JUNE, 1956

The journal of the Limb and Brace profession

Orthopedic and Prosthetic Appliance Journal

Assembly Program

Prosthetic Thumb

Machine Screws

published jointly by
Orthopedic Appliance & Limb Mfrs. Association
American Board for Certification

DATES TO REMEMBER — 1956

What • When • Where

SEPTEMBER

9 - 14	CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION	*Atlantic City, N. J. Ambassador Hotel*

OCTOBER

15 - 17	NATIONAL REHABILITATION ASSOCIATION—Annual Conference	*Denver, Colo. Shirley-Savoy Hotel*
19 - 20	CERTIFICATION EXAMINATION FOR ORTHOTISTS AND PROSTHETISTS	*San Francisco, Cal.*
20 - 24	NATIONAL ASSEMBLY OF THE LIMB AND BRACE PROFESSION—OALMA and Certification Meetings	*San Francisco, Cal. Sheraton-Palace Hotel*
28 - 31	NATIONAL SOCIETY FOR CRIPPLED CHILDREN AND ADULTS—Annual Convention (*Note* "Pageant on Prostheses" to be sponsored by the American Board for Certification)	*Washington, D. C. Statler Hotel*

1957

JULY

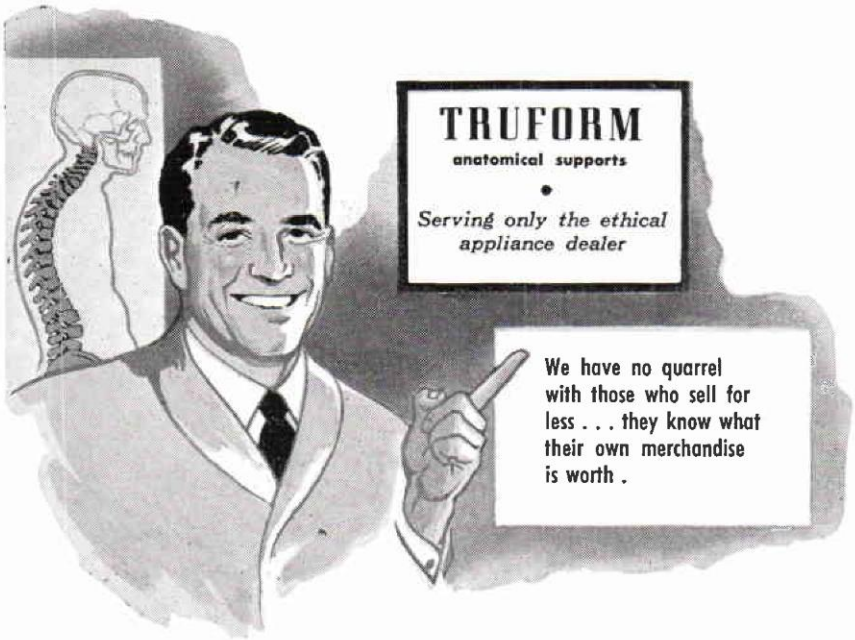
22 - 27	INTERNATIONAL SOCIETY FOR THE WELFARE OF CRIPPLES—Seventh World Congress	*London, England*

● "Seemed to me they went together, that's why I hung up those two signs side by side.

"That sign about Truform selling *only* to ethical appliance dealers — that's the policy that helps to keep *me* in business. It's one big reason why I carry only the Truform line — that, plus the satisfaction their quality appliances always give.

"And speaking of quality, I guess that sort of explains why I hung up the other sign beside Truform's. I never could feel right about fitting anything but the best, and I've always found that the best is worth a fair price. So I never did put in any low-price lines, because I never saw one that was any better quality than its prices indicated.

"Yes, sir, I'm going to keep going along with Truform."



FITTERS • TEACHERS • NURSES • *write for "Truform Red Book" illustrated reference catalog, and Anatomical Charts . . . both free!*

®TRUFORM *anatomical supports*
3960 ROSSLYN DR., CINCINNATI 9, OHIO
BRANCHES: New York and San Francisco

ACCO TRU-LOC Prosthetics Kit

Makes Swaging Easy... Saves Time... Eliminates Soldering... Permits Re-Use of most ACCO Tru-Loc Terminals and Fittings without the Fuss and Muss of Unsoldering!

The ACCO Precision Swaging Tool pictured in the Kit makes swaging easy with ACCO Tru-Loc Fittings and Terminals... eliminates soldering. Swaging is unquestionably best... provides 100 per cent bond between cable and terminals... and there is no acid to corrode the cable... no heat to weaken it.

This Kit contains a full range of the Finest Stainless Steel ACCO Tru-Loc Terminals, Fittings, Assemblies, Cable and Housings. Everything has been carefully designed to permit maximum re-use of Fittings *...without the fuss and muss of unsoldering.*

All of the parts, and the Precision Swaging Tool supplied in this ACCO Tru-Loc Prosthetic Kit, have been tested, approved *and adopted* by the Army Prosthetic Research Laboratory at Walter Reed Hospital and by Government Hospitals and Centers throughout the U. S. For further details see the following pages.

Portable Swaging Tool

The suction cup mounting pictured here makes ACCO's Precision Swaging Tool portable. It can be used on any flat surface.

for complete information write to—

ACCO

TRADE MARK

Automotive and Aircraft Division
AMERICAN CHAIN & CABLE

601 Stephenson Bldg., Detroit 2
2216 South Garfield Ave., Los Angeles 22 • Bridgeport 2, Conn.

Shown Here are the Stainless Steel Terminals, Fittings, Assemblies, Cable and Housings furnished to Limb Shop Operators in

ACCO's TRU-LOC Prosthetics Kit

• Quantities of parts or assemblies furnished with each kit are shown with each set of drawings. And, of course, each kit also contains the ACCO Precision Swaging Tool and Suction Cup Mounting shown in the pictures on the preceding page.

ACCO BUTTON

RA4683

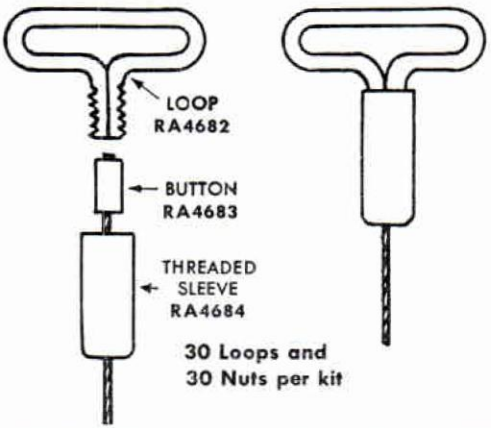
100 Buttons per kit

To assemble—

Insert Cable and Swage

ACCO STRAP "T" HANGER

All drawings approximately actual size



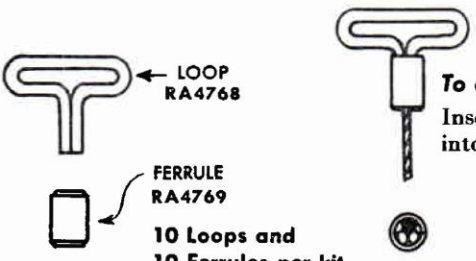
30 Loops and
30 Nuts per kit

To assemble—

Thread Cable thru Nut—
Swage Button to Cable—
Screw Loop into Nut

***NOTE** • Loop and Nut can be re-used*
No unsoldering involved

ACCO ELBOW "T" HANGER

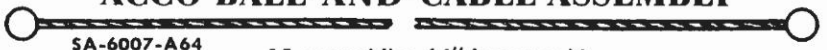


10 Loops and
10 Ferrules per kit

To assemble—

Insert Cable and Loop into Ferrule—then Swage

ACCO BALL-AND-CABLE ASSEMBLY

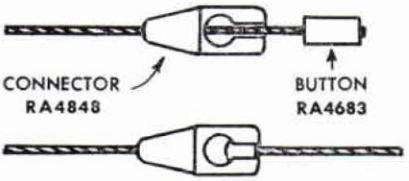


SA-6007-A64

15 assemblies 64″ long per kit

Stainless Steel Balls are on each end of these 64″ assemblies. Cut in half, each of these 64″ assemblies makes two full length 32″ cable assemblies. The Balls fit ACCO Connectors and other devices. Cut ends can be connected to ACCO Strap, Connector or similar devices.

ACCO CONNECTOR

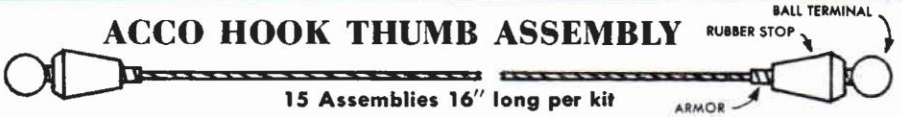


65 Connectors per kit

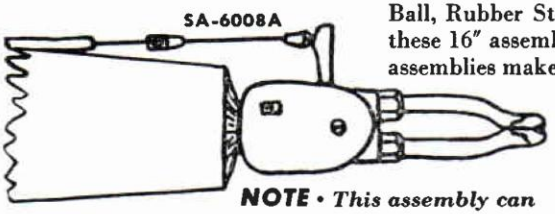
Ball Terminal drops easily into Connector. This Button and Ball assembly is ideal for quick disconnects on Hook and Hand exchanges.

***NOTE** • Connector can be re-used There is no unsoldering*

ACCO HOOK THUMB ASSEMBLY



15 Assemblies 16″ long per kit



Ball, Rubber Stop and Armor are on each end of these 16″ assemblies. Cut in half, each of these 16″ assemblies makes two Thumb Assembly units. Ball end is designed to fit thumb of a hook. Rubber stop holds Ball in position. Armor prevents Cable wear and reduces Cable fatigue.

***NOTE** • This assembly can be furnished to any length required for other types of installations*

ACCO CABLE HOUSING

5 lengths of 10 feet each per kit **RA4806**

Stainless Steel—Designed for use with Standard Retainers

SPECIAL **ACCO Lubricating Stick . . . will not soil clothing . . . lubricates Cable sliding through Housings . . . eliminates grunts and operating noises . . . insures smooth operation**

for complete information on ACCO TRU-LOC Prosthetic Kit and equipment, write to

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HERSCO Arch Products Corp.

MANUFACTURERS

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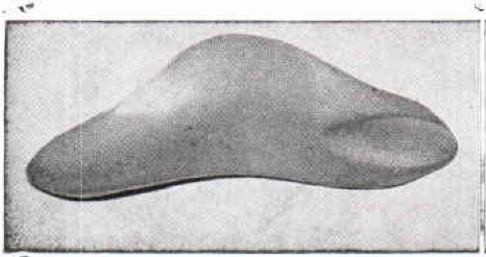
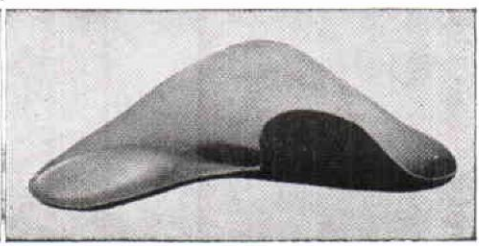
ALL ARCH SUPPORTS MADE AFTER PLASTER CASTS, IMPRESSIONS OR IN STOCK SIZES



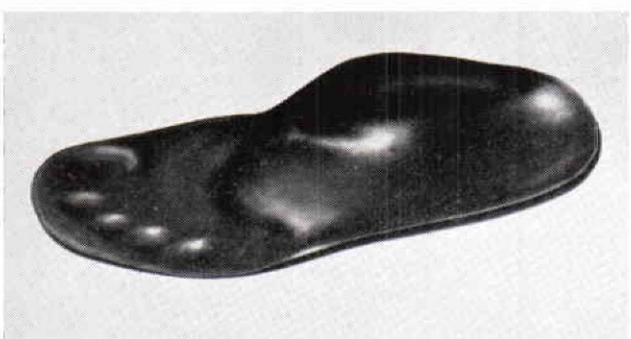
Style 600S (Schaeffer)

Combination longitudial and metatarsal arch support. Flexible with a sponge rubber metatarsal pad and a concealed highly tempered spring. Base of support is constructed of a high grade sole leather, moulded on individual lasts, the top finished with a fine calfskin and the bottom a high grade suede. Available with 1, 2, 3 or 4 springs.



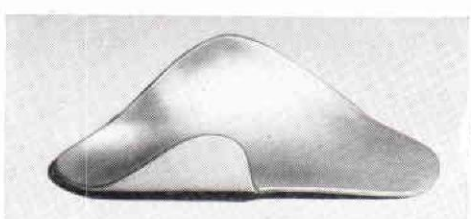
Style 903 Leather (Whitman)

A combination support with both inner and outer flanges designed especially to hold the heel firmly in position. In addition provides support for both inner and outer longitudial arch. Made with one or more springs. Used in cases where a metal Whitman would be too rigid as this support is flexible and light in weight.



