved and everybody felt good about the whole thing.

Sleeping Beauty woke with a magic hammer that could hit nails. The doctor’s bank account was saved and everybody felt good about the whole thing.
Bob Hall finds himself lecturing on an average of at least twice a month to universities, hospitals, medical conventions, and what-have-you. He’s delivered some 50 papers around the world, while his films on the “Hall Technique” have been shown in more than two dozen countries. And he’s had his share of odd events in his crusade to help the world by improving its surgery.

In 1966 he was invited to Russia as an exchange scientist at a time when that was still a rare thing. In order to do so he had to form the Hall Foundation (at the request of our own State Department) because he would not have been welcome as the president of an American corporation, but would be as the director of a foundation. In this way he was able to bring back information about the medical and surgical care in that country.

He’s had his satisfactions. Most important to him is the fact that his inventions have made living easier for patients, saved countless lives, and opened the way to forms of life-saving surgery never before possible. In 1966 he received a “Master Design Award” for his tools, and in 1968 he received the highest honor of all—a permanent display of his tools in the Hall of Medicine of the Smithsonian Institution’s Museum of History and Technology.

The next time you go to Washington, D.C. you can see this display for yourself—an animated life-like exhibit of five surgical operations performed with the air-powered tools of a fellow-dentist, Dr. Robert M. Hall. Realistic hands hold the surgical instruments as they are used for a craniotomy, reaming a hip socket, doing a spinal fusion, pinning a fractured hip, and wiring a fracture. The realistic effect is total, even to the blood, the bony structures, and the tissues of the patient. The acting director of the Institution has said it’s one of their most popular displays.

Dr. Robert M. Hall is the kind of dentist many practitioners see themselves as when they dream about what they might have been if they could have done what they really wanted to!

Part one of a two-part series

BOB HALL is the sort of dentist most practitioners dream of becoming—successful in his profession, moving first into a specialty, then changing into an inventor and brilliant innovator, founding a whole new world of medicine, turning virtual bankruptcy into millions, and finally seeing an entire exhibition in the famed Smithsonian Institution devoted just to his inventions and techniques!

Who could ask for anything more? Bob Hall for one does ask for more—for more and more ideas which he can turn into practical working devices for both the medical and dental professions, for a new world of international business!

Dr. Robert M. Hall is really the American dream come true—the entire rags-to-riches bit—for although he may not have started with rags, he was at a truly low point a number of times before his drive, ambition, and brilliance persisted in him through their entirety. He awakened in a hospital operating room just before his last year in dental school to hear a surgeon say, “Let’s take his arm off at the elbow”; he passed out again from the concussion he had suffered. He awakened three weeks later in a hospital where they had flown him there to save his arm. And this was the real beginning of his career, although he didn’t know it then. Despite a full cast from his shoulder down, he lost only three weeks of his senior year and graduated with the rest of his class nine months later. But he was in the operating room just long enough to hear the surgeon say, “Let’s take his arm off at the elbow”; then he passed out again from the concussion he had suffered.

In fact he recalls awakening in a hospital operating room just before his last year in dental school to hear a surgeon say, “Let’s take his arm off at the elbow.” Out of this stuff Bob Hall was made.

Actually, dentistry is a family tradition with the Halls. Bob’s father was an oral surgeon for whom dentists are accustomed to make inlays, it would have succeeded. But at that time the tools for such work just weren’t available to the medical profession.

Dr. Robert M. Hall, president of Hall International, a subsidiary of the 3M Company,

The Dentist Who Made a Million!

by Arthur S. Freese, D.D.S.

Dr. Robert M. Hall is really the American dream come true—the entire rags-to-riches bit—for although he may not have started with rags, he was at a truly low point a number of times before his drive, ambition, and brilliance persisted in him through their entirety. He awakened three weeks later in a hospital where they had flown him there to save his arm. And this was the real beginning of his career, although he didn’t know it then. Despite a full cast from his shoulder down, he lost only three weeks of his senior year and graduated with the rest of his class nine months later. But he was in the operating room just long enough to hear the surgeon say, “Let’s take his arm off at the elbow”; then he passed out again from the concussion he had suffered. He awakened three weeks later in a hospital where they had flown him there to save his arm. And this was the real beginning of his career, although he didn’t know it then. Despite a full cast from his shoulder down, he lost only three weeks of his senior year and graduated with the rest of his class nine months later. But he was in the operating room just long enough to hear the surgeon say, “Let’s take his arm off at the elbow”; then he passed out again from the concussion he had suffered.

