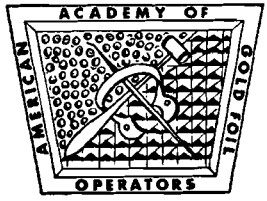
THE JOURNAL

OF THE

AMERICAN ACADEMY OF GOLD FOIL OPERATORS



Vol. VI September, 1963 No. 2

The Journal of the American Academy of Gold Foil Operators is published biannually by the American Academy of Gold Foil Operators. The opinions expressed in this publication by individual authors do not necessarily express the views of the Academy, unless they are based upon reports adopted by the organization. The Academy reserves the right to reject, condense, revise and edit any article submitted for publication if it does not conform to the standards and objectives established by the Editorial Board. In order to be considered for publication all articles must be submitted typewritten and double spaced, at least three months prior to the date of publication. Papers presented before any of the Academy meetings will become the property of the Academy and will be published in the Journal as time and space will permit.

Printed in U.S.A. by the Premier Printing Company, Fullerton, California

Officers and Committees 1963-1964

Henry A. Merchant, *President*
Arne F. Romnes, *President-Elect*

EXECUTIVE COUNCIL

Henry A. Merchant, *Chairman*
George A. Ellsperman, *Vice-Chairman*

Arne Romnes
William M. Walla ('63)
L. R. Ludwigsen ('64)
Paul A. Moore ('65)

Membership Committee

Floyd E. Hamstrom, *Chairman*
Ralph J. Werner
Charles E. Carara
Glenn A. Sutton
Donald K. Phillips

Rubber Dam Committee

Paul A. Moore, *Chairman*
Robert B. Wolcott
Theodore R. Ferguson
Loren V. Hickey
F. L. Jacobson
Harold M. Cline

Program Committee

Arne F. Romnes, *Chairman*
H. William Gilmore
Paul T. Dawson
Frederick A. Hohlt
Jose Medina
Loren W. Gruber

Study Club Committee

Lyle E. Ostlund, *Chairman*
Frederick A. Hohlt
John N. Penzer
Eugene S. Merchant
H. William Gilmore

School Committee

George A. Brass, *Chairman*
Howard I. Gilbert
Paul T. Dawson
William F. R. True
James H. Wick

Constitution and Bylaws

James P. Vernetti, *Chairman*
Robert B. Wolcott
Wilburn H. Wilson

Nominating Committee

D. F. Bourassa, *Chairman*
Herbert F. Gillard
Herbert D. Coy

Necrology Committee

Paul T. Dawson, *Chairman*
Allison G. James
William H. Gyllenberg
Austin S. Neeb

State Board Committee

Robert W. Chapin, *Chairman*
Carl J. Monacelli
Max Oppenheim
Ray E. Stevens
Harry E. Weber

Visual Education Committee

Jan Diepenheim, *Chairman*
Joseph B. Lenzner
William E. Cody
E. David Shooshan
Carl W. Sawyer

Dental Research Committee

Lloyd Baum, *Chairman*
Robert E. DeRevere
George M. Hollenback
Kenneth R. Cantwell
Kenneth L. Longeway

Literature and Publicity Committee

Peter K. Thomas, *Chairman*
Melvin R. Lund
Donald E. Lindsay
Martin E. Wicarius

President's Message

GREETINGS:

WITH THE APPROACH of the Annual Meeting on October 10-11 in Baltimore, one feels the burden of things yet undone, together with the need to suggest to abler minds that which can be accomplished in due time.

I did willingly accept from my predecessor, the scepter of responsibility as it falls upon one in the office of president of the American Academy of Gold Foil Operators. My dreams did not all come true, but this much was realized: There was evidenced by the officers and committeemen a devotion and loyalty to a cause, seldom seen and never excelled by any group, professional or otherwise.

This year has presented problems as well as an unfolding of broader horizons. It became apparent with the passing of our good friend and secretary, Dr. Charles Latham, it would be necessary to find a dentist, devoted and qualified, to assume the office of secretary-treasurer. He also had to have facilities available to assume the tremendous

---

Dr. Merchant was born and raised in Magnolia, Iowa. He received his early education in Magnolia High School and Woodbine Normal and graduated from the latter in 1908. Dr. Merchant graduated from Creighton Dental College in 1913 and first set up practice in Randolph, Nebraska. He moved to Omaha in 1916 and has since practiced there except for two years as a medical missionary in the South Sea Islands. Before and after his sojourn in the Islands he was a member of the Creighton Dental School faculty. He has always been a willing and honored worker for his profession.

He is a past president of the Omaha District Dental Society and of the Nebraska State Dental Association and has been a member of the Nebraska State Board of Dental Examiners and the National Board of Dental Examiners. Dr. Merchant is a Fellow of the American College of Dentists, a member of the American Denture Society, American Society of Dental History, Delta Sigma Delta and Omicron Kappa Upsilon. He is a Life Member and former president of the Woodbury Gold Foil Study Club and director of the Research Gold Foil Study Club of Nebraska. Dr. Merchant is a member of the Omaha Rotary Club, a Mason and a Shriner, and a member of the Reorganized Church of Jesus Christ of the Latter-day Saints.

task that such office would impose. At a special meeting of the Executive Council in Chicago, that man was found in the person of Dr. William Gilmore who was solicited and did accept the task. He also received the blessing of the dean of his school, the Indiana University Dental School and he was then unanimously elected. The Academy is fortunate to have Dr. Gilmore assume this responsibility.

It was with much grace that our secretary pro tem, Mrs. Vonne Wolf, skillfully prepared the files and turned them over with advice and good wishes, to Dr. Gilmore. We owe a debt of gratitude – more than words can express – to Mrs. Wolf.

At the annual meeting new officers will be elected and installed. We feel that under the direction of Dr. Romnes, with his able secretary, the machinery is well oiled for a successful year.

I would like to thank all of my associates in office, the council and committees who have worked to promote the affairs of the Academy. Many of these will not be thanked adequately, but they served so willingly. My apologies for any neglect, but God knows my humble desires are for the progress and ultimate success.

It must be realized that the Academy and the many gold foil study clubs which are teaching and promoting the use of gold foil (which has not yet been excelled) are exacting the utmost in skill from devoted leaders – individually and in clubs – for the sake of humanity. The backlog need is growing and seems almost insurmountable.

We sincerely invite you all to be at the Baltimore meeting. Bring an interested friend whom you may inspire to become a devotee of the goals of the Academy.

HENRY A. MERCHANT, D.D.S.
1229 Medical Arts Building
Omaha, Nebraska

NOMINEES FOR ACADEMY OFFICES

The Nominating Committee has submitted the names of the following members for offices during the 1963-1964 term:

Dr. José E. Medina – President-Elect
Dr. Gerald D. Stibbs–Councillor
Dr. H. William Gilmore–Secretary-Treasurer

The balloting will take place at the annual business meeting on October 11, 1963 at the Lord Baltimore Hotel in Baltimore, Maryland.

The Use of Gold Powder in Restorative Dentistry *

(A Progress Report)

LLOYD BAUM, D.M.D., M.S.; EARL W. COLLARD, D.D.S., M.S.; and MELVIN R. LUND, D.M.D., M.S.

Introduction: Gold in its pure form has certain properties, among which is the ability to cohere at room temperature. For dental purposes, pure gold is generally used as gold leaf (foil) and crystalline (mat) gold. This report deals with a relatively new and unfamiliar type of 24 K. gold – gold powder – which may be used in a manner similar to gold foil or mat gold.

Powdered gold is not new in dentistry. As early as 1937, Rule[1] reported on a type of "crystal" gold. From the description of his tests it is quite evident that his study was one of powdered gold rather than crystalline or mat gold. His reference to "other makes" of "crystal" gold leads one to believe that the material was available commercially in the early 1930's. After some testing**, Rule considered this material inferior to gold foil and unsuitable for dental use.

Reports of "crystal" gold extend back into dental literature beyond three-quarters of a century. Recently, in Europe, a number of brands of gold powder have become available commercially.*** However, this material made its debut in the United States only within the last two years.†

---

* Presented before the AAGFO in Birmingham, Alabama on Oct. 26, 1962 and in Indianapolis Indiana on Feb. 1, 1963.

** Possibly Rule utilized "Filoro" (A gold powder manufactured in 1934 by Baker & Co.) in his study.

*** "Karat" Distributed by Cottrell and Co., London, England.

† "Bio-Fil" Distributed by B. L. Dental Co., Inc., Richmond Hill 18, New York.

This article is republished in part with permission of the Editor, *J. Southern California State Dental Assn.*

The senior author of this article, Dr. Lloyd Baum, was born and raised in Ashton, Idaho. He attended Walla Walla College and went on to the University of Oregon where he was graduated in 1946. He received his M.S. degree in Restorative Dentistry from the University of Michigan in 1952.

From there he went to California to teach for a year at the University of Southern California. In 1955 he assumed duties as director of the Clinic of the Loma Linda University School of Dentistry at Loma Linda, California, where he has made his home.

Dr. Baum is extremely active professionally as well as being a member of the Redlands Lions Club. Among his activities are membership in the California Academy of General Dentistry, Fellow of the American College of Dentists, and he has been chairman of the Research Committee of the American Academy of Gold Foil Operators. Dr. Baum is also a member of several study clubs.

Without exception, all of these materials are marketed as irregularly shaped, precondensed pellets about one to three millimeters in diameter (Fig. 1), each pellet consisting of thousands, or possibly millions, of individual powder particles. This agglutination of particles into a mass is probably caused by surface cohesion of the individual particles. This bonding within a mass is not a strong bond, as it may be readily broken apart, the fragments pulverized and again reduced to powder through a screen. Powdered gold may be prepared by pulverization, by chemical precipitation from a solution of aqua regia, and by atomization.