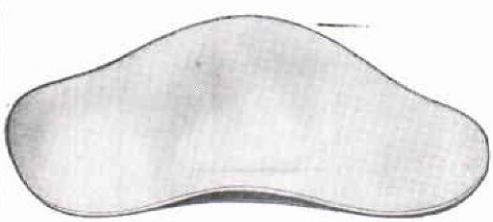
Hersco Plantar Mould

A foot appliance of great merit. This full length Plantar Mould is made with recessed indentations to accommodate the toes and pressure points such as plantar warts, individual metatarsal heads, and soft corns. The advantage of this appliance is that it reaches the fore part of the foot whereas the conventional 3/4 length support does not.



Style No. 900

Most popular metal Whitman—stainless steel scientifically designed and precision made to give you a perfect product. Stock sizes: Children 4 to 3 medium; Women's 4 to 10 wide and narrow; Men's 6 to 13 wide and narrow. Also made after cast or print.



No. 803

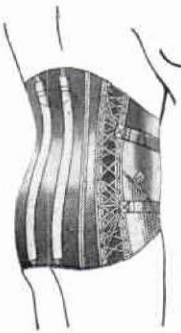
Stainless steel support with moderate inner flange to assure the utmost comfort, Meatarsal and cupped heel, made in stock sizes, after cast or print. Women 3 to 10, wide-narrow. Men's 6 to 12, wide-narrow. Children 6 to 2, medium. This support is available in both Stainless steel and Dural. This is one of the most popular supports in the Surgical field. All supports made from plaster cast, foot prints or stock sizes.

With Complete Confidence

DOCTORS PRESCRIBE . . . DEALERS SELL

Freeman

SURGICAL SUPPORTS



MODEL 422
Sacro-Lumbar Back Support for Men

MODEL 423
Sacro-Lumbar Back Support for Women

SOUND BASIC DESIGN—In developing the corset type of support, Freeman has worked closely with the medical profession. The result of this work and cooperation is a sound basic design that can give the exact degree of support or immobilization desired and still retain comfort for the wearer whether he's sitting, standing or reclining.

COMPLETE LINE—When you handle Freeman surgical supports you have available the *right* model for every surgical garment application the doctor may prescribe. You can be sure that each is correctly designed for its job and *will be worn* because it will be comfortable. That's why you can fit and sell Freeman garments with confidence.

FREEMAN QUALITY FEATURES • *Self-smoothing, Non-Wrinkle Fly. Exclusive. Speeds putting on garment, assures extra comfort* • *Petal-Soft Interior Finish. Cushions stays, avoids irritation* • *Nylon Laces at points of greatest strain* • *Soft Plush Padding under hooks and eyes* • *Superb Needle Work* • *Correct Materials.*

FREEMAN MANUFACTURING COMPANY, Dept. 806, Sturgis, Michigan

Send me complete literature on Freeman surgical supports ☐. Send on approval, without obligation, a Freeman Sacro-Lumbar Back Support for my inspection ☐.

Men's ☐ Women's ☐ Size_____.

Name_____

Address_____

City_____ State_____

Orthopedic and Prosthetic Appliance Journal

(Title registered U. S. Patent Office)

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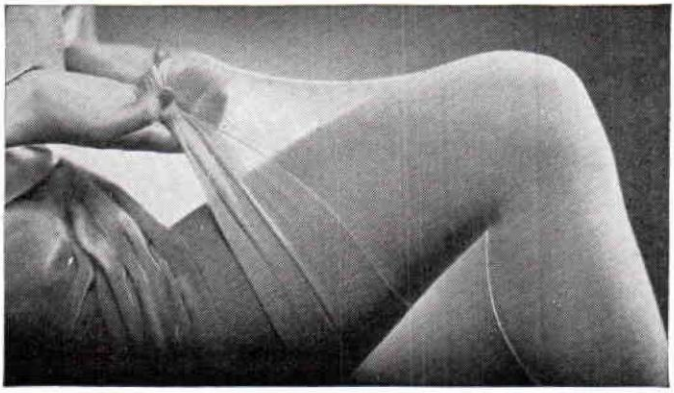
VOLUME 10 • June, 1956 • NO. 2

Office: 411 Association Bldg., Washington 6, D. C.

CONTENTS

DEPARTMENTS

ANNOUNCING THE NEW SUPER EXTRA-SHEER ELASTIC STOCKING BY BELL-HORN



#20 TROPICAL WEIGHT — EXTRA SHEER

- The Sheerest Elastic Stocking to reach the market incorporating all the style features so important to the women of today who are conscious of the value of full fashioned hosiery.

#105 KB
Hinged Knee Cap
With Straps

Wm. H. Horn & Bro., Inc.
451 N. 3rd St.
Philadelphia 23, Penna.

#213—S STUMP SHRINKER
Eight Stock Sizes Each for
Amputations Above and
Below the Knee

Assembly Program Announced: Noted Authorities to Give Courses

The program for the 1956 National Assembly features national authorities and gives heavy weight to seminars and instructional courses. As announced by Chairman Herbert Hart and approved by OALMA President Frank Harmon, the sessions will get underway at the Sheraton-Palace Hotel in San Francisco the morning of Sunday, October 21 and continue through until noon on Wednesday, October 24.

Preliminary events include the Certification Examinations on October 19-20, and "Early Bird" registration on October 20 for those members of the limb and brace profession who arrive ahead of the formal registration period. Officers of the Orthopedic Appliance and Limb Manufacturers Association will meet October 20.

The faculty of the seminars or instructional courses includes Dr. Sterling Bunnell of San Francisco who will give the course on "Hand Splints"; Dr. Paul W. Meyer of the Dickson-Diveley Clinic who with Ted R. Reynolds, C.O. will give a seminar on "Appliances for the Foot"; Dr. Edwin R. Schottstatdt and George Robinson, C.P., lecturing on "Functional Arm Bracing", and other noted authorities from the limb and brace field as announced in the tentative program which follows:

Tentative Program

1956 National Assembly of The Limb and Brace Profession

San Francisco, Calif., October 21-24

Sponsors: Orthopedic Appliance and Limb Manufacturers Association and the American Board for Certification.

Note: This is a tentative program; other features are now being arranged and will be announced in the September issue of this JOURNAL, and in the Official Printed Program available at the time of registration. The scheduling of individual programs is subject to change.

Preliminary Meetings, October 19 and 20

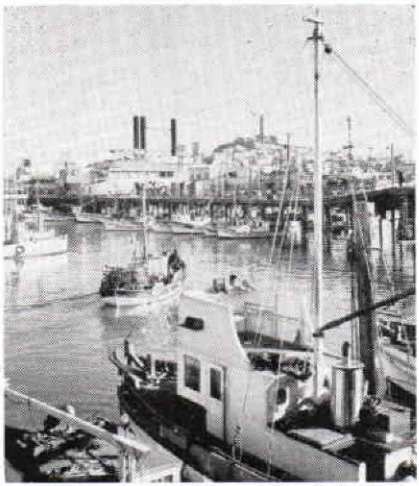
Certification Examinations. Hours to be announced.
OALMA Officers and Directors Meet.
"Early Bird" Registration opens at noon on October 20.

Sunday, October 21

Registration Underway
Scientific, Technical and Educational Exhibits Open in Rose Room of Sheraton-Palace Hotel.
Seminar: "Appliance Used in Deformities and Functional Disorders of the Foot"—Paul W. Meyer, M.D., Dickson-Diveley Clinic, and Ted R. Reynolds, C.O., Kansas City, Mo.
Seminar: "Anatomy for the Limb and Brace Technician"—Charles G. Hutter, M.D., Hollywood, Calif.

Monday, October 22—Morning Session

President's Breakfast. Welcome from the Program Chairman. Introduction of Guests. Surprise Film.
OALMA Business Session. Greetings from President Harmon. Treasurer's Report. Nomination of Officers (election to be held at noon October 23).



Above: The Colorful Fishing Fleet at Fishermen's Wharf in San Francisco (picture courtesy Redwood Empire Assn.)

At right: The famous Sheraton-Palace, Assembly headquarters.

MONDAY, OCTOBER 22—(Continued)

OALMA Brace Dictionary—Presentation of the sample chapter and Prospectus—Matt Laurence, Chairman Brace Project, and Edward W. Snygg.

The New Prosthetic Schools—Interview Session "What Are Your Questions", conducted by Vice President Charles A. Hennessy. Representatives of New York University and the University of California at Los Angeles, will take part in this presentation.

In Memoriam session. Tribute to departed members of the profession.

Certification Luncheon. Presentations.

American Board for Certification. Annual meeting. (Note: While only Certified Facilities are eligible to vote, all Assembly participants are invited to attend.)

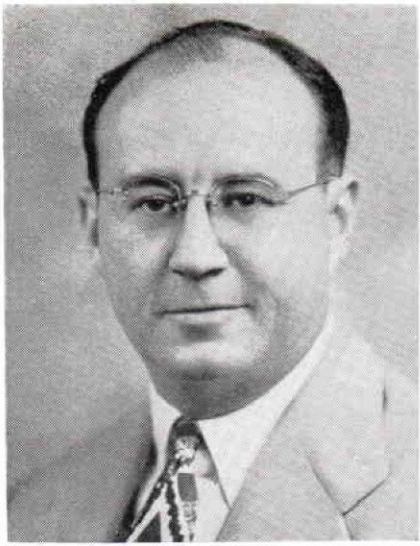
"How Certification Works"—five-minute interviews of the chairmen at the committees through which the Board plans examinations, checks credentials and certifies orthotists and prosthetists.

Seminar: "Cerebral Palsy Bracing"—Cedric D. Denison, C.O., Baltimore, Md., and others to be announced.

Seminar: "Hand Splints"—Sterling Bunnell, M.D., San Francisco.

Cosmetic Appliances—C. O. Anderson, San Francisco; Carl Nielson, Washington; Milton Tenenbaum, New York.

The Limb and Brace Contracts—Service to the Veteran—A Question and Answer Session. Dr. Robert E. Stewart, Director, VA Prosthetic and Sensory Aids Service. Joseph J. Pitrone, Supervising Purchasing Agent, VA Service Contracts Section.



Two members of the Seminar Faculty. Dr. Paul W. Meyer (left) and Ted R. Reynolds, C.O., who will give the course in Foot Appliances.

Tuesday, October 23—Morning Session

The Lower Extremity Amputee—a Clinical Picture as revealed by the studies at the University of California—Verne T. Inman, M.D., and Henry E. Loon, M.D., San Francisco.

Functional Arm Bracing—Edwin R. Schottstaedt, M.D., San Francisco; George Robinson, C.P., Vallejo, California, and others to be announced. (Note: Those attending this session will find it helpful to read the article "Functional Bracing of the Arm, Part I" by Dr. Schottstaedt and Mr. Robinson, which appears in the June, 1956 issue of the *Journal of Bone and Joint Surgery*, pages 477-499.)

OALMA Business Session. Election of officers.

Meeting of the National Advisory Council (Certification)

Tuesday, October 23—Afternoon and Evening Session

Seminar: "Harnessing", by Woodrow T. Yamaka, C.P., Los Angeles, and Jerry Leavy, San Jose, California.

Second Session of Seminar on "Cerebral Palsy Bracing"

The Child Amputee and His Environment—Findings of the Child Amputee Prosthetics Project at Los Angeles—Milo Brooks, M.D., Robert Mazet, Jr., M.D., Craig Taylor, Ph.D.

OALMA Reception

OALMA Banquet—Installation of New Officers. Presentations.

Wednesday, October 24—Morning Session

Fitting the Child from One to Ten

(1) The Lower Extremity—Charles H. Frantz, M.D., Grand Rapids, Mich.

(2) The Upper Extremity—George T. Aitken, M.D., Grand Rapids, Mich.

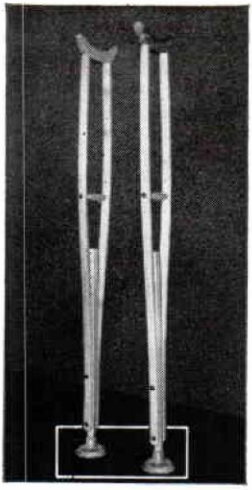
Management Clinic—"Finding Your Financial Facts"—Presentation of the OALMA Cost Accounting Service. Joseph Gitlin and John Hendrickson, Minneapolis; M. P. Gestaro, Washington.

Adjournment.

new SOLID FOOTING AND SAFETY FOR CRUTCH USERS!

Patent Pending

"SAFTEE-CRUTSHOE" for solid footing



HERE'S GOOD NEWS FOR EVERYONE REQUIRING THE AID OF CRUTCHES

Especially amputees and elderly people, who often are obsessed with the fear of falling, or slipping. It's the "Saftee-Crutshoe".

THE ENTIRE "SAFTEE-CRUTSHOE" IS MADE OF NATURAL RUBBER

Because it's made of natural rubber, it will retain its original resilience—throughout the entire life of the crutshoe.