Dr. Hall receives a “Master Design Award” in 1966 for his air-powered tools in hip surgery. Just above, the Hall Air Drill is shown as it is used in a spinal fusion procedure.
After graduation, Bob took his D.D.S. into the Navy for two years and came out in 1955 to get his training in oral surgery and enter the family practice in Pittsburgh. Before long there were two offices, one in downtown Pittsburgh and the other in the suburbs—and a very large practice with 13 nurses, nurse-anesthetists, and what-have-you. It was in this frame-work that he attended the Chicago Mid-Winter Dental Meeting in 1957 and saw his first air rotor.

As he recalls: "All the way home in the plane it bothered me that I had to do an impaction in the way it had always been done—as bone surgery had been done throughout medical and dental history—with hammers and chisels and all that such trauma did to the patient, the operator, the tissues involved, and the result."

The then young 30-year-old oral surgeon (he was born in 1928) bought a used Weber air rotor. He says: "I started to cannibalize it, to wheel it around, and to cut extracted teeth with it." But the memory of the inadequate preparation of his own arm bone graft bothered me that I had to do an impaction in the way it had always been done—as bone surgery had been done throughout medical and dental history—with hammers and chisels and all that such trauma did to the patient, the operator, the tissues involved, and the result.

But he sees it: "I learned this was the wrong approach but like the Wright airplane it proved that the concept was valid and workable. More development was essential—the tool at its initial stage just couldn't do the job by itself. And even the answer proved what it had with the airplane—we had to turn to industry for such radically new and different devices."

Entering A New World
At this point it was Bob Hall's vacationing father down in Florida who made a contact with another proud parent who was chairman of the board of directors of ABO, Corporation, which manufactured air-powered tools. Discussion of their children led to interest on the part of the industrialist, and Bob Hall had his first contact with the concern that was to help solve the engineering and shop problems for his new idea of air-powered tools for surgery. Actually, Hall would have to devise new ideas and techniques of production; new concepts for his business setup; everything new, in fact, all along the way for every step he took.

All this involved production, engineering, patents, marketing and, most basic of all, a new device for a vast step forward in surgery—a world in which drills would provide the means for cutting and precision bone sculpturing for over 500 different surgical procedures.

So it was that an oral surgeon turned to industry to provide a new surgical instrument and as Hall puts it: "It was a tough five years later, in 1963, that we had our first product: a two-stage air turbine with a series of unique characteristics—finger-tip control, all air-powered with no electricity (so it would be safe in operating rooms where explosive anesthetics were used), no water or oil such as the high-speed dental handpiece uses, and with new attachments and portability (it's only six ounces) and more powerful."

Bob Hall also had to come up with new patents to protect his amazing inventions and developments. He finally introduced his new drill in 1963 but it took another year to iron out all the bugs. In fact, such is the basic professional integrity of the man that has carried over from his training as a dentist into his industrial role that when the first hundred or more drills were already in use in the field, applied by surgeons all over the country in fact, he devised a new improvement. Never hesitating, he promptly recalled all those drills in use so that he could incorporate his final improvement, despite the very considerable expense to himself. Which is probably why his devices have attained the reputation they have, why they're today in use by tens of thousands of surgeons in more than 60 countries all over the world.

But it also took a brilliant businessman with vision to accomplish all this; the technical aspects were only the beginning. As Bob Hall now admits: "If I know when I started what I know now, I don't think I would have had the guts to go through it all!" An experienced industrialist today, he knows now that statistical success, with the background he had at the beginning, had no more than 1 chance in 36 to succeed! And so he understands why everyone—father, friends, bankers—tired to talk him out of the venture.

But he started in 1958 and gradually got in deeper and deeper, put more and more money into the venture until by 1962 he had so much tied up in it—money and personal investments—that he couldn't pay proper attention to his surgical practice. Moreover, it was clear by then that the only way he could turn the thing around and get out with a whole skin was to give up dentistry entirely and go for broke in his new business.

The six-driven Hall Nerve Drill saves time and exhausting labor for the neurosurgeon, making it possible to remove a section of the skull in a quick circular motion. (Washington Institute exhibit)