The particle size of individual fragments of gold powder may vary from submicroscopic to 100 mesh. Most gold powders, however, will readily pass through a 325 mesh screen which means that each particle must slip through a square opening in a sieve which measures 0.0017 (44 microns) x 0.0017 inches. With a comparator microscope 50 particles of a powder were selected at random and measured. Diameters of particles ranged from 2 microns to 150 microns with the majority measuring about 15 microns.

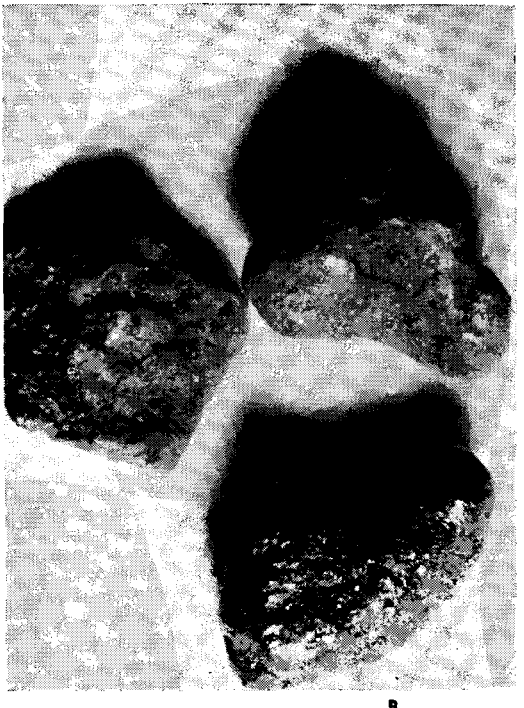


Fig. 1. Clumps of powdered gold which serve as filling increments: A, "Filoro"; B, "Karat"; C, "Bio-Fil".

Shape as well as size of particle is also important in consideration of this substance. As can be seen in Figures 2 and 3, the particles may vary in shape from flake-like, to spherical, to irregular. Figure 4 shows the shape of mat gold crystals.

The influence of surface texture of the particles, although not understood, is extremely important in cohesive factors and final condensation of the material. The surface texture of the powder seen in Figure 5 is dull and has a brown color. This is in contrast with the highly polished appearance of the powder in Figure 3 which has a

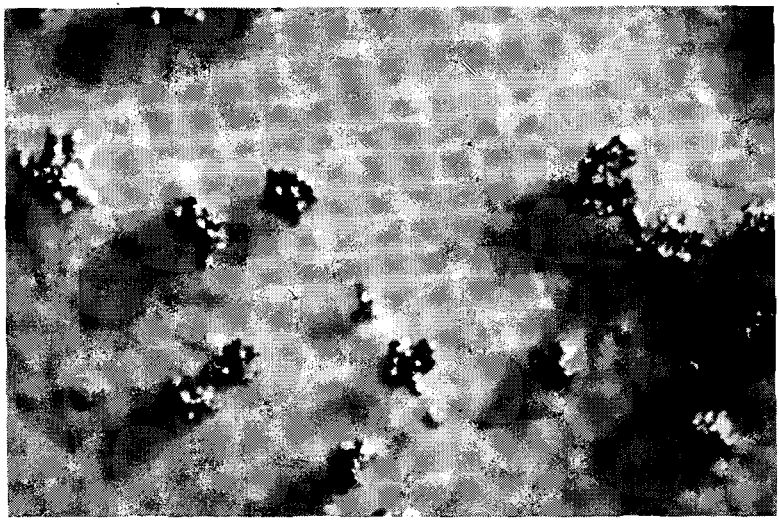


Fig. 2. Irregular shaped powdered particles prepared by chemical precipitation.

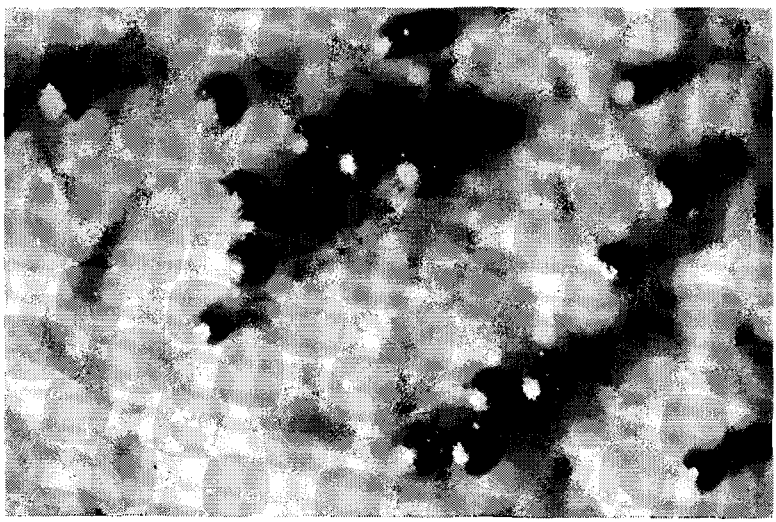


Fig. 3. Spherical shaped powdered particles prepared by atomization.

yellow color. At any rate, a delicate blending of various particle sizes, particle shapes, and surface textures is necessary to produce a powder which will condense into a cavity and form a cohesive mass of gold metal – a mass which contains few voids and is united by good cohesive bonds. Gold powder of poor consistency and poor surface

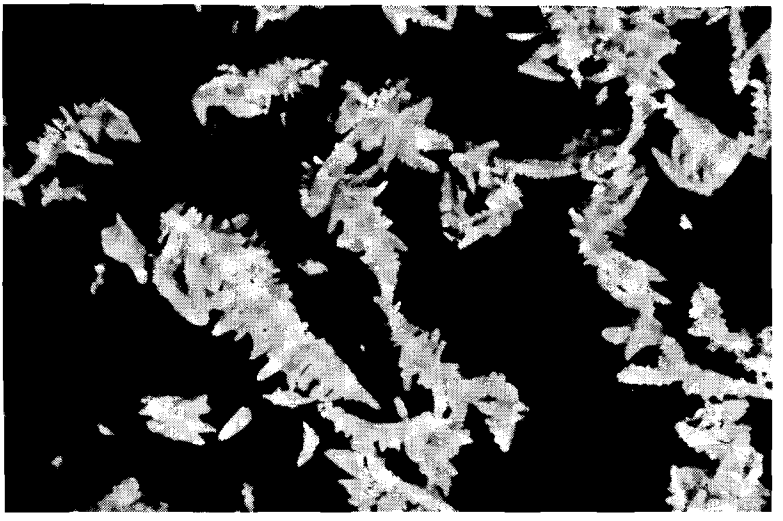


Fig. 4. Highly magnified crystals of William's Mat Gold (Courtesy of Williams Gold Refining Co., Inc.)

texture is probably responsible for the unfavorable report rendered by Rule[1].

Physical Properties: A report of an outstanding study by Hollenback and Collard was read before the American Academy of Gold Foil Operators and published in the *Journal of the Southern California State Dental Association.*[2] Utilizing the controlled stepping device and other equipment designed by Hollenback, specimens of foil mat and powdered gold were prepared for testing hardness. The material was condensed against a polished tungsten carbide plate, thus producing a polished surface on the pulpal floor of the filling, which

Fig. 5. "Dusty" appearing powder prepared by chemical precipitation. Wire passing through the field is .001 inch diameter.

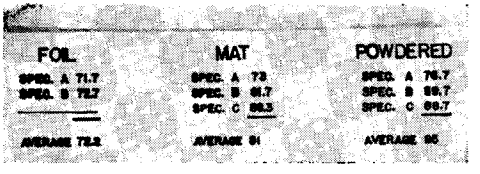


Fig. 6. Brinell hardness of gold foil, mat, and powdered gold.

when inverted, was tested by the Rockwell hardness tester. The results of the eight specimens tested are shown in Figure 6. As can be seen by the graph, the specimens are all of comparable hardness. Although these few tests are by no means conclusive, it is quite apparent that powdered gold can produce a filling as hard as gold foil or mat gold.

Specific gravity determinations were made of each type of gold specimen and the results are shown in Figure 7. Although the bar graph depicts powdered gold as being the least dense, the difference between these three materials is negligible.

It has been felt by some that resistance to abrasion is a matter of considerable importance in a foil restoration. To better compare the resistance of these materials to abrasion, the following experiment was devised. Specimens of gold foil, mat gold, and powdered gold were condensed side by side in an ivorine block. This was subjected to the abrasive onslaught of fine pumice slurry at the mercy of a large circular bristle brush for two and one-half hours. Gross examination failed to reveal differences between the three specimens. In fact, only under careful microscopic study could the specimen of powdered gold be differentiated from the mat or foil.

It might be supposed that the finished restoration would be weak and friable because of poor bonding of the fine gold powder particles. Preliminary tests* which subjected a condensed specimen to tensile forces, indicate that powdered gold produces a weld which is as strong as gold foil or mat gold. It was interesting to discover that the mat gold and gold foil specimens fractured along a point of weld, clearly indicating serration marks from the face of the plugger, whereas the specimens of powdered gold fractured within the mass of the material. Of the few valid readings obtained from comparable specimens, the powdered gold appeared to produce a stronger bond than did foil or mat.

Powdered gold seems to be more cohesive than gold foil. Perhaps this is true because, unlike the surface of a piece of foil, the surface of the powder particles has not been contaminated by gold beating, manufacturing, packaging and other procedures in general.