THE "SAFTEE-CRUTSHOE" FITS ANY STANDARD CRUTCH OR WALKING AID

Yet, it differs radically from other crutch tips on the market, in both design and in its basic operating principle.

THE DESIGN INSTILLS A FEELING OF SECURITY—"SOLID FOOTING"

It instills such a feeling of confidence in the patient that fears are dispelled with the very first step taken—for faster recovery.

120 GRIPPING FINGERS ARRANGED IN A SAFETY-TREAD DESIGN

When pressure is applied, each finger acts as an individual "squee-gee", to insure the utmost in safety for the user.

IT'S MUCH SAFER THAN ANY OTHER CRUTCH TIP ON THE MARKET TODAY

They can be used on irregular surfaces, such as lawns, soft ground, snow, sand beaches, and loose gravel—with confidence.

THE "SAFTEE-CRUTSHOE" HAS BEEN TESTED IN LEADING HOSPITALS

They've been tested under almost every conceivable condition—and proven satisfactory even on tile and highly polished floors.

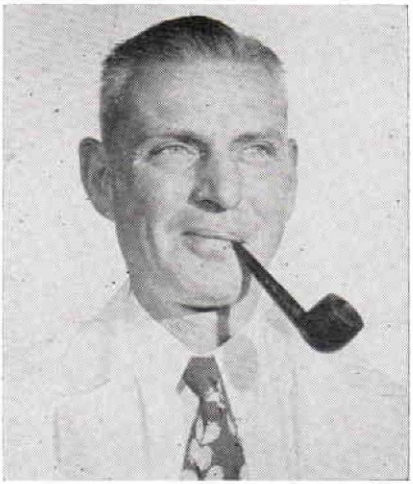
LEADING HOSPITAL AND SURGICAL SUPPLY HOUSES HANDLE THEM

They are available at Orthopedic and leading Hospital and Surgical Supply Houses in your choice of gray, black or white.

D & L PRODUCTS

"SAFTEE-CRUTSHOE" FOR SOLID FOOTING

990 South Oakwood • Detroit 17, Michigan



A Message from The President of the Certification Board

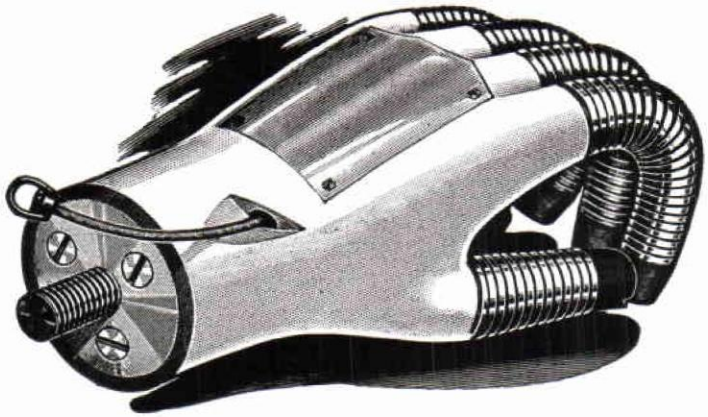
Decisions of transcending concern to certifees and prospective certifees were made during last month's meeting of the ABC.

Candidates for certification who anticipate taking the examination in San Francisco next October will be particularly concerned in a change in the procedural technique of the oral portion of the examination which will be instituted at that time. The Board believes that the previously used method of inflicting on the examinee the performance of a succession of stereotyped procedures in the unfamiliar setting of a strange shop is not the most advantageous method of gauging the ability of that individual. The tools he is accustomed to using are not at hand. The tasks he is required to perform are often those which he should have mastered during the earliest months of his training. In some instances a specific technique he is expected to apply, or device he is asked to make, may be one which is not used in his area, so that he has had no experience in its application or fabrication.

The examiners are permitted a certain latitude in conducting such an examination, but greater elasticity is desirable. It is though such will be attained by a different approach. This year the oral examination teams will consist of three men. Each of the three will interview every candidate in an area of work, such as lower extremity prostheses or leg braces, for a period of twenty minutes. He will have at hand devices, parts, and completed braces or prostheses. He will discuss with the examinee indications for the use of the divers mechanisms, methods of fabrication, techniques of measurement, fittings, and adjustments. He may request the candidate to fit a back brace to a model, make a correction on the adjustable leg, draw a pattern for a specific brace, or take measurements for a device using him (the examiner) as the patient.

In this discussion type of examination, the examiner will, we believe, be able to more fairly evaluate the experience and ability of the orthotist or prosthetist being interviewed. After each of the examiners has completed his evaluation of the prospective certifee, the team will render a composite judgment and assign him a grade. This method of examination is widely used in many professional fields. We anticipate that it will work to the advantage of all hands.

SEE THE NEW LOCKGRIP HANDS



WITH improved finger lineup, enabling the thumb to grasp between 1st and 2nd fingers.

WITH naturally shaped and molded rubber finger tips.

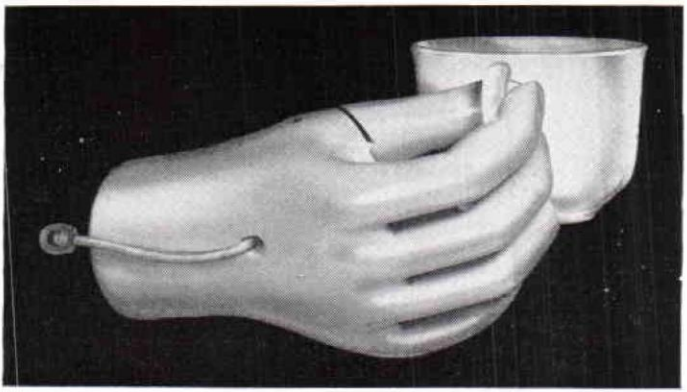
WITH Finer gauged and stronger flat finger spring wire, adding to the jointed fingers flexibility.

NEW Realistic cosmetic gloves exceedingly lifelike in sizes 7½—8—8½.

A lighter, stronger and the most useful of all mechanical hands, in sizes from 6 to 10, all wrist styles.

ALSO THE LAMINATED WOOD HAND WITH FIBRE CORED FINGERS **PLYLITE**

LOCKING



SNAP THUMB

D. B. BECKER CO.

152 WEST STEVENS STREET ST. PAUL, MINNESOTA

THE OBSERVER

The Alert Man Is Alerted

I understand that a lot of candidates for Certification got their applications in too late so they had to be turned down for a whole year. So they stirred up a fuss.

Their common complaint was: "We didn't hear about a 60-day deadline, so it isn't fair to turn us down."

"Well," says the Certification Board, "we publicized the date in our Journal."

"But," says the man, "I don't ever see your Journal."

"Well," retorts the Board official, "we announced it at our assemblies and it is rather common knowledge wherever our folks get together."

"But I don't get to your meetings, so how am I to know?"

Well, we got to thinking about this. And it dawned on us that these men had not been alerted because they were not *alert men.* They don't go to meetings. They don't manage somehow to get to training institutes, or schools. Or, even if they do go they aren't alert to what is going on. Oh, they do all right with tools, measurements, materials—the things they are paid to do. But they don't have an inquiring mind. And, in modern life it takes that to win.

It's like the doctor who, because he has been at it for 30 years and he is tired to death when his day's visits are over, just doesn't have the desire to read his Journal—"too busy to get to the convention or the meeting of the medical society."

It's like the employee who says, "I put in a good day's work." When that's over I go home to the wife and kids. I like to read the headlines, the funnies and the sports page. I'm doing my job—that should be enough."

The fact is that it is not enough—at least not to win in this competitive world.

Seems to me that just like the foot race goes to the speedy, the rewards in a profession go to the alert.

So, I just can't be too sorry for the fellows who complain that "they should have been told." *For if they were alert they would have been alerted.* Anyway that's how it looks to me.

The Board has long been concerned with the development of the *National Advisory Council,* which is elected by vote of the individual certifees. There was much discussion about the Council's work in the future.

One suggestion would give the Council power to nominate or elect one member of the Certification Board. At present three members of the Board are nominated by the Academy of Orthopaedic Surgeons, and four by the Directors of OALMA. It is generally conceded that certifees should have a voice in the deliberations of the Board, but until the present the time there has been no practical method of their participation in its activities. This suggestion may be the answer to this problem. The suggestion will come up for further study at the next Board meeting.—ROBERT MAZET, JR., M.D.

The Cerebral Palsy Full Control Brace

By C. D. DENISON, C. O. & P.

President, C. D. Denison Orthopaedic Appliance Corporation
Baltimore, Md.

This article is based on the experiences of thousand of cases and of about fifteen years of creative research and designing developments.

It sounds rather simple when one says: "The Cerebral Palsy Full Control Brace." One would think that all that is necessary to accomplish full control of a Cerebral Palsy patient is to make and apply one of these braces, but this is further from the truth than any person can imagine.

The measuring of the Cerebral Palsy Control Brace is so vital to the outcome of the final results that it should be given comprehensive attention. Bear in mind that in this initial operation of building a brace, one is not only obtaining certain sizes but is creating a design and writing instructions for the production plant. I shall endeavor with illustrations and outline form to pass on to you the various techniques which I have found to make the measuring of cerebral palsy patients much easier with the possible exception of a very few cases.

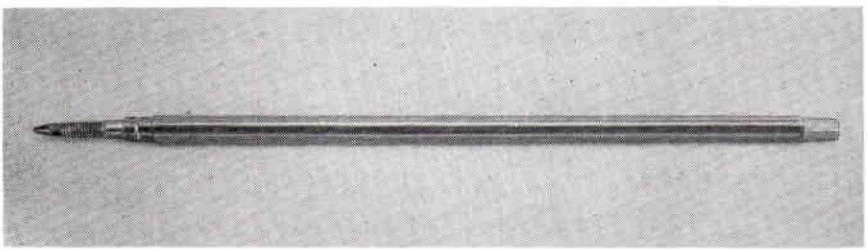


Fig. 1. Special Measuring Pen

How to measure for these braces, judge proper sizes of materials, build proper types of bearings and finally to develop the adjusting and fitting technique which is necessary to make the braces completely functional and comfortable are all problems that require infinite experience. It would be difficult to explain in writing the fitting technique and the multitude of small details which make these braces functional. This I believe could only be done in clinical classes where a particular problem in each case could be studied and worked out to a satisfactory solution. Therefore I shall limit this article to the measuring and the potential functions of the full control brace.

Special Measuring Pen

In figure 1 you see a special measuring pen. The small diameter of this pen and its great length insure greater accuracy in tracing the leg. The ball pen rolls easily over the paper. All measurements should be in ink to prevent loss of instructions in the shop, due to smudging, and to reduce eye strain of the workers who are continually reading the measurements.

Tracing paper in figures 2 and 3 is taped to a piece of sheet brass.

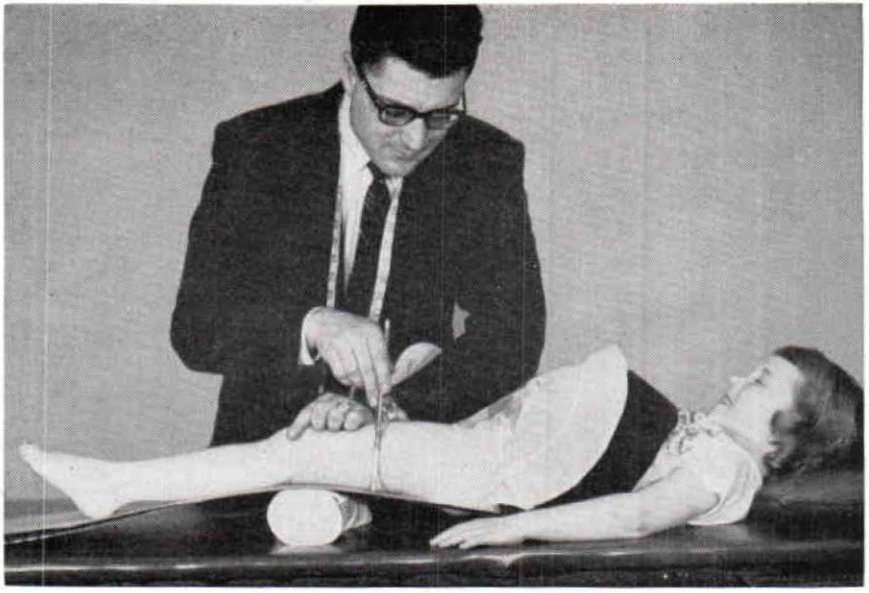


Fig. 2. Favorable Position for Measuring

Favorable Position for Measuring

In figure 2 you will see a very favorable position used in tracing the leg of a cerebral palsy patient. In this position most cases will be considerably relaxed. Relaxation and comfort of the patient should be vital considerations. Force is very seldom necessary.

Favorable Position and Method for Measuring Difficult Cases

In difficult cases it is wise to have assistance to hold the pelvis down and the foot in dorsal flexion. Place your own hand on the knee. (figure 3)

Sample Measurement

Figure 4 illustrates the final measurements. These results may be obtained as follows:

1. Never measure both legs unless there is a marked difference between the two. This reduces the time one must hold the patient and insures a pair of braces that look alike. If there is a slight difference in the circumferences, use the larger measurements.

2. Trace the leg, mark the joint locations and measure the calf and thigh circumferences as indicated in the figure. The lower thigh cuff circumference should be taken well down in the lower third of the thigh. Be sure and put the circumference measurements at the exact point where they are taken. When this is done take the patient off the paper, immediately.

3. Measure all lengths with the hip, knee and foot at right angles except the medial length from center of knee to top of thigh cuff. This measurement is taken with the leg straight.

4. Measure spinal uprights with patient on stomach with arms down by the sides. The proper distance to be measured is from the coccyx to the mid shoulder blades.

5. Pelvic circumference and caliper width is taken midway between the superior spines and the head of the trochanters.

6. Write all instructions, very clearly, on the same horizontal plane. This in combination with your ink drawing can reduce errors and increase efficiency in production and fitting.

Fig. 3. Favorable Position and Method for Measuring Difficult Cases

Full Control Brace

Before considering the possible functions of the full control brace, I would like to point out that full control does not mean that the braces function 100% in their operation of controlling the various motions, contractions and spastic conditions. Full control means that the braces are designed for application to the entire lower extremities and torso, and not just to the foot, knee or hip. Control can only be up to the point of tolerance and practical utility of the patient. With this in mind, I will outline for you all possible control functions of these braces. All of these functions are not utilized in each case.

The most essential element in the successful operation of the full control brace is the control of the feet which may require one or more of the following:

1. Equinus of the foot or forefoot
2. Valgus or Varus deformity
3. Dorsal flexion or Calcaneous foot
4. Abduction or Adduction of the forefoot, usually in conjunction with valgus or varus
5. Hammer toe
6. Hallux valgus

The various shanks, stops, T straps, big toe extensions, malleolus pads, etc., for obtaining these controls are well described in the "Orthopaedic Appliances Atlas," Volume 1, starting on page 522. There are several items which have been adapted since the printing of the Atlas, such as:

1. Double wedge soles and heels
2. Triple wedge soles and heels
3. Wedges and spreaders for toe control

It is quite obvious to the orthotist that the knee joint control takes care of medial, lateral, posterior and anterior support, but two quite common controls in this area which are not as obvious, are:

1. Subluxation below the knee joints. This is controlled by using a wide open calf cuff in conjunction with the knee cap.
2. Lateral bowing of the tibia. This is controlled by lateral padding at the calf and medial padding at the knee joint.

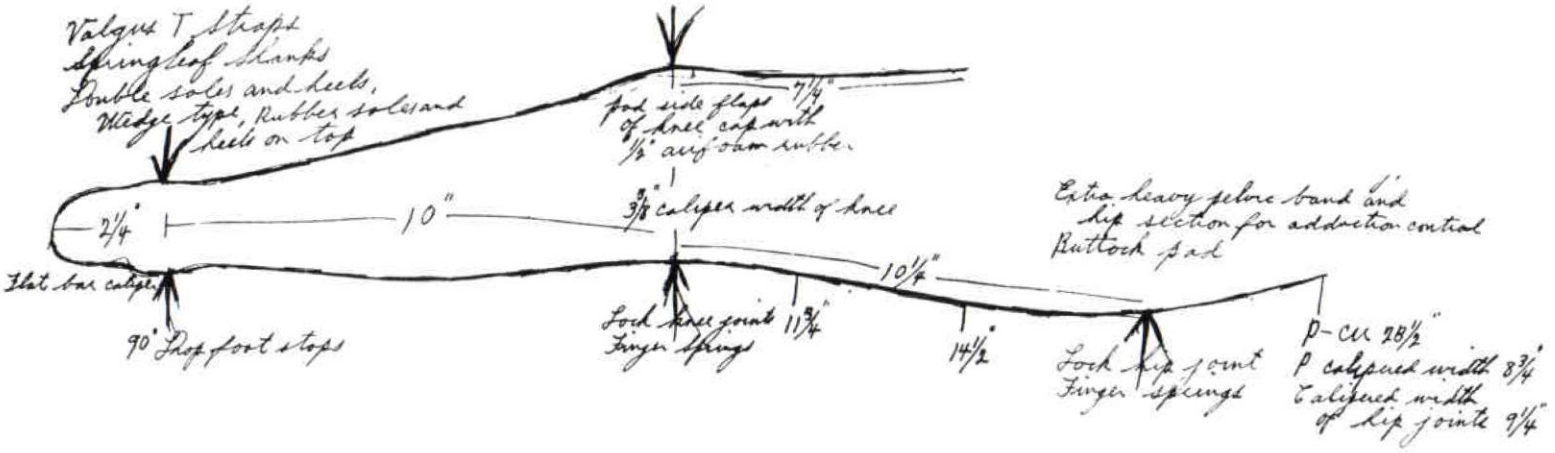


Fig. 4. Sample Measurement. C. P. Full Control Braces. Spring back Uprights 10". Harness type shoulder straps. General Instructions: The child has very powerful internal rotation and abduction. Set brace in abduction and supinate feet.

Fig. 5. Full Control Brace

Assuming that the feet and knees are in proper control, we may expect the following controls in the hip area:

1. Abduction
2. Adduction
3. Internal or external rotation
4. Radial reciprocation
5. Straight standing with the lock fastened
6. Limited walking motion with the loose fitting hip lock
7. Limited extension with the extension pin stop
8. Some degree of hip flexion control with the buttock pad. (See Fig. 916, Atlas.) However, the buttock pad is primarily used as a counter pressure for the contractions of the knees.

Assisting in some of the above functions are the spring back uprights which accomplish some of the following controls:

1. They stabilize a tilting of the pelvic band due to rotation strain on the hip bearings.
2. They force positive hip flexion to the rolling type of hip flexion.
3. They assist in standing and sitting posture, both laterally and posteriorly.
4. They act as a leverage in walking with the loose fitting lock and the limited motion extension stops.

With the above knowledge on measuring and certain functional controls, I believe an orthotist will have a good starting point in the bracing of cerebral palsy patients.

In the preceding paragraphs I have set forth, in brief, my ideas and opinions on a very complex subject. I hope that these thoughts will in some way help those who are faced with the problem of bracing cerebral palsy patients.

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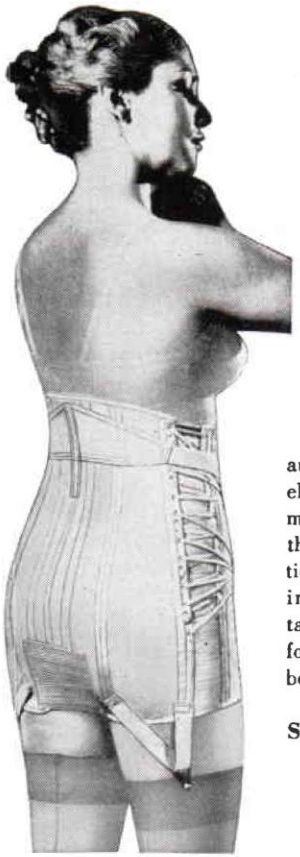

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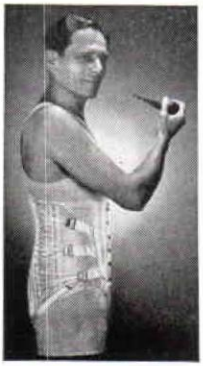

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UCLA and New York Univ. Offer Courses

Schools Cover Above Knee Prosthetics

Early in 1955, the Advisory Committee on Artificial Limbs announced plans to provide a series of courses in above-knee prosthetics for prosthetists. Part of the subject matter was also to be offered physicians, surgeons and therapists.

Following a pilot school held last summer at the U. S. Naval Hospital at Oakland, in which faculty personnel were trained, arrangements were made to establish these schools at New York University and the University of California at Los Angeles.

On March 5, the first course began with an enrollment of ten prosthetists from the Metropolitan New York area for the New York University School. Classes and laboratories were held in the NYU Dental School Building at the corner of First Avenue and East 26th Street. The second course in the series began April 2, with an enrollment of twelve prosthetists. Dr. Sidney Fishman served as Project Director for the Prosthetic Devices Study.

The first school at Los Angeles opened May 28 with an enrollment of seven prosthetists. The second school is scheduled to run from September 3 to September 14. This school is presented by the Prosthetics Education Program of the School of Medicine and the Department of Engineering and Engineering Extension of the University. Dr. Miles H. Anderson serves as Educational Director for the courses which are held in the New Medical Center of the Los Angeles campus.

A fuller report with lists of the students registered will appear in the September issue of this *Journal.*

The schools are now sponsored by the U. S. Office of Vocational Rehabilitation (Department of Health, Education and Welfare) and the U. S. Veterans Administration. The Orthopedic Appliance and Limb Manufacturers Association is listed as a cooperating organization, in addition to the Prosthetics Research Board, and the U. S. Department of Defense.

The course is described as an intensive upgrading course, presenting comprehensive coverage of the prescription, fitting, alignment, fabrication and check-out of the above-knee prosthesis, and gait analysis and training of the wearer.

Some of the major topics covered in the intensive two-weeks course of over a hundred hours are: pain, the phantom limb, biomechanics, locomotion, gait analysis, fabrication and fitting principles, medical and surgical problems, prescription, care and training of the above-knee amputee, functional anatomy, the adjustable leg, the alignment duplication, and the Canadian hip disarticulation prosthesis.

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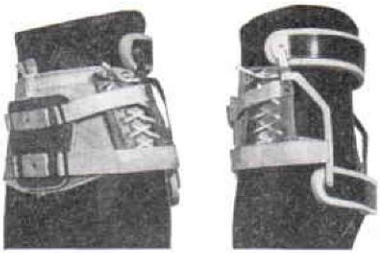

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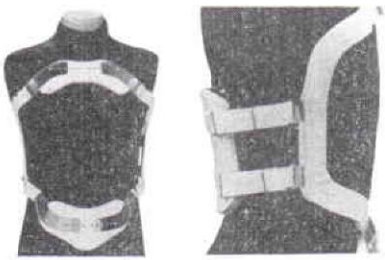

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A Prosthetic Thumb for the Partial Hand Amputee

ROBERT G. THOMPSON, M.D. and MICHAEL M. AMRICH, C.P.

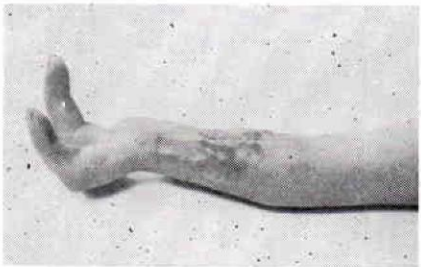
Prosthetist, Liberty Mutual Rehabilitation Center, Chicago

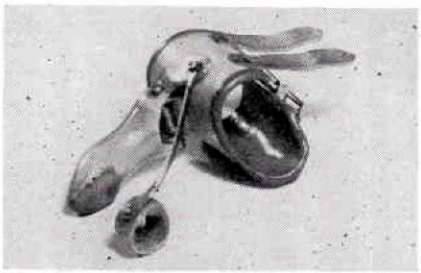
Modern prosthetic clinical teams are being confronted with a relative increase in the number of partial hand amputations especially among the group of industrially injured. This is partially because of the dictum of the modern suregons to save all possible viable structures and also due to the widespread use of infection controlling anti-biotic drugs.

For the majority of partial hand amputees, the best we have had to offer them, from the field of prosthetic replacements, was a cosmetic glove, with a filler for the missing portions. However, the cosmetic glove does not meet the needs of an industrial amputee as an assistive appliance in future gainful employment.

The patient with a thumb or several fingers missing will be handicapped if he is not fitted with some type of assistive utility prosthesis. For the amputee with a thumb and several fingers amputated, some form of opposition to the remaining digits is required. Stationary posts or digits mounted on leather or plastic cuffs have been successful to some degree, for such activities as gross lifting or carrying of objects. However, the inability to selectively pinch, grasp and hold objects is somewhat discouraging and frustrating to this type of amputee.

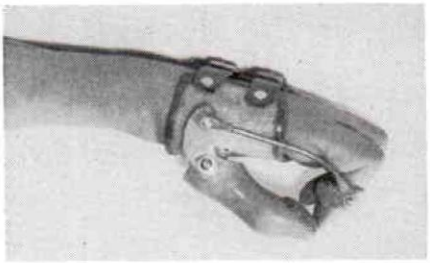
Recently, we were confronted with this type of partial hand amputee, at the Liberty Mutual Rehabilitation Center in Chicago. The patient's hand (Figure 1) showed a complete loss of the thumb, fourth and fifth fingers. In addition, the musculature and tendons of the palmar surface had been damaged, resulting in contractures of the metacarpal-phalangeal and interphalangeal joints of the remaining second and third fingers. After extensive physical therapy treatment the maximum active range of motion attained was 40 degrees in the metacarpal-phalangeal joints, 68 degrees in the proximal inter-phalangeal joints and 65 degrees in the distal inter-phalangeal joints. Muscle strength was eventually nearly normal in the fingers.