How well does powdered gold adapt itself to an internal wall, to a line angle or point angle? Is it as good as gold foil or mat gold in producing a marginal seal? These unanswered questions are now under study with equipment which has been designed and constructed by Dr. George M. Hollenback.

Discussion: These tests seem to lead to one basic conclusion; namely, pure gold (in the range of 99.99 per cent pure) as used in restorative dentistry, is basically the same material, whether it is used as crum-

* A method for testing the cohesive bond within a gold restoration has recently been devised by Hollenback and will be described in detail at a later date. Insufficient data are available to warrant a complete report at this time.

pled sheet metal (foil), a tenacious structure of crystals (mat), or smooth, miniaturized sand or gravel (powder). Preliminary tests of physical properties indicate fairly well that powdered gold can produce a fine, beautiful restoration, capable of giving the patient the best possible service (Fig. 8).

Although it is different from foil, mat gold, likewise is a tough material and does not have spreading tendencies. Powdered gold, on the other hand, will spread apart easily before the force is sufficiently great to cause it to weld or cohere into a solid mass.

Clinically, this tough characteristic of gold foil makes its placement more difficult because it tends to pull out of the retentive points of the cavity during condensation. This is overcome by "tying-in" the foil between opposite retentions. With powdered gold such is not the case. The initial "spreading" character of this material seems to eliminate dramatically the "tying-in" or "starting" procedure.

Before gold foil can be transformed into a solid mass within the cavity three separate steps must be taken. (1) The operator must condense the pellet with the proper force or blow of the mallet, (2) the condensing force must be directed at the proper angle, and (3) the uncondensed pellet must be maneuvered into the exact position within the cavity before any condensation occurs.

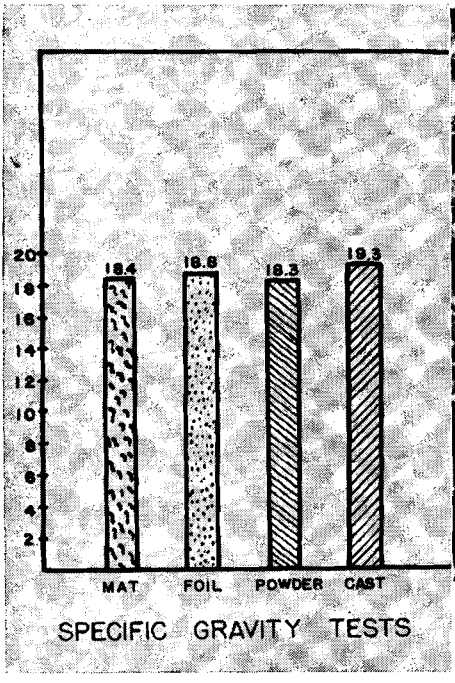


Fig. 7. Density or specific gravity.

rig. 8. Low power magnitication of specimen of foil (upper right), mat (lower left), and powdered golds (center), through which an explorer point has passed. Once condensed it is impossible microscopically to distinguish one gold from another.

An inexperienced student will endeavor to use pellets which are either too large or cannot be maneuvered into a cavity that is not extended properly for access. The importance of proper outline form for access has been stressed by Ellsperman[3] and many others.

Since it lacks toughness, powdered gold is almost impossible to handle or maneuver into a cavity. When the condenser is first pushed into the gold the pellet crumbles in a manner similar to Figure 9. Only in cases where gravity is in the operator's favor, is it possible to handle the material suitably.

This disadvantage has largely been overcome, however, by the advent of a new commercially available material* consisting of cuboidal or cylindrical shaped masses of powder encased in neat gold foil wrappers. This provides the operator with the advantage of powdered gold yet also gives him the advantages of a tough gold foil wrapper. The foil covered pellet can be speared with a broach for flame annealing and can be maneuvered successfully into the cavity for condensation. When the mass of powder breaks apart it is retained within the gold foil bag and the entire mass is condensed together.

Perhaps the greatest advantage of this material is its greater mass per unit volume. Foil is fluffy and condenses down into a small solid piece of metal, whereas powdered gold has much more "body." One pellet of powdered gold has approximately ten times the mass of a comparable sized pellet of gold foil. Figure 10 portrays the amount of bulk required to produce a comparable weight of raw material for mat, gold foil and wrapped powdered gold. Needless to mention, this speeds up the condensation procedure.

Because gold does not oxidize at room temperature the heating process may be done before placement in a cavity. Dentists have known and practiced this annealing process for years. Because of the weight and mass of the material, powdered gold pellets do not anneal well on a hot plate. Additional heat obtained from an alcohol flame is more desirable. The pellet is heated to only a very dull red color and removed from the flame for two or three seconds for cooling before placing it in the cavity.

Analogous to industrial procedures, powdered gold must be subjected to pressures equivalent to at least five tons per square inch. For small or medium faced pluggers this requires a hand pressure of six to eight pounds. To obtain greater pressure per unit area, it is found that slightly convex faced condensors** used with a rocking motion are better than flat faced pluggers. Achieving this with a "pen" grasp is possible in the hands of a strong operator, but finger

* Goldent, manufactured by Morgan Hastings & Co., Philadelphia, Pa.

** Loma Linda G. F. Condensers No. 20, 21, 22; available from American Dental Mfg. Co., Missoula, Montana.

fatigue may result after placing a large two-surface restoration. Aids for grasping the instrument to exert this pressure may be fashioned from quick curing acrylic or from prepared finger stops.***

A palm grasp is much better than a pen grasp. Heavy force is then easily applied – particularly in a lingual approach Class III restoration. Force is applied with a squeezing action (thumb braced on the tooth, instrument in the palm).

Access is one feature in the cavity preparation which must be altered to accommodate this material. Even retentive areas need wide open access (Fig. 11). Naturally this creates no problem for the Class I, II or V cavity. However, alteration in outline is necessary for the Class III cavity. The lingual wall should be flush with the axial wall and should be extended well out onto the lingual surface. Moreover, the incisal "turn" occurs on the lingual surface – not on the proximal surface (Figures 11 and 12).

*** Available from Suter Dental Instrument Co., Chico, California

Fig. 9. Pellets of powdered gold fracturing as they are grasped with tweezer or speared with a broach.

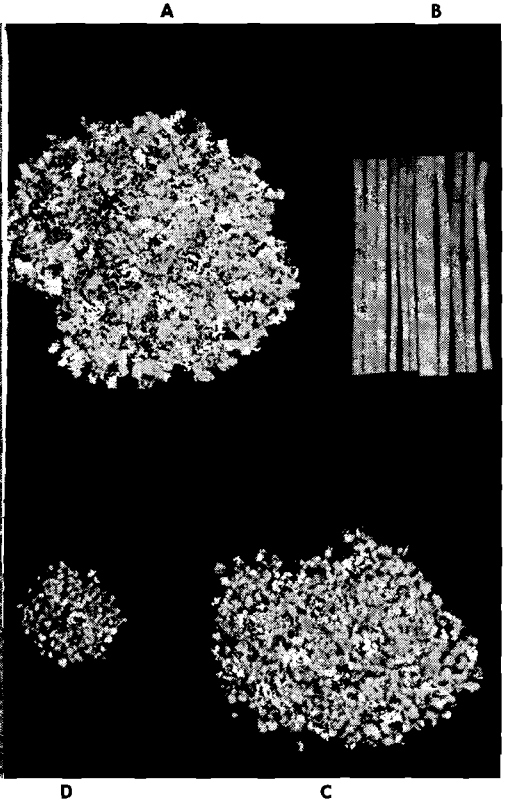


Fig. 10. Comparable weights of: machine rolled cylinders, A; mat gold, B; hand rolled pellets, C; powdered gold pellets, D.

The effect imparted by a malleting blow has not yet been determined. Foil malleted between parallel walls will tend to wedge the dentin apart as the cavity is filled. Will the same effect be produced with powdered gold? Since industry subjects this powder to pressure rather than impact, this aspect merits investigation. Adequate clinical restorations, however, have been placed with both hand pressure and malleting methods.

As in the industrial mold, the tooth cavity must be well confined to support the strong pressure required by the plugger. In Class I cavities this strong firm mold is automatically present in the enamel and dentin. In a Class II cavity the missing wall to the mold cavity is replaced by a good gingival wedge and a strong matrix band, which may be supported by quick curing acrylic. An acrylic reinforced mold cavity likewise has applications for Class III restorations (Fig. 12).

Finishing may be done in a conventional manner; however, it will be observed that this material is harder than gold foil. Consequently, it lends itself well to coarse grit finishing stones or finishing burs, both at high and slow speeds (Fig. 13). Caution should be exercised when using ultraspeeds for finishing, as the restoration tends to heat *very* rapidly. Heat produced by a light "brushing" action with the stone or bur is adequately dissipated with a stream of air. When gold files and gold knives are used the material tends to be friable unless it is "pinched" or "mashed" toward the margin. A well-condensed foil can be whittled with a sharp gold knife and fine shavings result. Powdered gold cannot be subjected to this treatment.

Condensing this material into conventional Class V cavities does pose a finishing problem in areas near the clamp where certain margins must be finished with a gold knife. Satisfactory results in finishing have been obtained by lining the cavo-surface bevel of the gin-

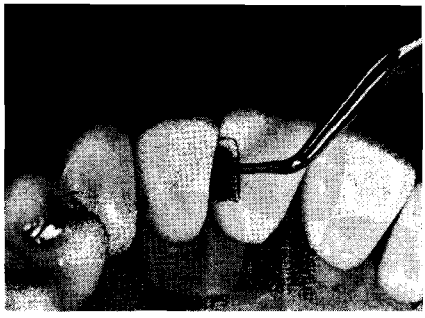


Fig. 11. Lingual aspect of proximal cavity preparation. Note wide open access to all internal areas of the cavity.

Fig. 12. Class III cavity ready for filling. Wooden wedge and acrylic occlude gingival and labial embrasures, thereby forming a reinforced four-walled mold cavity.

gival and cervical portions of the mesial and distal walls with a layer of conventional gold pellets, a surface layer which can be worked successfully with the gold knife or gold files. For that matter, powdered gold pellets or gold foil cylinders can be used at will interchangeably.

One precaution should be exercised when using this material. It is a pleasurable material to handle, a fact which is very deceptive. Even with considerable experience one finds himself being overconfident and careless in obtaining proper condensation. The working nature of the material itself seems to produce a false sense of security in the mind of the operator.

To emphasize a point already mentioned, gold (including powdered gold) is a noble metal and will not be abused. It requires attention to detail to obtain best results. With gold foil the experienced operator in a slow, methodical fashion packs the cavity to completion; with powdered gold the operator is inclined to "race ahead" thereby developing flaws in the finished product. In other words, self-discipline with this material is a necessity.

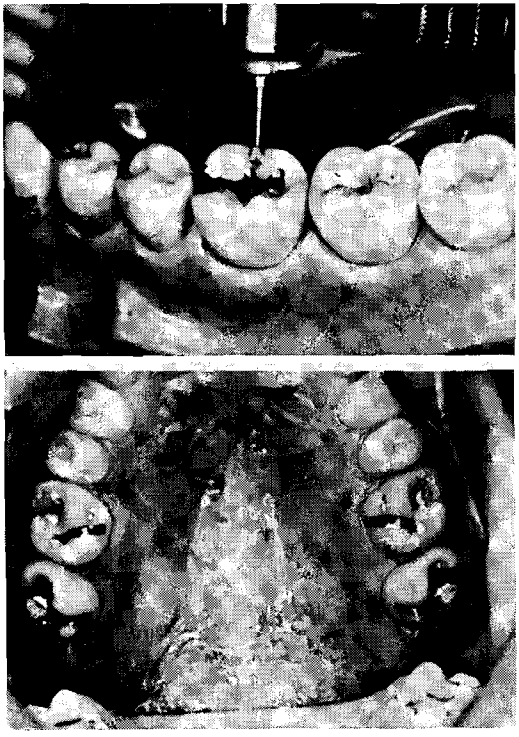


Fig. 14. Occlusal restorations in maxillary molars.

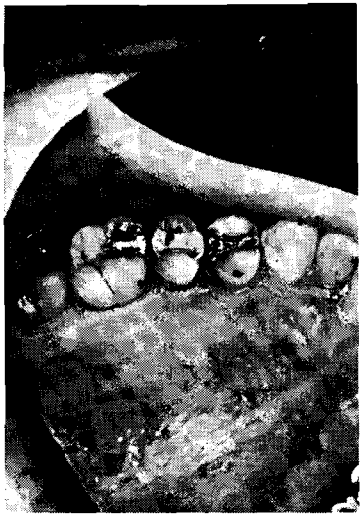


Fig. 13. (Left) Finishing occlusal surface with a No. 2 round finishing bur (friction grip.)

Fig. 15. MOD replacing a defective amalgam on a maxillary second bicuspid.

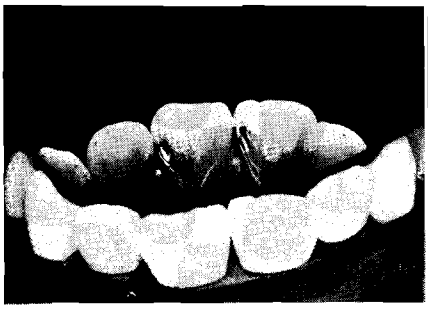


Fig. 16. Class III restorations.

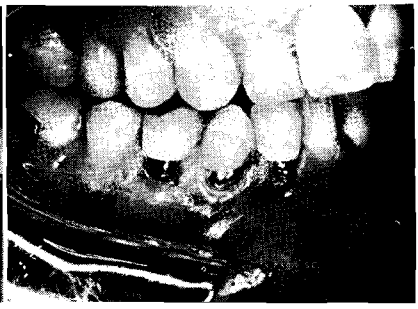


Fig. 17. Class V restorations. The cuspid restoration is made of powdered gold, the other two of gold foil.

To date, at Loma Linda School of Dentistry, some 500 of these restorations have been placed (Figures 14-17). None of them have been subjected to the all important tests of time; however, observations of scores of those which have been in service for six months are very gratifying. There is no evidence of flaking, recurrent caries, tooth sensitivity, or other adverse clinical symptoms. It is recognized that this report will be subject to numerous changes as future studies are made with newly designed cavities or condensers, modified techniques or materials.

Summary: Preliminary investigation of a new type of compacted gold tooth filling material, powdered gold, has been presented. Laboratory tests of hardness, abrasion resistance, tensile strength, and density have been conducted. Over 500 restorations have been placed in Class I, II, III and V cavities. Observations over a period of a few months reveal no untoward effects. Reduction of chair time and ease of placement are considered the main advantages of this material over gold foil or mat gold.

Although none of the restorations placed in the mouth have been subjected to a long period of time, it is impossible to detect whether a finished restoration has been made from gold foil or powdered gold. Additional investigation should be conducted to study other physical properties of this material. Likewise, study in clinical techniques will undoubtedly yield information which will make placement of compacted gold restorations more acceptable to the profession.

Loma Linda University, Loma Linda, California

The authors extend their appreciation to William Outhwaite for his assistance in conducting these studies.

REFERENCES

1. Rule, R. W.: "A Further Report on Physical Properties and Clinical Value of Platinum-Centered Gold Foil as Compared to Pure Gold Filling Materials." *J.A.D.A. and Dent. Cosmos*, 24:585, April 1937.
2. Hollenback, G. M. and Collard, E. W.: "An Evauation of the Physical Properties of Cohesive Gold." *J. So. Calif. State Dent. Assn.*, 29:280-293, Sept. 1961.
3. Ellsperman, G. A.: "Fundamental Procedures in Gold Foil Operation." *J. of AAGFO*, 1:10-17, Oct. 1958.

Study Club Influence on the Use of Gold Foil *

D. Jackson Freese, D.M.D.

For the past few years, (and presently as chairman of the Study Club Committee of the American Academy of Gold Foil Operators), I have witnessed the formation of operating study clubs for the specific purpose of mastering the techniques of gold foil. Study clubs have been organized in all but two of the six New England states. At the present time there are three active clubs in New York with several more in the formative stage. This past fall the George Hollenback Gold Foil Seminar became a reality in West Virginia, and the Miles Markley Operative Dentistry Seminar got underway in New Hampshire. The latest group to organize for gold foil is in Orlando, Florida. Gold foil study clubs are not new. They have been operating in the west and mid-western parts of our country since 1906.[1], when the Woodbury Gold Foil Study Club was organized. That club is now in its 56th year of continual operation.

As one travels throughout the United States and sees firsthand the picture of American dentistry, he is struck with the fact that where study clubs prevail, so does a superior brand of dental service.

Several years ago, one of the younger pioneers in this field, Charles M. Stebner of Laramie, Wyoming, spent several days in New England stimulating those in this area to organize the first operative dentistry study club devoted exclusively to the manipulation of gold foil. Now, under the able directorship of José Medina, chairman of the Operative Department at Baltimore College of Dental Surgery, it continues to unfold and spread its wings.

It is significant to report of renewed interest throughout New England in the use of gold foil. More and more it is being used to restore

* Presented before the Thirty-eighth Annual Session of the Greater New York Dental Meeting, December 3-7, 1962, in New York City.

Dr. D. Jackson Freese is an active New Englander, having been born, raised and educated in the State of New Hampshire. He studied dentistry at Tufts University, School of Dental Medicine, where he is presently an Assistant Professor of Operative Dentistry.

Among Dr. Freese's many professional affiliations are; the American Dental Association, the American Academy of Gold Foil Operators, International College of Dentists and numerous others. He is past president of the New Hampshire State Board of Dental Examiners.

Dr. Freese is a charter member of the New England Study Club of Dentistry as well as a member of several other study clubs.

lost tooth structure in the gingival areas of our older citizens and in the small interproximal lesions of our younger patients.

Study club activity is exerting a tremendous influence on the quality of dentistry done in our schools. Many teachers of operative dentistry hold membership in these clubs and participate in their workshops. Students now seem to graduate from dental school with an enhanced desire to utilize the basic fundamentals of sound operative dentistry. Two of these basic fundamentals are:

1. To operate in a clean, dry field. This calls for use of the rubber dam.
2. To employ the best restorative material for the case at hand. This may be done with any of our present day filling materials, but certainly must include gold foil.

The Rubber Dam: With the rubber dam we obtain improved visibility. We can see what is being done and, therefore, can expect to achieve a superior performance. It is one of the finest and most rewarding ways to practice our profession. In any discussion of the rubber dam two questions must be answered. Can we learn to work with it? Will our patients accept it?

From a study recently completed (Fig. 1) the average operating time on ten consecutive patients, all having a Class V mat-cohesive restoration, was 44 minutes and 33 seconds.