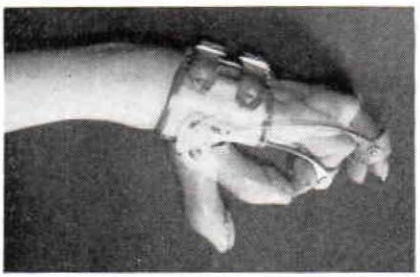


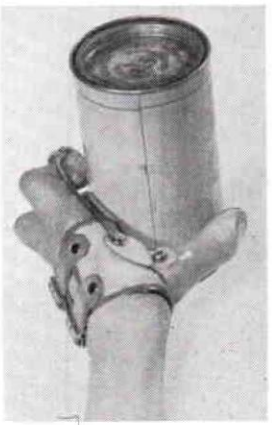


Figures 1 and 2

Due to the inability to grasp objects between the remaining fingers, and/or the palm, a specially designed prosthesis was constructed utilizing a plastic prosthetic thumb for opposition to the second and third fingers (Figure 2). The prosthesis consisted of a naugahyde lined melmac plastic cuff attached to the stump by two straps. Mounted on a bolt type pivot,







Figures 3 and 4 above.

Figures 5 and 6 at right.

with a piano wire spring for automatic return, was the prosthetic thumb. The thumb was activated by a rod, set off-center, and attached to the index finger by a plastic ring (Figure 3). With the prosthesis the amputee was able to attain a maximum opening between the index finger and the prosthetic thumb of 5½ inches, and tightly oppose the index finger to the tip of the prosthetic thumb (Figure 4). As a result, he was able to handle objects ranging in size from a coin or nail to a large can or glass (Figures 5, 6.) The amputee was able to flex against 10 lb., with the index finger, and resisted a 5 lb. pull with the prosthetic thumb.

The activated rod can be lengthened or shortened to accommodate the range of motion in the activating finger. From a therapeutic standpoint, the spring return resistance offered by the prosthetic thumb enabled this particular amputee to increase the range of motion in the metacarpal-phalangeal joints of the index finger by 20 degrees, with a similar increase noted in the other finger joints during a period of three months. Assuming that this progress will continue, the activating rod can be shortened and the proximal phalanx be used for activating the rod to the thumb lever.

The principle of this appliance can also be used to activate a prosthetic finger for opposition to a normal thumb. Other materials can be substituted for the plastic used in this case such as a molded leather cuff, stainless steel ring, and stainless steel thumb. Individual preferences and needs should be the basis for the proper selection of materials.

In view of the fact that very few partial hand amputations are alike, each one presents a new challenge to the ingenuity of the prosthetist.

Without a standard pattern or prosthesis to follow, the trial and error method may be the only way to solve a particular problem in fitting the partial hand amputee. Many partial hand amputees do require more time to equip with a prosthesis than the so-called standard below-elbow amputation. However, the fitting of a prosthesis to a partial hand amputee is a real challenge and we must do our best to assist them toward the goal of maximum rehabilitation.

JUNE, 1956

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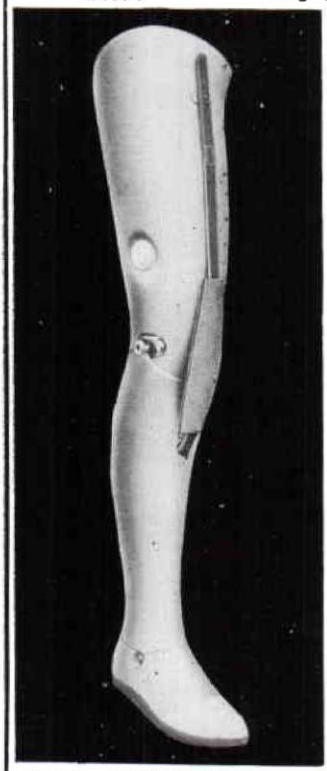

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The Relationship of the Surgeon, and the Brace and Limb Shop

By JAMES E. M. THOMSON, M.D.

Lincoln, Nebr.

My introduction to braces was in medical college when working as an orderly at a crippled children's hospital in Chicago in 1912. The Orthopaedic Staff, realizing my profound interest in helping to adjust the numerous fantastic contrivances that they applied, taught me much and with time gave me certain liberties in adjusting and repairing and even changing the apparatus to make them work more efficiently.

These were the Golden Days of the Brace and Buckle Orthopaedic Surgeon. Orthopaedic Surgery has advanced far from the concepts of Nicholas Andre who coined the word Orthopaedia from two Greek words "Ortho" to make straight and "Pedia," a Child. The frontispiece of his historic treatise on this subject was a little crooked Oak Tree, being braced and straightened by a rope wrapped around its trunk, pulling against a straight post. The theory was that as the tree grew, the rope was tightened and finally the trunk would become straight as the post. You can see from this, that the principle of bracing has from the beginning been linked with Orthopaedic Surgery and the correction of deformity.

This little crooked tree has become the emblem of Orthopaedic Surgery throughout the world.

Therefore, all the doctors who correct, prevent and treat deformities of a child or adult, whether they are congenital or acquired by disease or accident, must of necessity, rely on braces and prosthetic apparatus. They are wholly dependent for a part of their results on the brace and prosthetic appliance maker.

This little tree which formed the frontispiece of Nicholas Andre's book "Orthopaedia" has become the symbol of Orthopaedic Surgery. The illustration was sculptured by the author, cast in bronze and forms a decoration on the entrance of the Lincoln Orthopaedic and Rehabilitation Center which also houses the Lincoln Splint and Brace Shop.

We are linked together far more closely than usually recognized in the success or failure of any case by our joint efforts.

Orthopaedic and surgical training has advanced far, in many phases of corrective methods. The possibilities of surgical techniques have been expanded during the past decade to previously undreamed of realms. Due to research and discoveries in the fields of physiology, bacteriology, chemistry, bio-chemistry, metabolism, understanding hormones and the use of materials that can be buried inside the body as replacement, or as internal splinting, one might think

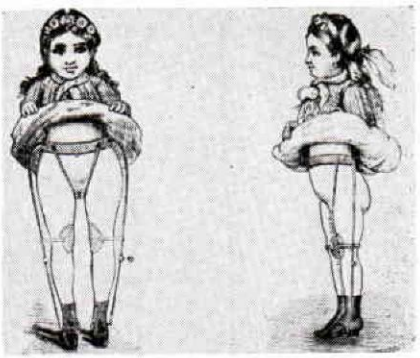
* Delivered at the Assembly of Region VII, OALMA, Omaha, Nebr., April 14, 1956.

that with time, splints and braces could be done away with or become less useful. They are even using replacement material for circulatory surgery. Vital organs of the body have been grafted from one person to another; why should not this happen to the extremities? Yes, such things have been reported.

Will the ever advancing field of surgery finally blot out the need of the brace and limb-maker? My answer is emphatically *no*. There is a funny thing about progress in the field of health and human endeavor. Strides forward always seem to make new untold opportunities for those who keep abreast of the times.

Let's look back before the turn of the century. In the great city of Chicago, there were two or three bracemakers who made all the braces that were needed. The surgeons did very little major surgery on the bones and joints. They did do some extensive tenotomies, through small ⅛ or ¼-inch holes in the skin. They likewise through similar small holes, severed contracting tissues. What they did do with wonderful effectiveness was manual, forcible stretching of the deformed parts, particularly after tenotomies and fasciotomies. These corrections were held in plaster of paris. Later, in the convalescence, a brace to maintain the correction was put on; often it was cumbersome, but usually an effective apparatus. Extensive bone operations were frowned upon as dangerous and exploitive. A child's bow-legs, were fractured in an osteoclast at the point of greatest deformity without opening the skin. At the time I started my training, ankylosing and fusion of joints to stabilize flail extremities was gaining favor.

Well do I remember Dr. Fred Albee demonstrate in Chicago in 1912, the Albee technique of bone graft. Revolutionary and courageously, after the operation, a cast was applied. Ultimately, the patient wore a brace for a year. Braces were a paramount to success.



This knock knee brace of the 19th Century was very practical but it is difficult to understand how it would be tolerated with any pleasure. We have gone a long way in improving the braces children have to wear today. Only by research can we expect continued improvement in our concept of braces.

One of the best things I did, during my Resident Training at this same crippled children's hospital was to advise and work with our bracemaker in the problems of these unfortunate children. The Shop was on the other side of town, so I made casts of the scoliotic trunks, bow-legs and knock-knees, club-feet, so that he could have a form on which he could contour the brace. Weeks, yes months were often required before the brace came back. By that time, sometimes the child did not need it or had out-grown it. Time was lost and effort wasted. Extensive alterations were required but we finally got them on. With time, I learned to make light weight removable plaster cast jackets for backs and extremities which could be laced up and removed for hygienic purposes and for exercise training, and also the processing of celluloid corsets. We always cautioned children wearing celluloid against playing with fire, but in those days the young girls didn't smoke, so we did not have to worry too much about the inflammable angle. Then there were leather corsets and braces for the legs that

could be fitted into shoes. Well do I recall soaking the old leather cowhide, molding and pounding it over the cast of a torso or leg, holding it into the deformed areas by means of nails or screws, and then wrapping it with hundreds of feet of twine or small clothesline to prevent change while it was drying. Then, there came the finishing. Lining it with chamois skin, punching holes in it to give aeration, re-enforcing it with steel strips, finishing it off with shellac. Arduous labor and effort, and I can assure you, very hot and uncomfortable for the patient to wear, but it was effective.

I recall many of the artificial limbs were something to be dreaded. A peg leg was far more desirable.

You must bear with me in my historical reminiscencing of personal experiences, as it is a point to an end.

When I came to Nebraska in 1916, there was one brace-maker in the State. He was in Omaha, a full day's trip to Lincoln.

"Thank goodness," I wasn't too busy.

In my little home shop, I made many simple braces, insoles and all my shoe corrections.

In 1917, World War I came. As an Orthopaedic Surgeon for the University of Nebraska Base Hospital in Northeastern France, we found ourselves as the hospital opened, a long distance from the source of supply and all at once hundreds of casualties were laid at our wards. We had no splints, no braces, nor were any to be had. Fortunately, the years of experience that the British had had before we entered the war, gave us patterns of splinting that proved invaluable, not only in saving lives and treating extensive fractures and wounds. In the open market I could buy round iron and other materials. The thing I had to do was to take some Medical Corps men and teach them to make Thomas, Jones, Airplane and numerous other splints, so essential to taking care of battle casualties. Then

Hugh Owen Thomas. The creative Orthopaedic Surgeon of the 19th Century who worked in Liverpool, England, developed many useful splints and braces for the treatment of injuries and joint diseases. Many of his braces were built by bending the iron to fit the contour of the body. This is one of his illustrations.

we began to adapt these to ambulation by cutting them off at the end at the proper length and turning the ends into the heel of their shoes. Short leg braces were made in a similar way. All types of arm braces were made. Finally, before our American supplies caught up with us, we were fabricating everything we needed.

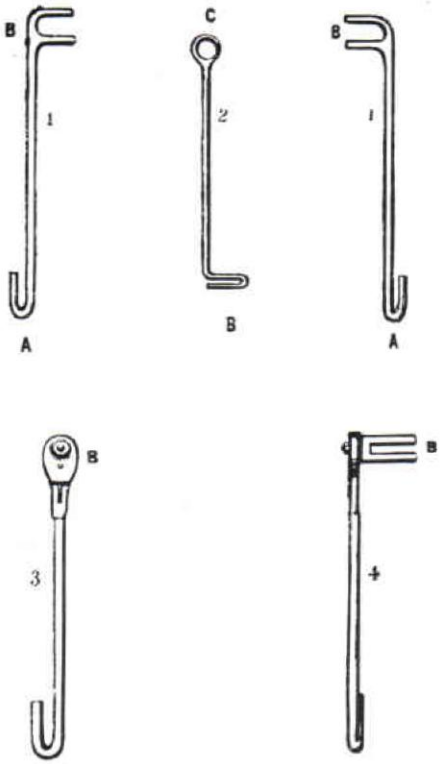
The war was over and I was back in Lincoln in 1919. There was still no brace-maker here but I had learned a great deal by that rich experience with surgery-of-war trauma, and the challange of furnishing splints, braces and temporary prosthesis to these casualties. I was full of ideas, so when I opened my office, finding that business was slow in coming, there was plenty of time, I found. I put in my own brace shop; with an acetylene torch, anvil, vice, drill press, heavy sewing machine, shoe maker's tools and polishers. We went to work making braces, shoe pads, plates, shoe corrections, etc. My wife took over the leather work, and we spent our spare day time and evenings in this shop. We could not do

too much pounding in the day time without disturbing the tenants in the First National Bank Building, so most of the pounding was done at night after they had left their offices. I got away with the acetylene torch as long as we were there but afterwards discovered I would have been thrown out as a fire risk, had it been realized that I was fooling with such a dangerous instrument.

About 1921, I realized that if I kept up with my growing practice, I would have to get a brace-maker. Advertising did not help, they were as "scarce as hen's teeth." Finally, Dr. H. W. Orr, Dean of the Lincoln Orthopaedic Surgeons and I planned a partnership. I suggested we advertise for a mechanic who might like to take up brace work. We interviewed many. One day, a likable "Irish" youngster just out of the war applied; he liked the idea of learning a new trade. So James Casey was taught from the ground up, the rudiments of brace making.

Jim caught on rapidly and worked diligently. Ultimately after several years, we realized that it was to our advantage to simply turn the brace business over to him, as we each wished to pursue our own way, but by doing this, both of us could avail ourselves of his services. As we have progressed, Casey in his business progressed by the association with both of us. The plan worked out marveously. Neither Dr. Orr or I were involved in the problem of production or expansion of the brace services, yet, we had close to us, a man we had trained to give us just the service we needed.

How proud I was when young Jack Casey teamed up with his "Dad" to learn the profession of brace-making. More proud am I that he has progressed and advanced with the trends of the times, never hesitating to pursue further study and go away for training to keep abreast of the need and opportunities.



Thomas developed these wrenches to bend brace iron and with these very same devices, we make alterations today. This same principle was the secret of the success of the "Thomas Wrench" used so extensively in correcting deformities of the feet.

This has been a long story *but it teaches several important lessons.* In the first place, far too often, the surgeon does not know much about braces, what they are really supposed to do, or their application or the methods of making them serve their best purpose, or when they are not performing the function for which they were made.

I think my personal experience before and during my Residency was invaluable: added to this the challenge of the war experience which had given me an insight into the problems of braces and prosthetic work, has added greatly to my own effectiveness as a surgeon. It has also

JAMES E. M. THOMSON, M.D.

The author was born in Los Angeles in 1889. He holds the M.D. Degree from Rush Medical College. Since 1916 he has been engaged in the practice of Orthopaedic Surgery at Lincoln, Nebr., except for service in World War I as Chief of the Orthopaedic Dept., University of Nebraska Red Cross Base Hospital in France. Dr. Thomson was a member of the World Health Organization Mission to Poland and Finland in 1948. He is a member of numerous medical societies, including the Academy of Orthopaedic Surgeons, Clinical Orthopaedic Society (President, 1937); Nebraska State Medical Association (President, 1948). Dr. Thomson is a fellow of the American College of Surgeons. He is the author of numerous articles on orthopaedic surgery.

contributed to my service to the patient who has to wear a mechanical apparatus for correction or stability. Lastly, it has been of value to my manufacturer of brace and prosthetic appliances; in that *we can talk a common* language and see eye to eye on perplexing problems.

In other words, I think that in training surgeons of trauma and Orthopaedics, greater stress should be made in the direction of giving them practical experience in the field of, and the problems of the manufacture of braces, splints and prostheses. Without this experience, a surgeon is looking into a realm of therapy through a small screened window and gaining but a blurred image of the potentialities involved.

The *second lesson* to be learned from this story is, that if the brace and prosthetic profession is to maintain a position of prestige, the members must remember that they are not mere mechanics, following the rule of the thumb, fabricating defined designs and stabilizing devices for physical weaknesses or whittling out conventional sockets, but rather, they are an integral *part of an important team of therapists* of the maimed and halt.

You are actually physiological mechanical engineers of the highest order, who if you do not constantly delve into engineering research, pursue advanced study zealously and maintain high standards, will be caught wanting as time goes on. Too few are trained in the engineering principles that are fundamental to brace manufacture, nor are many sufficiently acquainted with the anatomical and functional factors essential to mechanical success of stabilizing appliances.

Research and engineering has made tremendous advances in the artificial limb making. Great engineering institutions and industry as well as the Armed Forces and Veterans' Services have contributed generously to these improvements. Fortunately, you have been able and quick to absorb this and pass it on to the amputee. But further research is needed in the field of making of braces by the use of plastics, new metal alloys and fabrics. The whole field of brace making has hardly been scratched from the stand-

point of research except in a few places. Research offers a tremendous challenge to your organization.

Lastly, there is a lesson of confidence, patience and cooperation to be learned between the teammates, (the surgeon and the brace-maker) not only in solving the therapeutic needs of the patient but also in assuring the success of the appliance *from the time it is put on—throughout the course of treatment.* Our obligation is more than simply putting on the brace or prosthesis and fitting it properly. The idea involves *following through, together* training the patient in the proper use of the apparatus. This is truly a joint obligation. *When either of the team fails to carry out his part, he fails in a contractural therapeutic function.*

Far too often, the brace-maker never sees the patient after he applies the brace. Often, the doctor when he sees the patient, doesn't know whether the brace fits or not, or if the patient can stand to wear it. Unfortunately, he may not be able to stand it, even though he has paid for it; he may throw it away, go to another doctor or the doctor will say, "you will get used to it in time." Remember, *we are both involved* in this therapeutic attempt to accomplish a result. It isn't how splendidly you have finished the brace or how pretty the contraption is, that makes a difference. *Therefore,* I feel that *every doctor and brace-maker* should go over the patient and his appliance every so often until the end of the therapy, to make sure that he is getting the most good out of the apparatus. Too often, a brace is worn too long or not long enough, or has been out-grown; nobody recognizes the needs for a change.

If these ideals are followed, surgeon and appliance maker will find themselves prospering and their work increasing by being of greater value to humanity.

Letter from Japan

OALMA headquarters has received the following letter, written from Japan by our colleague, William A. Tosberg, CP&O. Mr. Tosberg, was sent to Japan in March at the request of the Japanese Government to conduct four courses in suction sockets. Upon his return, he will resume his duties as Director of Research and Service in the Prosthetic Division of New York University's Institute of Physical Medicine and Rehabilitation. He is also a member of the faculty of the Medical College.

May 26, 1956—from Tokyo.

"Dear Glen:

Greetings to you, Lester and to your staff. I am about to leave Tokyo for Korea and for home by way of Europe.

The three suction socket courses conducted here in Japan were very successful and I am sure that they will lead to an improved amputation service in the not too distant future.

Mr. Tosberg with Japanese students.

Yesterday we had a 3-hour meeting with the Executive Committee of the Japanese Limbmakers Association. Among other suggestions I discussed the function of the American Board for Certification. The interest shown leads me to believe that a similar movement will start here soon.

The skill of the Japanese technician is very high but his fundamental knowledge is limited. Training courses such as just concluded will be of great help.

Please remember me to all—Bill Tosberg."

The Growth and Development of Orthopedic Appliances*

By W. FRANK HARMON

President, The Orthopedic Appliance and Limb Manufacturers Association; President, The Atlanta Brace Shop, Atlanta, Ga.

The Orthopedic Brace Industry is making every effort possible to effect the transition from an industrial status to a professional level that will, we trust, eventually be recognized and respected by the medical profession, the layman, and the victim of circumstances who require the assistance that trained and certified orthotists are able to give.

To trace the growth of this field of endeavor, it is necessary that we turn back the pages of time briefly and survey the progress made starting with the earliest information that we have available and finally bringing to attention the ultimate aims and objectives as we now see them.

Braces and splints are nothing new. Sometime in dim and unrecorded history man must have discovered the relief from pain which splints afforded, regardless of how crudely or inadequately they may have first been conceived. He soon discovered that variations in even crude designs afforded greater comfort and relief. This age-old urge of man to preserve himself in the best physical form possible has served as a constant stimulus to improve and perfect orthopedic and surgical appliances. It is the constant quest for technical improvements that has created an industry whose sole excuse for existence is the necessity for providing assistance of a mechanical nature to be used in conjunction with the treatment prescribed by the physician or surgeon.

Archeologists have discovered numerous bones of prehistoric races and our knowledge of them comes from these remains rather than from written records. Many of these skeletons indicate the successful joining of broken bones, but there is no tangible evidence to irrefutably indicate the orthopedic use of braces or splints by primitive man.

The First Splints

Possibly the earliest known period which furnished visual and authenticated evidence of the use of splints in ancient times is during the Egyptian Dynasty which flourished about 2600 years B.C. or 4500 years ago.

The British Medical Journal published in March of 1908 contained a report of the professor of Anatomy at The Egyptian School of Medicine at Cairo: "I have been fortunate enough," writes the author, "to have had the opportunity of examining two sets of splints which had been applied to fractured limbs almost at the dawn of Egyptian history—roughly about 5000 years ago. These are certainly the oldest splints which have come to light in any part of the world . . . they are the earliest surgical appliances ever discovered." We quote further: "These splints must have been quite useless as a support for a broken bone although they formed a protective casing completely around a damaged limb. It was quite obvious at a glance that their only purpose could have been to fix the knee joint and by that means ensure some degree of comfort or rest to the damaged member."

Hippocrates, the Greek Physician and the most celebrated practitioner of antiquity and the man known as

* Presented at the Symposium on Socio-Economic Aspects of Orthopedic Engineering, Dec. 30, 1955; 122nd Annual Meeting, American Association for the Advancement of Science, Atlanta, Ga.

"The Father of Medicine" entered upon a disturbing scene in the 4th Century B.C.: Under a line of Pharaohs, a powerful military state was developed in Egypt and a remarkable cultural and physical attainment ensued during the period from 2400 to 1500 B.C. The maintenance of high physical standards was based to a considerable degree on religious convictions which called for the extermination of the congenitally defective, the deformed, the halt, and the blind. Apparently two reasons were paramount for this practice. The primitive code annihilated the infirm for survival while the Spartans eliminated or destroyed the imperfect for supremacy.

Hippocrates brought to the confused period of his era the fundamentals of humanitarianism to eliminate the shadows which had for so long persisted. For almost 2000 years after Hippocrates, braces, splints, and manipulations constituted almost the sole line of treatment for all types of orthopedic problems.

Some 350 years later another great teacher pleaded for human sympathy for the handicapped and the oppressed and taught the glory of humanitarian tolerance. Thus with the birth of Christianity the hard lot of the crippled and maimed was greatly ameliorated.

But after the cross on Calvary, the torch of tolerance flickered faintly and only here and there lighted the way for the handicapped. Orthopedic help for the incapacitated lapsed into near sommolence for more than 1500 years. The whole social structure in this dark period was again one of the survival of the fit.

Brace making did not become an art until the 17th Century, and the transition of the armorer-blacksmith, who was the original brace maker, to the present day orthotist parallels closely the transition of the barber-surgeon of the 14th Century who at that time was considered a craftsman while the physician had already attained professional rank and commanded the respect of society.

It was not until the 18th Century that the word "Orthopedic" was coined by Nicholas Andre, a professor of medicine at the University of Paris *Orthos* (straight) and *Paidios* (child). Orthopedic surgery until the latter part of the 19th Century was limited by the inability to control infection. It was not until 1842 that Crawford W. Long, for whom a modern hospital in Atlanta is named, performed the first surgery under anaesthesia.

Dr. Hugh Owen Thomas

One of the first brace shops of which we have knowledge was in the home of Dr. Hugh Owen Thomas. In addition to a formal medical education, Dr. Thomas had the advantage of the secrets handed down by his family who represented several generations of bone-setters. He was a prolific designer of original apparatus. His influence, because of the simplicity of his designs, is still present in our modern appliances. Each brace was tailored to the patient's individual requirements. It is important to remember that he considered the style or design of the brace to be relatively secondary to the fit and adjustment to the individual. After spending a day caring for his patients he spent most of his evenings in his work shop making braces and splints that would be applied upon completion.

During the latter half of the 19th Century the orthopedic surgeon often maintained one or more brace makers in his office. Mechanical surgery was frequently used to describe this division of medicine. Gradually, however, as the orthopedist became more surgically minded, the brace technician moved out of the doctor's office, established his own brace shop and began to serve a number of surgeons and physicians rather than

one. Hence the birth of the brace shop or facility as it is known today.

The artisans of the brace shop were usually men of limited education who had served long years of apprenticeship, usually with their father, to emerge eventually as the proprietor of a small establishment that might include assistance from the mother or other members of the domicile.

Methods, processes, and procedures were usually closely guarded secrets that were not to be divulged. Consequently an air of suspicion surrounded any attempt to promote cordial relationship among operators of hostile establishments.

Today: Cooperation

Fortunately, however, in recent years, we find a reversal of the aforementioned trend. Today every effort is being made, not only to acquire greater knowledge and skills, but to distribute that information regarding materials, design, and technique in a manner that will contribute to more effective bracing for everyone concerned.