In an excellent article written by Charles M. Stebner[2], entitled "Economy of Sound Fundamentals in Operative Dentistry," he describes a study which he conducted in 1953, where his average time for placement of the rubber dam was 2 minutes and 36 seconds. He concluded that, "The rubber dam is an important aid to good den-

TIME STUDY OF 10 CONSECUTIVE CLASS V GOLD FOIL RESTORATIONS UTILIZING TRAINED AUXILIARY PERSONNEL

PATIENT NUMBER	1 M S	2 M S	3 M S	4 M S	5 M S	6 M S	7 M S	8 M S	9 M S	10 M S	TOTAL TIME M S	AVERAGE TIME FOR EACH PROCEDURE M S
APPLICATION OF HEADDRESS	:07	:04	:06	:05	:06	:05	:05	:03	:06	:04	:51	:05.1
APPLICATION OF RUBBER DAM NAPKIN	:02	:03	:02	:03	:02	:02	:03	:02	:02	:03	:24	:02.4
APPLICATION OF HOLD-CLAMP OR TIE-BACK	:03	:06	:02	:02	:07	:12	:08	:10	:06	:03	:59	:05.9
APPLICATION OF RUBBER DAM, HOLDER AND SALIVA EJECTOR	3:36	3:48	3:10	3:59	3:13	3:39	3:43	4:19	4:05	4:41	38:13	3:49.2
APPLICATION OF FERRIER (212) CLAMP	4:10	5:11	4:13	4:58	5:41	4:47	4:10	3:57	4:09	3:34	44:50	4:28.8
CAVITY PREPARATION	11:19	10:11	10:34	9:19	9:44	11:05	13:03	8:58	12:05	8:17	104:35	10:27
FOIL CONDENSATION MAT-COHESIVE TECHNIC	14:43	14:08	12:54	13:11	11:53	12:03	10:45	15:09	13:17	14:10	132:13	13:12
FINISHING RESTORATION	13:12	10:16	12:43	9:10	16:53	11:11	8:59	10:12	15:05	11:43	119:24	11:54
REMOVAL OF RUBBER DAM AND ACCESSORIES	:27	:24	:29	:33	:21	:18	:19	:23	:24	:21	3:59	:23
TIME FOR EACH COMPLETED OPERATION	44:39	44:11	44:13	41:20	48:00	43:22	41:15	43:13	49:19	42:56		

TIME KEY M- MINUTES S- SECONDS

AVERAGE TIME FOR COMPLETED OPERATION PER PATIENT ▶ 44:33

A

Figure 1

tistry; it insures financial gain both for the operator and for the patient."

According to Medina[3], "The rubber dam is the best adjunct we have in operative dentistry, not only in the manipulative procedures of preparations and restorations, but also in serving as an incentive mechanism to stimulate in us the desire to perfect our techniques and render better dental srvices." Once our patients are aware of these added advantages, and when they are informed of the superior quality of services received, they will demand its use. Their comments will be: "My, what a pleasant way to have my dentistry done. It is certainly much faster this way. I like it because I don't have to rinse all the time. I had the feeling that your hands were not in my mouth. Is this something new?"

A leading dental manufacturer reports a fifty per cent increase in the use of the rubber dam since 1955. That is very encouraging information. Truthfully, it's the best practice builder we can possess.

The Headdress: The headdress, as originally designed by McGehee, True and Inskipp[4], is a protective covering for the patient's hair. It can be applied in a matter of seconds and is a delight to use from the operator's, as well as the patient's point of view. We prefer to make it from a single thickness of Bird's-eye cloth because thinner material is unable to withstand repeated laundering. The headdress and rubber dam napkin are commercially manufactured.* Until recently, making these was an added chore for our dental assistants (Fig. 2A).

* For further information regarding specifications and procurement contact author.

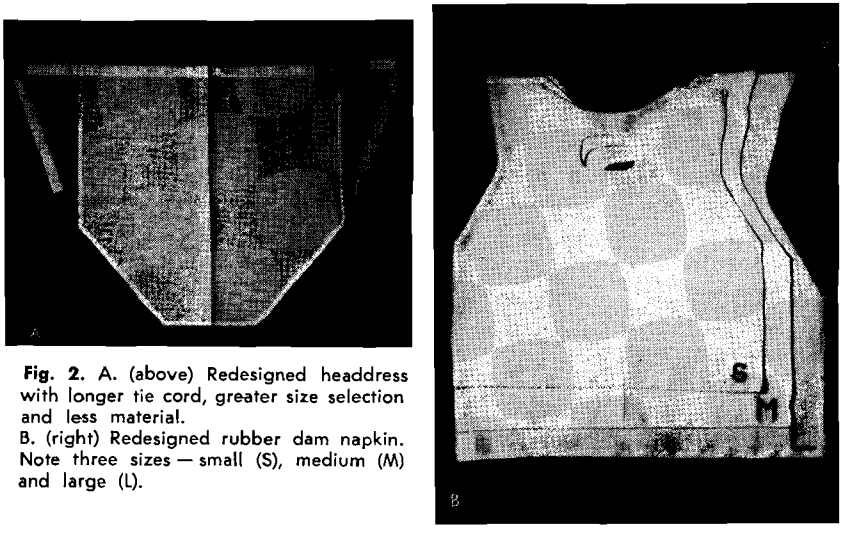


Fig. 2. A. (above) Redesigned headdress with longer tie cord, greater size selection and less material.
B. (right) Redesigned rubber dam napkin. Note three sizes — small (S), medium (M) and large (L).

A headdress has the following advantages:
1. It prevents the rubber dam holder straps from being transferred directly from one patient to another.
2. It prevents the patient's head from touching the headrest of the dental chair.
3. It prevents the rubber dam straps from slipping.
4. It confines the patient's hair and keeps it in place.
5. It prevents the operator from coming in direct contact with the patient's head.
6. It establishes in the patient's mind a distinct impression of the operator's surgical approach.

The headdress is applied in the following manner:
1. The patient is instructed to sit forward in the dental chair with the headdress being held behind the patient's head.
2. The tape end of the headdress is centered over the patient's forehead, with the inferior border hanging loosely about the shoulders.
3. Place the side portions of the headdress between the middle and fourth fingers, sliding them carefully down over the patient's ears.
4. Tie the cord securely in a bow knot and smooth the inferior border of the headdress around the back of the patient's head.
5. Pull the side folds far enough forward to protect each side of the patient's face from the rubber dam holder attachment clips.
6. The application is complete.

Rubber Dam Napkin: The rubber dam napkin, as described by McGehee, True and Inskipp[5], is made of a double thickness of Bird's-eye cloth. We have a choice of a small, medium or large size. The large one serves a double purpose. It may be used as a multiple quadrant napkin and/or for a patient with large features. The medium size is the most popular and is used for the average case. The small size is very convenient for children. Sizes may be more readily recognized if identifying letters (S, M or L) are sewn in the lower, right-hand corner (Fig 2B).

Gold Foil: Many leaders of our profession are using gold foil. True, it must be used with discretion and judgment.

All restorative materials have desirable and undesirable characteristics, and in each case we are responsible for the selection of the material to be used. We are expected to render the best possible service regardless of the ease or difficulty encountered in its manipulation. We must always remember that our goal is to prevent recurrent decay; provide resistance against the forces of mastication; maintain normal tooth form and effect a pleasing esthetic result for our patient. It is with these thoughts in mind that we approach the use of gold foil.

Gold foil is used for our older citizens in the gingival third area where tooth structure is lost from either decay or erosion (Fig. 4). It may also be used for repairing fractured tooth structure and worn

Fig. 3. A gold foil restoration placed in 1909.

areas on otherwise perfectly sound gold inlays and crowns. Today there is no restorative material that serves so well in the anterior teeth of our younger patients as does gold foil. This is particularly

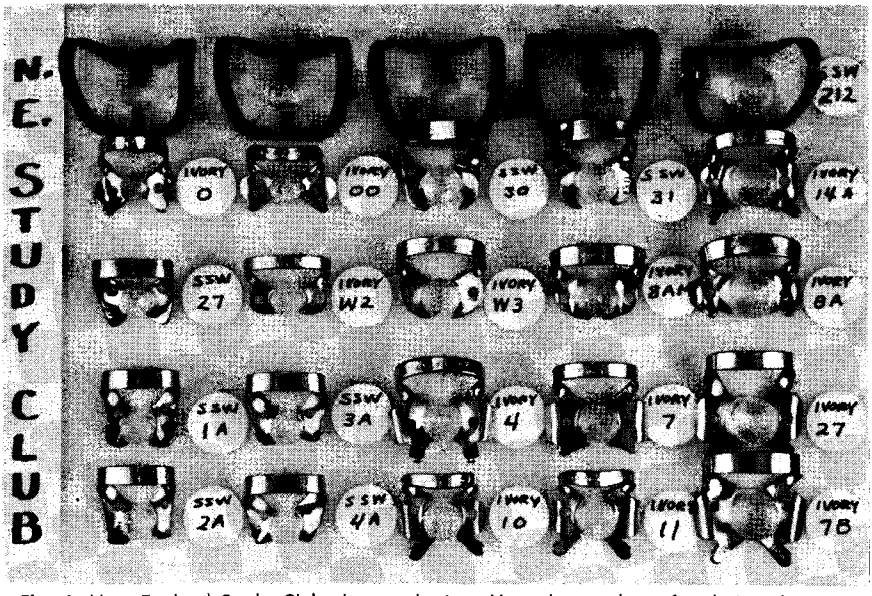


Fig. 4. New England Study Club clamp selection. Note the number of redesigned Ferrier 212 clamps which also have accentuated grooves for retention of the clamp forcep.