Here I quote from the Federal Trade Commission trade practice rules for the orthopedic appliance industry as promulgated November 13, 1954, "Believing that the interest of the orthopedically handicapped is its first concern, the industry favors making available to all its members and the general public any improved technique that may be used or developed by any of its members in respect to the making, fitting, aligning, or servicing of industry products. Further, the industry desires to be an active and cooperative factor in all progressive developments of improved techniques that will contribute to the welfare and comfort of the orthopedically handicapped."

We have gone to great length to familiarize you with the background of orthopedics and its relationship to the general field of medicine in order

W. Frank Harmon, C.O.

that you may more fully comprehend the problem of the orthotist or brace maker and his relationship to the orthopedist, the physiatrist, and their patients.

Now let us digress for a few moments while we consider a few elements that control or at least exert a tremendous influence on the successful operation of an orthopedic appliance facility.

As was mentioned earlier, the first known brace shop was in the home of Doctor Hugh Owen Thomas, and his activity in this field was in the evening after allowing for a normal day's work caring for his patients. This was followed by the trend toward the establishment of small private workshops where the brace maker could serve more than one surgeon or physician. Since no formal training had been given in the field of orthopedics it was left to the individual doctor to design or devise or direct the construction of any mechanical apparatus he considered necessary in the treatment of his patients. Consequently apparatus and equipment took on the characteristics

of the locale in which they originated. Thus they frequently bore little resemblance to the apparatus and equipment used by surgeons and physicans on similar problems in other sections of the country or world. Since there was little unity of thought or procedure it is little wonder that we found the lack of cooperation that existed until recent years.

We now find that by working together, greater achievement is possible in every phase of our relationship with the medical profession and their patients. We are recognizing the importance of teamwork and cooperation.

In 1946, the Orthopedic Appliance and Limb Manufacturers Association was founded for the express purpose of accomplishing this objective, and we now have about 95% of the eligible firms in the United States as members.

By working in close harmony with each other and being fortunate to receive excellent cooperation from the medical profession we are making progress that a few years ago was not even dreamed. The result will be reflected directly to the patients whom we serve.

1948: Certification

In 1948, sponsored by our trade association, the industry made another forward step when the American Board for Certification of the Prosthetic and Orthopedic Appliance Industry was conceived and became a reality.

This Board has done more to elevate the standards and qualifications of orthotists and orthopedic appliance facilities throughout this country than any other group of events in our history. We have by no means achieved perfection but by our continued efforts in this direction we are drawing closer to our objective of contributing the maximum toward the welfare and comfort of all, who by force of necessity, are required to use our services.

Only a relatively few years ago all braces were made of some form of steel; many were hand forged, heavy, awkward, and cumbersome. Even today there exists a need for appliances made of strong steel particularly when it is necessary to control abnormally strong muscle segments to obtain desired patterns of behavior as is sometimes found in cerebral palsy, or again when certain occupational conditions demand the maximum in strength and endurance.

New Materials

However, with the advent of a new era in metallurgy, we have found that many of our original ideas in brace fabrication have become obsolete. It became necessary to formulate a new conception of certain types of bracing. For example: poliomyelitis frequently leaves an individual with either a partial or complete loss of use of certain muscles or groups of muscles. Normal movement is labored, extremely difficult or impossible without the aid of supportive or assistive braces or apparatus. The application of heavier steel braces would often further incapacitate or handicap the victim of this unfortunate circumstance. For this reason the use of aluminum has found favor among many groups of medical personnel and the brace men who fabricate and fit appliances where additional weight would hinder rather than promote a more rapid rehabilitation. Aluminum in its chemically pure form would not be acceptable in most phases of bracing since in its natural state it is very soft and would not stand up under normal usage, but science has found that by combining other elements including copper, manganese, and magnesium that the strength of the alloyed metal, properly heat treated, can be increased many times its original strength. It must be borne in mind, however, that points of excess strain

and stress should be further reinforced or even replaced by a harder or more durable substance. Certain types of stainless steel and monel metal are highly desirable for such points.

It is possible that a brace can be made from the best materials obtainable, and it can be mechanically perfect; it can be polished to the brightest finish and covered with the softest and most durable leather, but if it does not fit properly it is worthless. For this reason every effort is being made to train the personnel in our industry not only to be able to make the appliances that may be needed, but to be able to properly interpret the prescription and fit the potential user with the appliance that will give the most satisfactory functional results.

In spite of all the professional knowledge and technical skill which have already been applied to orthopedic appliances, they still fall short of the perfection which has so persistently been sought. There still appears to be a missing ingredient.

This may be mainly an inability to fuse two divergent skills which are, in fact, both seeking the same common denominator. The brace maker expresses his professional pride in his ability to interpret into structural materials the orthopedic surgeon's prescription for a corrective or supporting brace. The orthopedic surgeon, on the other hand, makes the diagnosis and prescribes the means and manner of treatment. He also uses his professional skill to the utmost, but every day increasing calls are made upon him for additional, newer knowledge.

Thus, the higher the orthopedic surgeon's level in scientific bracing, the more exacting in turn is the brace maker's problem of precise mechanical production. His "artisan's or fabricating knowledge," to meet the newer standards of the orthopedic surgeon, already embraces a vast field of technical information. Complicated and profund subjects which never entered the mind of the old-time brace maker or doctor have now become, under such exacting demands, of intense interest to both.

To supplement the knowledge and skill of both doctor and brace maker, engineers and scientists are bringing to bear the specialized knowledge of their particular fields. In time, this assistance may result in improvements never before contemplated.

The general public is becoming more conscious of the tremendous number who wear braces and corrective appliances and of the many more who could and should wear them. As designs of newer and more physiological aids are developed, more and more people will find advantage in orthetic appliances which are fitted to their comfort and satisfaction.

Dr. Gillette Honored

• *Dr. Harriet E. Gillette* of Atlanta, Ga., has been granted the Richard Kovacs Memorial Fellowship for 1956. The Fellowship carries with it a $1,000 award, to help defray expenses of a qualified person to attend the International Congress of Physical Medicine at Copenhagen August 20 to 24.

Dr. Gillette, who is the daughter of a physician, has had an outstanding record in the field of physical medicine and rehabilitation. Since 1951 she has been in the practice of physical medicine and rehabilitation in Atlanta, Ga. In 1955 she was named Woman of the Year by the American Medical Women's Association. Dr. Gillette is well known to members of OALMA and attended the 1954 Assembly at Atlantic City and the 1955 session at New Orleans.

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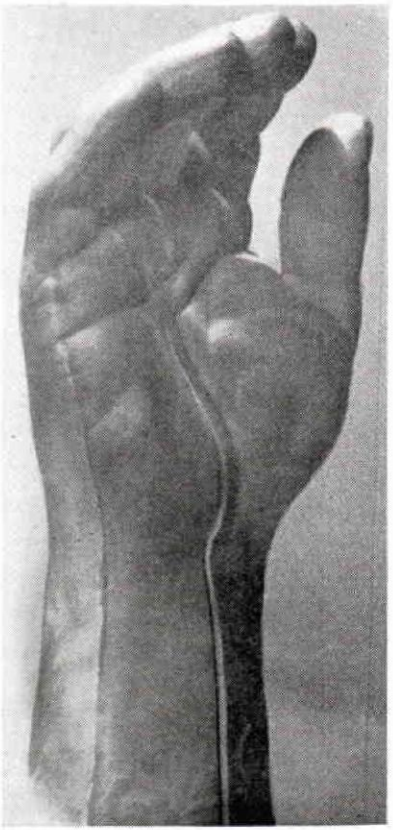

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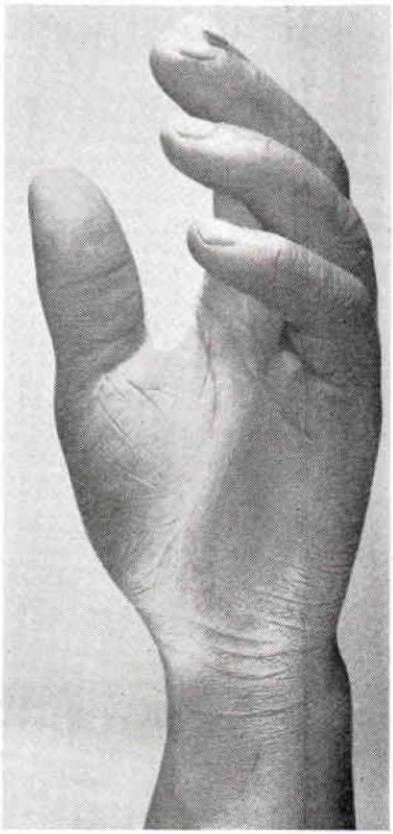

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Chester Haddan Named to Government's Advisory Council on Rehabilitation

Meeting of
NATIONAL ADVISORY COUNCIL ON VOCATIONAL REHABILITATION
Washington, D. C.
May 17-18, 1956

First row, left to right: Voyle C. Scurlock, Eli Gorodezky, Mrs. Spencer Tracy, Mary E. Switzer, Louise Baker, and Eugene J. Taylor. Back row, left to right: Russell W. Brothers, Chester W. Haddan, Peter J. Salmon, Dr. Theodore G. Klumpp, and Dr. Henry H. Kessler. This picture was taken at the first meeting since Mr. Haddan's appointment. The Council was set up by Public Law 564 in order that the Federal Program of Grants for rehabilitation might have the advice of outstanding citizens.

"What's New(s)"

• *Robert H. Saint*, a registered splint-maker and brace technician of Australia, was a visitor to OALMA Headquarters on May 24. While in Washington he conferred with Charles Ross of R & G Orthopedic Appliances and other local orthopedic authorities. From Washington Mr. Saint went to Toronto. Before returning to Australia he will visit the Gaines Orthopedic Appliances Co. at Denver and several OALMA members on the West Coast.

• Dr. Alexander E. Nash, president, advises that the *Nash Surgical Company* of Bridgeport, Conn., is now located at 1633 Main St.

• The C. R. Newton Company of Honolulu is now known as *C. R. Newton Company, Ltd.* Charles R. Newton has sold his interest to George E. Newton, who is the new president, and to Satoru Kato, who is vice president.

• *Mr. J. Schmid*, Manager of the European firm, Maschinen Schmid, sends word that he will be attending the National Assembly at San Francisco. Mr. Schmid, whose factory is located at Oberau/Loisach, Germany, is considered one of Europe's leading specialists in orthopedic machines. He is making a visit to this country to discuss technical problems of production with OALMA firms.

ICD Offers Second Training Program

Four students receiving instruction about leather. Left to right J. Pacheco, R. La Torre, C. Ujamaris, J. Carleton, and instructors Julius Biro, C.O., and Charles R. Goldstine, C. P. & O.

A critical shortage of skilled limb and brace makers throughout the world has led the Institute for the Crippled and Disabled, in New York City, to again offer a nine month training course, beginning September 24th, 1956; for a total of 8 students, and concluding June 1957.

Two courses, one for limb makers and the other for brace makers, will be offered concurrently. Four students will be admitted to each. The majority of the student's time will be spent in the Institute's Prosthetic and Orthopedic shops. Brace makers will be trained in plaster cast work, the use of the machinery and tools involved and the application of metals in orthopedic appliances. Limb makers will receive the same information as applied to their phase of work, as well as instruction on the use of wood and plastics.

Students in both groups will be given academic instruction and practical training in measuring and fitting. The utilization of leathers and fabrics will be covered. Class room instruction will include the theory of prosthetics and orthopedics, as well as shop management and administrative procedures. Also included will be a series of lectures on medical subjects allied to limb and brace making, and training through hospital affiliations.

Instruction will be conducted by prosthetic and orthopedic technicians from the staff of the Institute; all of whom have been certified for their skill by the American Board for the Certification of the Prosthetic and Orthopedic Industry.

Minimal educational requirement for students will be high school graduation. No specific experience in the Prosthetic and Orthopedic field is required. However, previous training or experience in manual arts, mechanical drawing, anatomy, and work with handicapped people will be looked upon with favor in the selection of applicants.

A tuition charge for either course of $550.00 will be made. Tools and most supplies for the course will be provided to the students for the duration of the training period without cost.

Applications received prior to July 15th, 1956 will be given priority for enrollment. Requests for information and application forms should be directed to Charles R. Goldstine, at the Institute for the Crippled and Disabled, 400 First Avenue, New York City 10, New York.

INVESTIGATION OF MACHINE SCREWS

By FRANCIS L. SMITH, Fellow

With JOHN L. YOUNG, Ph.D., Senior Fellow

The Sarah Mellon Scaife Foundation's Multiple Fellowship on Orthopedic Appliances at Mellon Institute, Pittsburgh, Pennsylvania

Machine screws, bolts, and most threaded parts are usually made from material that is easily machined and not very strong. This is especially true of screws that are sold in the average hardware store. Most of the time machine screws are used in situations that do not demand strength, and this type of machine screw is perfectly satisfactory.