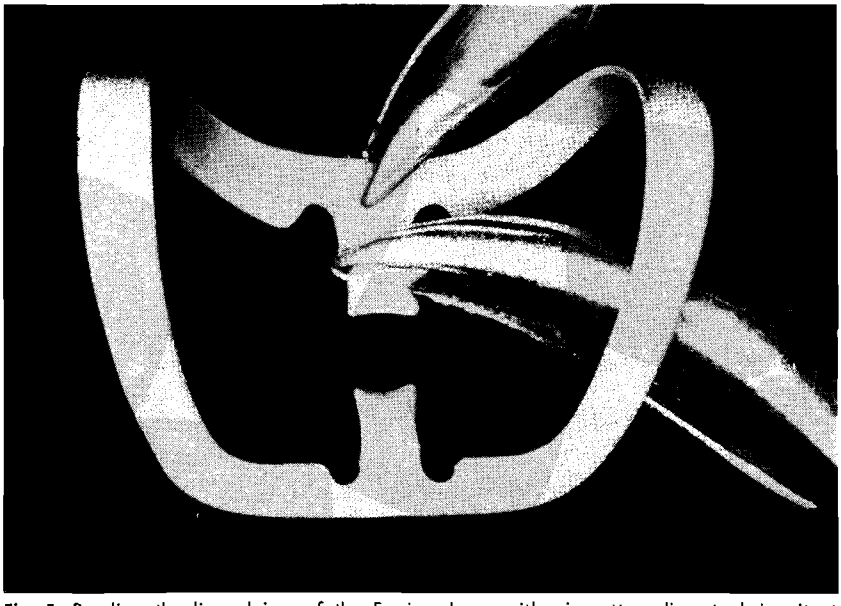


Fig. 5. Bending the lingual jaw of the Ferrier clamp with pin setter pliers to bring it at right angles with tooth being restored.

true when the interproximal lesion is small. If the technique used in restoring these areas is well founded and the operator is well trained, our patients can expect a lifetime of service from these restorations (Fig. 3).

Class V Gold Foil: After pre-selecting our instruments and having prepared our patient for the operation by applying the headdress, rubber dam napkin, and a properly placed extra-heavy dark rubber dam, we are ready to position the cervical clamp as designed by Ferrier[6], to retract the gingival tissue and give freedom from operative interference. It is best to have a selection of these clamps prepared ahead of time (Fig. 4). Before using the 212 clamp it is very helpful to redesign it in the manner suggested by Hamstrom[7] (Fig. 5). The grooves are deepened with a small diamond wheel, thus preventing the rubber dam clamp forceps from slipping and releasing the clamp unexpectedly as it is being placed upon, or removed from, a tooth. The labial and lingual jaws may be cut with the same diamond stone to provide small and medium widths. The wide width is obtained by leaving the jaw unaltered as it was when purchased. For teeth that are not in alignment, Hamstrom suggests cutting the jaws of the clamp at an angle so that when they are positioned they will engage the tooth squarely. After tempering the clamp, the lingual jaw is bent upwards two or three millimeters to bring it at right angles to the gingival tissue and cingulum of the tooth receiving the restoration. This prevents the clamp from creeping and

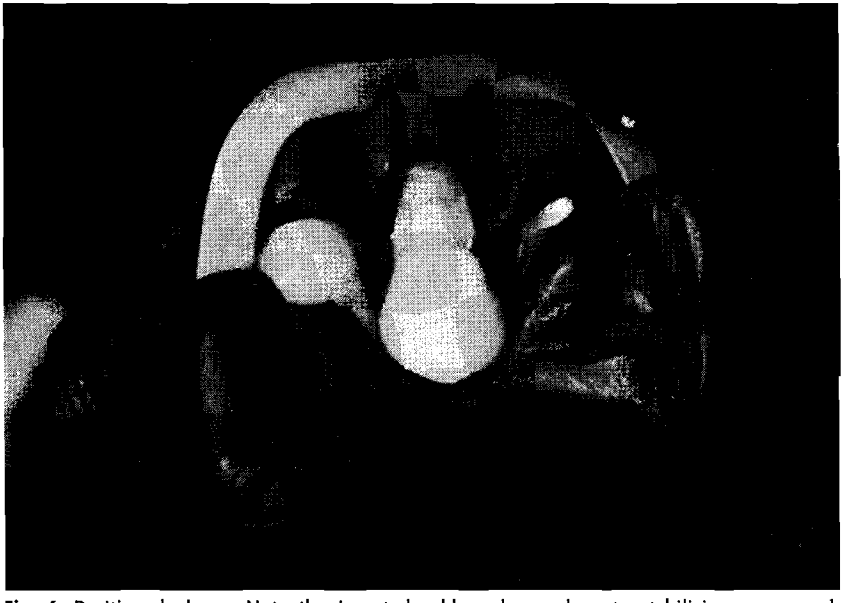


Fig. 6. Positioned clamp. Note the inverted rubber dam, adequate stabilizing compound, and room for finishing the gingival margin of the restoration.

unnecessarily injuring the lingual tissues. After these adjustments have been made, all sharp points and edges of the jaws are removed so that a blunt surface is against the tooth structure. This prevents grooving the soft cementum as the clamp is slowly moved into position.

Teeth in the operative area are now cleansed with hydrogen peroxide and painted with resin liner to aid in the retention of the compound[8]. After placing a small cotton roll in the lingual area on which the lingual jaw of the clamp rests, the clamp is positioned and secured with compound. The labial jaw is placed one to three mm. below the planned gingival margin for good access in finishing the restoration (Fig. 6).

Cavity Design: The cavity design is that suggested by W. I. Ferrier[9], with modifications governed by the extent of erosion and decay (Fig. 7). The cavity margins are extended into self-cleansing areas with the gingival margin placed below the tissue. The mesial and distal walls flare in the same direction as the enamel rods. The occlusal and gingival walls are parallel, with their line angles being accentuated for retentive purposes. After the cavity is varnished the occlusal and gingival margins are slightly beveled.

Restorative Material: We have a choice of what type gold foil to use in our cavity preparations. It may be purchased in pellet form from gold manufacturers or it can be prepared into pellets or cylinders from a book of No. 4 non-cohesive gold foil, as described by Smith[10].

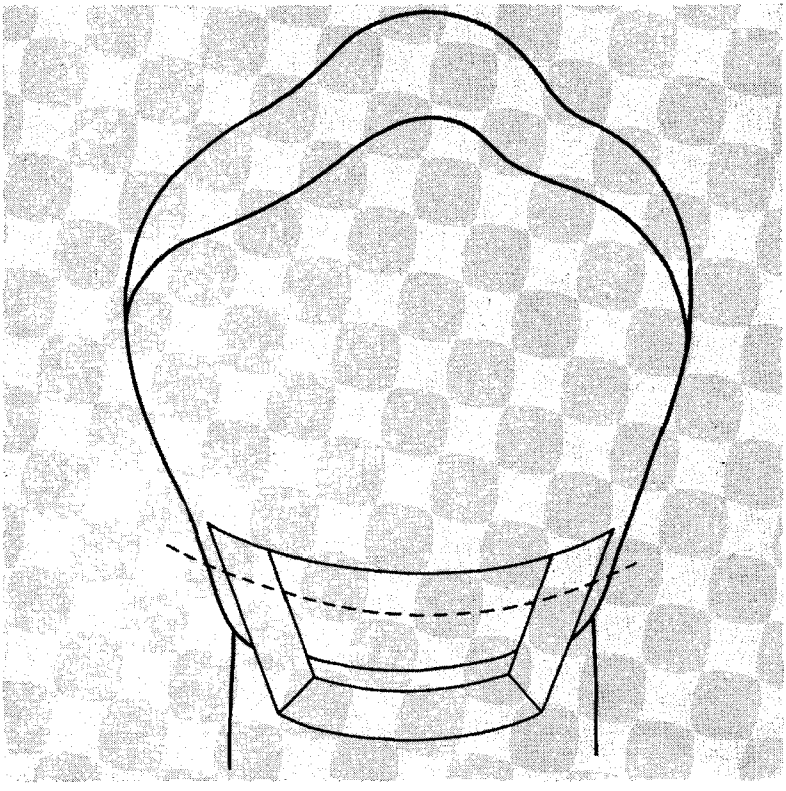


Fig. 7. Class V cavity design of W. I. Ferrier.

Many operators are now using mat gold in combination with cohesive gold foil as suggested by Koser and Ingraham[11].

Condensation: After the gold has been properly annealed, it is carried to the cavity. Maintaining a correct line of force is essential in placing the foil, with each pellet or cylinder being thoroughly condensed before additional gold is used. Condensation is accomplished with either the hand mallet or with one of the automatic or electronic condensers.

Finishing the Restoration: Finishing a gold foil restoration requires meticulous care and the strictest adherence to detail in order to restore a tooth to its normal form and proper function in the arch. It is important that we use extreme caution, particularly when finishing close to the cementum of the tooth.

Conclusion: We should be most grateful for the information and guidance that has been given us by great leaders of our profession. With their inspiration and dedication, we have a direct challenge to live up to the high standards which they have set. We also must

provide a good example for our successors if dentistry is to continue as one of the great professions.

4 Wall Street, Concord, New Hampshire

EDITOR'S NOTE: The editor regrets that the author's entire manuscript with its generous illustrations could not be published.

REFERENCES

1. Myers, L. E. "The Influence of Study Clubs in Operative Dentistry, with some Suggestions for Organization and Management." *J. of So. Calif. State Dental Assn.*, Vol. XXVI, No. 10, pp. 357-360, Oct., 1958.
2. Stebner, C. M. "Economy of Sound Fundamentals in Operative Dentistry." *J.A.D.A.*, Vol. 49, p. 296, Sept., 1954.
3. Medina, J. E. "A Philosophy of Dental Practice." *J. of Am. Acad. of Gold Foil Operators*, Vol. 5, No. 1, May, 1962.
4. McGehee, W. H. O., True, H. A., and Inskipp, E. F. *A Textbook of Operative Dentistry*. McGraw-Hill Book Company, Inc. New York, Toronto and London, 4th Edition, pp. 85-87, 1956.
5. McGehee, W. H. O., True, H. A., and Inskipp, E. F. *A Textbook of Operative Dentistry*. McGraw-Hill Book Company, Inc., New York Toronto and London, 4th Edition, pp. 127, 128, 585, 1956.
6. Ferrier, W. I. *Gold Foil Operations*. University of Washington Press, p. 96, Seattle, 1959.
7. Hamstrom, F. E. "Evaluation of Rubber Dam Technic." *J. of Am. Acad. of Gold Foil Operators*, Vol. 5, No. 1, p. 19, May, 1962.
8. Myers, L. E. "Filling a Class V Cavity with a Combination Mat and Cohesive Gold Foil." *J. of P. D.*, Vol. 7, No. 2, p. 255, March, 1957.
9. Ferrier, W. I. *Gold Foil Operations*. University of Washington Press, p. 95, Seattle, 1959.
10. Smith, B. B. "Gold Foil in Everyday Practice." *J. of Am. Acad. of Gold Foil Operators*, Vol. 4, No. 2, p. 59, Oct., 1961.
11. Koser, J. R. and Ingraham, R. "Mat Gold Foil with a Veneer Cohesive Gold Foil Surface for Cass V Restorations." *J.A.D.A.*, Vol. 52, pp. 714-727, June, 1956.

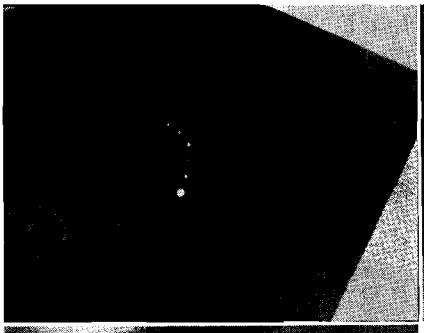
* * * * *

Dam Gems

It is the intent of the Rubber Dam Committee to publicize, at regular intervals, various techniques that will be of use to students and practitioners. Some of these will be time-proven and others will be new. Your comments, suggestions or ideas for assisting others with various steps of dam techniques will be appreciated. If photographs are necessary, the Committee will make every effort to be of assistance to you. Please send your ideas to Cdr. Loren V. Hickey, DC, USN, USS Constellation, CVA 64, FPO, San Francisco, California.

TAKING THE Damn OUT OF RUBBER DAM

It is most discouraging when the rubber dam has been torn by a bur and must be replaced. Solutions to this problem range from stuffing cotton into the opening, to the complete removal and replacement of the clamp and dam. The following procedure has been advocated by the author and used by men in their study groups for several years and has been responsible for the recruitment of innumerable men to routine rubber dam procedures.



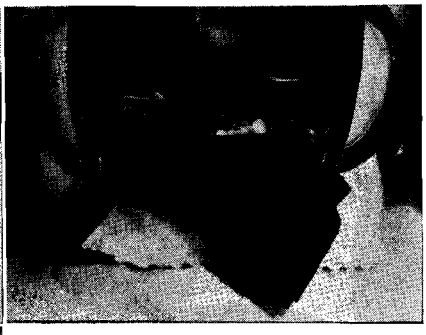


Figure 1 (Top Left) illustrates the second piece of rubber dam with new holes punched and soapy water applied.
Figure 2 (Bottom Left) illustrates the placement of the large hole over and around the existing clamp.
Figure 3 (Right) illustrates the second dam in place with the teeth fully exposed. If rubber of the same size is used one piece should fit exactly over the other. This was not done in the illustration in order to demonstrate the presence of the supplement.

When a dam is cut or torn, another piece of rubber of the same size is punched in the same manner as the original, lubricated with soapy water and placed over the existing clamp and application. Rubber of the same thickness can be used, or lighter weight material can be kept on hand for just this purpose. It can be readily attached to the rubber dam holder of choice. As many as four or five supplements may be added if necessary, which also contributes to tissue retraction.

Suggested by: Dr. Lloyd Jacobson
Department of Oral Diagnosis
and Treatment Planning,
School of Dentistry.
University of Washington,
Seattle 5, Washington

* * * * *

Two Pairs of Clamp Forceps

It has been found that the time required to apply the dam is reduced, in certain cases, if two pairs of forceps are used. For example, having seated a clamp on a tooth, the operator hands his assistant the forceps and she is immediately able to hand him the second pair loaded with the second clamp. In cases where a third clamp is needed, the assistant can have it loaded onto the first pair of forceps.

Suggested by: Dr. Terence Knight
1102 Medical Arts Bldg.,
Jeppe Street,
Johannesburg, South Africa.

Recipients of the 1963 Student Achievement Award

The following recent graduates were presented the Gold Foil Achievement Award by the American Academy of Gold Foil Operators:

James A. Abdoney, *West Virginia University*
Larry G. Bamesberger, *Northwestern University*
Theodore Berg, Jr., *Ohio State University*
Charles M. Berridge, *Georgetown University*
Byrl Blount, Jr., *University of Kansas City*
Clark B. Brown, *State University of New York at Buffalo*
Charles A. Caruso, *Seton Hall University*
Edward L. Davenport, *University of Michigan*
Ursula Dietrich, *University of Alabama*
Howard Teruo Fujino, *Howard University*
Lyndon D. Harder, *Loma Linda University*
Ronald E. Harmon, *University of Washington (Seattle)*
Paul J. Hoffman, *Columbia University*
William C. Jennette, Jr., *Baltimore College of Dental Surgery*
Kenneth W. Kleinman, *St. Louis University*
Roland G. La Fleche, *University of Manitoba*
Walter W. Laos, *Loyola University (Chicago)*
Kenneth J. Law, *Creighton University (Omaha)*
Howard E. Lewis, *University of Tennessee*
Albert Fung Louie, *University of California*
John R. Maas, *Marquette University*
Lee T. Metcalf, *University of Oregon*
Lloyd A. Morgan, Jr.,*Temple University*
John H. Patton, *Baylor University*
Garry H. Radford, *Meharry Medical College*
Robert R. Rock, *Indiana University*
Francis Salvatore Scimone, *Tufts University*
Carroll D. Shelton, *University of Texas*
Dominick N. Shoha, *University of Detroit*
James W. Smalley, *State University of Iowa*
Arthur I. Steinberg, *University of Pittsburgh*
John Takekoshi, *University of Illinois*
Terry R. Thalman, *Washington University (St. Louis)*
Richard A. Thompson, *University of Minnesota*
Louis S. Winner, Jr., *University of Pennsylvania*

It is the sincere hope of the Academy that the recipients of this Award will continue to seek additional knowledge and training in the use of gold foil. In that manner they will be able to perform this procedure with greater facility and satisfaction, and they will be able to render a more comprehensive treatment to their patients.

Annual Meeting
PROGRAM

Thursday, October 10, 1963
Executive Council Meeting – Lord Baltimore Hotel, Parlors G and H

* * * * *

Friday, October 11, 1963
LORD BALTIMORE HOTEL, BALTIMORE, MARYLAND

9:00 a.m. **Registration**

9:30 a.m. **Opening Ceremonies**
Call to Order ..... DR. HENRY A. MERCHANT
President
Invocation
Greetings
Remarks ..... DR. ARNE ROMNES
Program Chairman

9:45 a.m. – 12:00 **Essay Program** – Auditorium of the Health Sciences Library, University of Maryland, Lombard and Greene Streets.

"*Current Studies on the Physical Properties of the Various Forms of Pure Gold*"
Dr. Jean T. Hodson, Seattle, Washington

"*Gold Foil in Periodontics and Restorative Dentistry*"
Dr. Harry Rosen, Montreal, Canada

"*The Effect Gold Foil Technics Have on Pulpal Tissue*"
Dr. Henry J. Bianco, Jr., Ellicott City, Maryland

12:00 Noon **Luncheon** – Baltimore Student Union Building, 621 West Lombard (across the street from the Dental School)

1:00 p.m. **Clinical Session** – Operative Clinic, Second Floor
BALTIMORE COLLEGE OF DENTAL SURGERY, DENTAL SCHOOL
UNIVERSITY OF MARYLAND, BALTIMORE, MARYLAND

Class II Restorations:
Dr. Donald K. Phillips, Nebraska City, Nebraska

Class III Restorations:
Dr. George A. Ellsperman, Bellingham, Washington

Dr. Paul T. Dawson, Chicago, Illinois
Dr. Raymond W. Shaddy,
Omaha, Nebraska
Dr. William E. Cody, Denver, Colorado
Dr. William M. Walla, Sr.,
Fremont, Nebraska
Dr. Merle McGee, Pittsburgh, Pennsylvania
Dr. Robert W. Chapin, Omaha, Nebraska
Dr. Ralph J. Werner,
Menomonie, Wisconsin
Dr. Raymond W. Dolph,
Corona, California
Dr. Carl Monacelli,
Brookline, Massachusetts

Class IV Restorations:

Dr. John H. Nolen, Muskegon, Michigan

Class V Restorations:

Dr. Hunter A. Brinker, Orlando, Florida
Dr. Henry J. Bianco,
Ellicott City, Maryland
Dr. George A. Brass, Winnipeg, Canada
Dr. Eugene S. Merchant, Omaha, Nebraska
Dr. Herbert J. Underhill, Jr.,
East Greenwich, R. I.
Dr. Ray E. Stevens,
Grand Rapids, Michigan
Dr. D. Jackson Freese,
Concord, New Hampshire
Dr. Clifford Miller, Chicago, Illinois

Chairside Clinic —
"The Use of the Rubber Dam"

Dr. Floyd E. Hamstrom,
Burlington, Washington

* * * * *

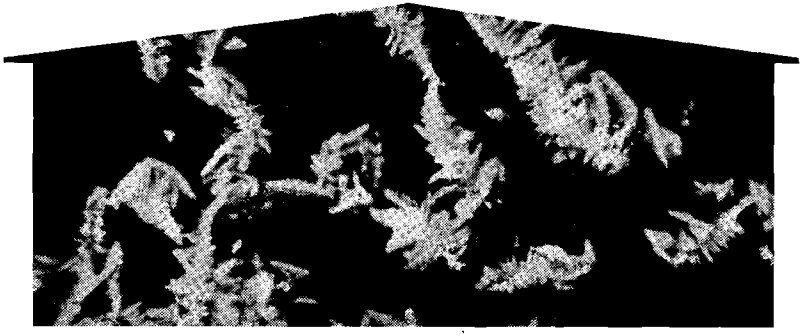
LORD BALTIMORE HOTEL — CASWELL ROOM

6:00 p.m. Cocktail Hour
6:30 p.m. Dinner
8:30 p.m. Business Meeting

2 RECOGNIZED AND ACCEPTED AIDS TO SUCCESSFUL AND ENDURING TOOTH RESTORATION

WILLIAMS MAT GOLD is an interlaced, interlocked, crystalline product of the highest purity ever marketed commercially. After proper annealing to expel air-borne cohesion impairing surface deposits, it may be condensed by standard methods into masses of a density and hardness comparable to a Type A gold casting. For ease of working, and where indicated, there is no superior filling material.

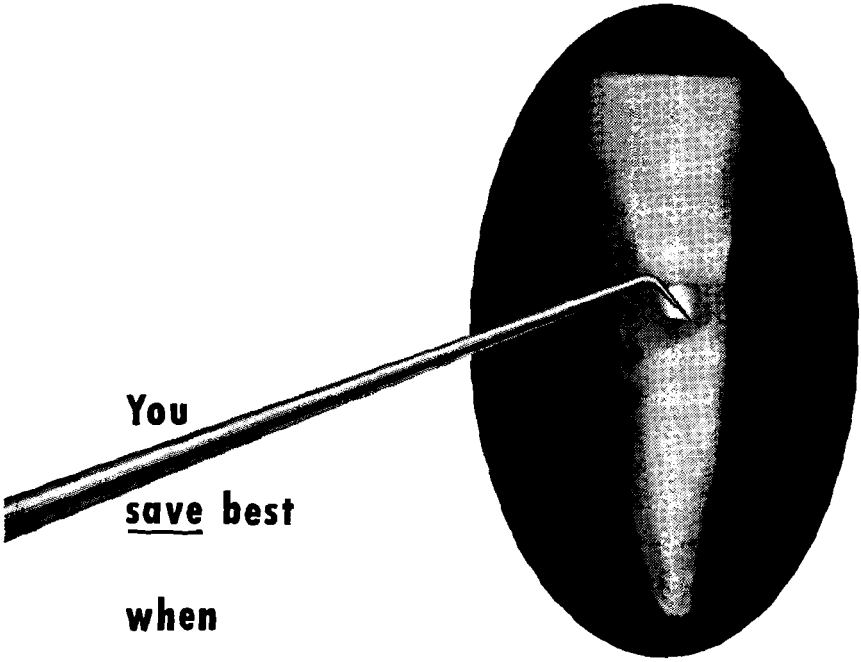
WILLIAMS MAT-FOIL is Mat Gold with a thin overlay of gold foil covering the surfaces. It has been developed for ease of handling and results in a restoration of outstanding density.



Mat crystals magnified about 100 times. This shows the "pine tree" effect which makes it possible for the interlocking of particles. Also, this configuration gives a greater surface area to enhance cold welding.

Your special introductory outfit supplies Mat Gold or Mat-Foil, serrated Plugger Points, and Handle. Contact your dealer for your introductory kit.

WILLIAMS GOLD REFINING COMPANY, INC.
2978 MAIN STREET BUFFALO 14, NEW YORK
and WILLIAMS GOLD REFINING CO. OF CANADA, LTD.
FORT ERIE ONTARIO



You

save best

when

YOU SEAL BEST!

Gold Foil saves best because it seals best, sealing out all moisture and microbes. And Gold Foil works best when it's "M-H" Extra Pliable Cylinders, the *easiest-working* Foil ever offered to the dental profession.

Though perfectly cohesive, they are soft and pliable — a combination never before developed so successfully. They respond to your condenser instantly, packing easily and rapidly into a dense, resistant restoration of great edge-strength and unsurpassed hardness. They do not balk at the condenser, but follow it pliantly, going true to the mark the very first time they are condensed to place.

Discover their radically new responsiveness under your own condenser. You'll like what you'll discover!

MORGAN, HASTINGS & CO.
2314 Market Street, Philadelphia 1, Pa.

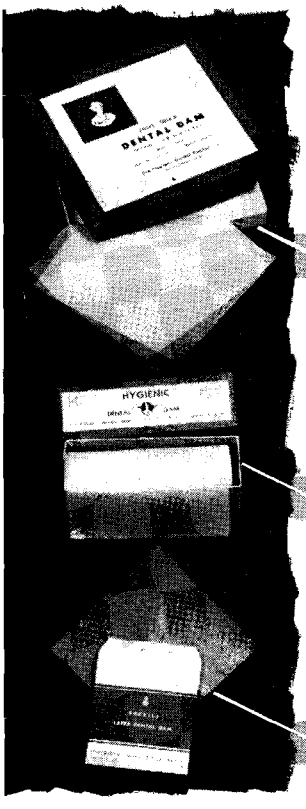
Please send, through my dealer, 1/40 oz. of "M-H" Extra Pliable Cylinders — price, $2.85.

Doctor .....

Address .....

Dealer .....

HYGIENIC offers Pure Latex DENTAL DAM



in cuts and thicknesses to meet the requirements of every gold foil operation

★ READY CUT DAM

Available in:
5" squares — 52 pieces per box
6" squares — 36 pieces per box
Light or Dark Color
Thin, Medium, Heavy or Extra Heavy Gauge (Extra Heavy—Dark only)

★ DAM IN ROLLS

Available in:
½ sq. yd. roll — 5" or 6" wide
1 sq. yd. roll — 5" or 6" wide
Light or Dark Color
Thin, Medium, Heavy or Extra Heavy Gauge (Extra Heavy—Dark only)

★ STERILE DAM

Each piece individually packaged to keep it sterile until used.

Available in:
5" squares — 30 pieces per pkg.
6" squares — 30 pieces per pkg.
Light or Dark Color
Medium Gauge only

GAUGES & TOLERANCES

Thin	— .005" ± .001"
Medium	— .0075" ± .001"
Heavy	— .010" ± .001"
Ex. Heavy	— .0125" ± .001"

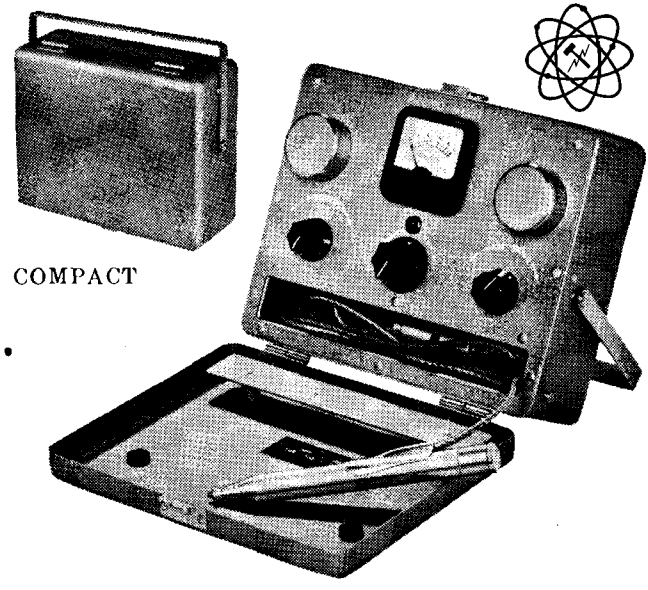
STRONG, TEAR-RESISTANT Hygienic Latex Dam, together with modern accessories (from other manufacturers), now combine to render the recognized advantages of the rubber dam readily available for easy application by all. See your dealer or write us. New technics for application of the rubber dam would be welcome for our file.

another quality product by the manufacturers of
PERM • MICROLON FLEXIBOLES

THE HYGIENIC DENTAL MANUFACTURING CO.
AKRON 10, OHIO, U. S. A.

ELECTRO - MALLET

The Electronic Foil Condenser



COMPACT

Operates on the new principle of high-frequency malleting at reduced intensity without sacrifice of foil density. Recognized as superior by leading dental schools and nationally known foil operators.

The **Electro - Mallet** is equally advantageous for condensing **amalgam.**

A 30-day trial without obligation to purchase is available. Please write for details.

McShirley Products

6535 SAN FERNANDO ROAD GLENDALE 1, CALIF.