In a large number of the situations that do call for strong screws or threaded parts the problem is easily solved by merely using two screws instead of one, or by using a larger diameter screw.

Unfortunately the easy solution is not always possible. Sometimes space for additional or larger screws is limited or weight limitations prevent using larger parts that will take more or larger screws.

If the load on the bolts is not of the repetitive type and it is not possible to use larger screws or more of them, the only possible thing left to do is to use stronger screws. Screws and bolts made from a good grade of steel and heat treated for the greatest strength can sometimes be purchased in hardware stores, but the most likely source of supply would be an aircraft parts company. Of course, any company manufacturing screws or bolts would make any type requested. Small orders would be expensive.

If the load on the screws or threaded parts is of the repetitive type as it usually is in orthopedic work, there are a number of things that can be done to increase the life of the threaded part.

Most machine screws sold in hardware stores are made from low carbon steels. The carbon content varies from 20 points down to and below 8 points. Usually cold drawn steel is used although this is sometimes annealed. As a general rule, these screws can be strengthened by heating them until they are no longer attracted by a magnet, then quenching in water. This treatment would apply especially to low carbon parts having cut threads. The parts having rolled threads might be weakened by this treatment.

Threaded parts made of stronger steel naturally would be much better.

For repeated loadings, steel for threaded parts normally should not be harder than 300 BHN, or 150,000 psi ultimate tensile strength.

Machine screws made from austenitic stainless steel should be very good for orthopedic parts. Stainless steel machine screws have good corrosion resistance, very good fatigue strength, and are obtainable.

Any groove or sharp indentation in metal parts is very undesirable if the part is to withstand repeated loadings. Machine screws, bolts, or any threaded part automatically then have undesirable features which cannot be eliminated. Some things can be done to partially alleviate the stress raising threads. It is a well proven fact that a very sharp thread root is undesirable. The British Whitworth thread and the new Unified thread use rounded roots and many tests have been made proving their superiority over the sharp rooted threads. Every effort should be made to keep the sides of the threads as smooth as possible.

Rolled threads are becoming quite common. Tests have shown the rolled thread to be superior to any cut thread. The roots are smoothly radiused, the sides are very smooth, and the grain structure at the root of the thread is better than that of a cut thread. The stainless steel machine screws mentioned previously have rolled threads.

Threaded parts that involve the use of a nut at one end usually fail at the root of the thread level with the contact side of the nut face. In fact, most bolted connections fail at this point. There has been a lot of experimental work done in an attempt to design a nut that would eliminate this problem. The idea is to design the nut to distribute the load onto all of the engaged threads, rather than on just a few threads. The usual method of doing this is to weaken the load carrying capacity of the threads on the contact side of the nut by tapering the nut threads or by undermining the nut with a groove on its contact face. As far as the author knows, these nuts are not commercially available and the only practical thing to try, when necessary, is a nut made of a material that has a better ability to deflect than the material in the bolt. For example, use a cast iron nut with a steel bolt. Using a nut of softer steel than the bolt should also help.

Threaded parts also sometimes fail at the first thread in the shank. The reason failure occurs here rather than at any other thread is that the threads interfere with each other and actually decrease the harm done by their neighboring threads. The first thread in the shank has no adjacent thread on the one side and so can cause higher stresses than any of the other threads. It is for this reason that a completely threaded screw or bolt has more resistance to a repeated load than one which is only partially threaded. If a screw, bolt, or stud has just enough threads on it to allow complete engagement of the male and female components, then two bad features of threaded devices occur at one location; that is, the first thread in the shank, and the thread located level with the contact face of the nut. For this reason it is recommended to have as many unengaged threads as possible. This means that a stud, such as is sometimes used in ankle joints, should be completely threaded rather than just threaded at the ends.

Another thing that is sometimes done to relieve the first thread in the shank is to cut the shank diameter down to the root diameter of the threads. Sometimes this is done for the complete length of the shank, and sometimes just for a short distance.

Screws and bolts will also fail at the end of the shank just under the head. This is especially true if a sharp corner is used rather than a fillet. The fillet should be made as large as possible. Some people object to a large fillet at this point because it necessitates countersinking the hole slightly to get a flush fitting head.

Regardless of how much attention is given to making threaded parts correctly to resist failure due to repeated loadings, a large number of failures will still occur due to improper assembly. Considerable care is usually taken to make the major parts of an assembly but the bolts and screw holes are too often just rammed in with a hand drill. If the holes don't line up good enough for the screw to enter, it is very easy to enlarge the one unthreaded hole and two parts can then be fastened together. As soon as a little wear occurs, the two parts are very loose. If the holes are not drilled perpendicular to the surface, the bolt or screw is given an additional load due to uneven seating of the head.

One of the most important things to remember in assemblying bolts and screws is to draw them tight. A tight bolt will last much longer with a repeated type of loading than a loose bolt. Of course, it is very easy to tighten a small bolt or screw too much

and exceed or almost exceed the strength of the screw. Very often, especially with a tight fitting screw, an additional stress due to twisting is put on the screw. This can sometimes be partially eliminated by lubricating the screw when tightening it.

Cut threads have a tendency to become loose because the rough surfaces on the sides of the thread gradually wear. Since rolled threads have smooth sides there is less tendency to become loose.

The literature survey revealed that most of the fatigue tests done on threaded parts covered the range from one-quarter inch diameter and larger. The smaller size machine screws, namely, numbers six, eight and ten, apparently have not been investigated too thoroughly. Since these sizes are used quite frequently in orthopedic work it was decided that an experimental investigation would be made.

The first phase of the investigation was to find the ultimate static breaking load of the screws.

Four different makes of No. 6-32 machine screws were purchased from regular hardware stores. The ultimate static breaking load of these screws ranged from a low of 620 pounds corresponding to a stress of 63,800 pounds per square inch to a high of 850 pounds corresponding to a stress of 94,400 pounds per square inch.

Three different makes of a better grade of No. 6-32 machine screws were purchased from wholesale hardware stores. Local hardware stores do not as a rule stock these makes. The ultimate static breaking loads ranged from 1,660 pounds with a corresponding stress of 184,400 pounds per square inch to an ultimate breaking load of 1,840 pounds with a corresponding stress of 204,400 pounds per square inch.

One make of No. 6-32 stainless steel screws was obtained with an ultimate breaking load of 1,000 pounds corresponding to a stress of 111,000 pounds per square inch.

A No. 6-32 brass machine screw had an ultimate breaking load of 640 pounds with a corresponding stress of 71,000 pounds per square inch.

None of the machine screws tested have the recommended strength of 150,000 pounds per square inch ultimate tensile strength for repeated types of loading.

In the second phase of the test, it had originally been planned to run a complete fatigue test on the machine screws in direct tension. Since time was limited and a comparison of the different makes of screws was desirable, it was decided to run a partial fatigue test and test all of the screws with just one loading: a loading high enough to produce quick results.

All of the machine screws were tested in direct tension with a load varying from zero to 432 pounds corresponding to a stress of 48,000 pounds per square inch.

It was originally planned to test the screws with no preload and also with varying amounts of preload. Lack of time prevented running any tensile tests with preloads.

The test results were fairly well scattered. It was quite obvious, though, that the group of three makes of screws with an ultimate tensile stress of around 200,000 pounds per square inch were not as well suited for alternating tensile loads as the group of four makes of screws with an ultimate tensile strength around 90,000 pounds per square inch.

The one type of stainless steel machine screw tested gave the largest variation in results, from very good to very poor. Apparently this can be expected of stainless steels in general.

The brass screw gave the lowest results, as expected. No plated brass screws were tested, but these would undoubtedly give lower results.

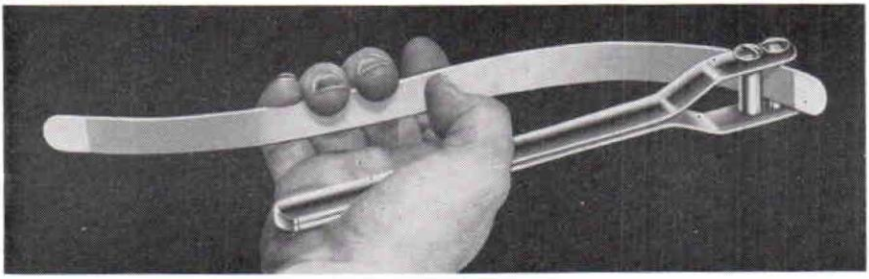
The third phase of the investigation consisted of testing the machine screws in single shear with the same loading used in the alternating tension test. This phase consisted of

two parts; with preload and without preload.

The results from the single shear fatigue test were also fairly well scattered. The group of four makes of screws with an ultimate tensile stress around 90,000 pounds per square inch were not as well suited for single shear as the group of three makes of screws with the higher ultimate tensile stress. This lower tensile group failed in pure shear while the higher tensile group failed in tension due to bending.

Placing a preload on the screws increased the life. The amount of increase was quite variable but was consistent enough to definitely say a preload should be placed on all screws if long life is desirable.

"WHAT'S NEW(S)"



"Stay-Shaper" for Surgical Fitters.

• *Truform Anatomical Supports* has designed a surgical fitters' "stay shaper" for ease in the shaping of heavy steel or duraluminum to proper body contours. The new instrument is made of aluminum. No adjustments are required, the stay shaper being so set that the steel is inserted to the point desired. Hand pressure shapes it readily, even to the very end.

• *Howard Hollander* has been named by the Pope Brace Division as its representative in the Southwest area. Mr. Hollander will be calling on brace establishments in the states of Arizona, New Mexico, Texas, Oklahoma, Arkansas, Louisiana and Colorado. In announcing his appointment, Ralph Storrs, Manager of the Pope Brace Division, emphasized that the Pope Division would continue its efforts to ship orders the same day received. Mr. Hollander was formerly with the U. S. Public Health Service. He has represented several different companies and has a wide knowledge of brace establishments.

• 1956 is a key year in the life of *Konrad Hoehler*, OALMA member and Certified Prosthetist in New York City. It's the fiftieth anniversary of his work in artificial limbs and braces—it's the fortieth anniversary of his graduation from the German Orthopedic Training Program—and it marks a quarter of a century that he has spent in the United States in the orthopedic and prosthetic field.

• *"Care of Your Realastic Restoration"* is the title of a new booklet prepared for patients by Prosthetic Services of San Francisco. The booklet and an accompanying sheet of instructions, "How to Care for it" has been prepared for patients who are wearing cosmetic restorations such as gloves, leg coverings and facial prostheses.

Facilities Which Are No Longer Certified

The following list of establishments which are *not now certified*, is published by direction of the American Board for Certification.

The firms listed below have lost their certified status for various reasons, including non-payment of the certification fees. Their names no longer appear in the annual "Official Registry of Certified Prosthetic and Orthopedic Appliance Facilities."

William Ballert & Co.
Chicago 45, Ill.

I. P. Boggs Company
Huntington, W. Va.

Bryant & Campbell Co.
Cleveland, Ohio

Cook Artificial Limb Co.
Winston Salem, N. C.

Crescent Artificial Limb Co.
Columbus, Ohio

A. Diadul & Sons, Inc.
Chicago 22, Ill.

Diamond City Limb Co.
Wilkes-Barre, Pa.

Easton Surgical Co.
Easton, Pa.

Eisen Surgical Appliances, Inc.
Jamaica, Long Island, N. Y.

Engberg Surgical Appliances, Inc.
Seattle 1, Wash.

Enterprise Surgical Appliances, Inc.
New York 23, N. Y.

G. L. Estle Co.
Anderson, Ind.

Fort Wayne Orthopedic Co.
Fort Wayne, Ind.

Herman Frank
East Orange, N. J.

C. A. Frees
Albany, N. Y.

Fresno Artificial Arm Co.
Fresno, Calif.

Fresno Orthopedic Co.
Fresno, Calif.

Gremco Orthopedic Appliance Co.
Sacramento, Calif.

Hall Surgical Mfg. Co.
Pasadena 9, Calif.

John Haller Surgical Service
Los Angeles, Calif.

Lyons Artificial Limb Co.
Chicago 2, Ill.

J. S. McDonald, Inc.
Springfield, Mass.

Martin-Halsted, Inc.
Detroit, Mich.

Alfred E. Mills
Los Angeles 14, Calif.

Milwaukee Artificial Limb Co.
Milwaukee, Wis.

Reed Orthopedic Shop
Little Rock, Ark.

Salt Lake Artificial Limb Co.
Salt Lake City, Utah

Spencer's Artificial Limb & Appliance Co.
Long Beach, Calif.

Surgical Brace & Appliance Co.
New Orleans, La.

Texas Surgical Co.
Beaumont, Tex.

20th Century Artificial Limb Co.
Chicago, Ill.

Twin City Artificial Limb Co.
Council Bluffs, Iowa

Vass Orthopedic Appliances
Miami, Fla.

Washburn's
Worcester 8, Mass.

Washington Artificial Limb Co.
Seattle, Wash.

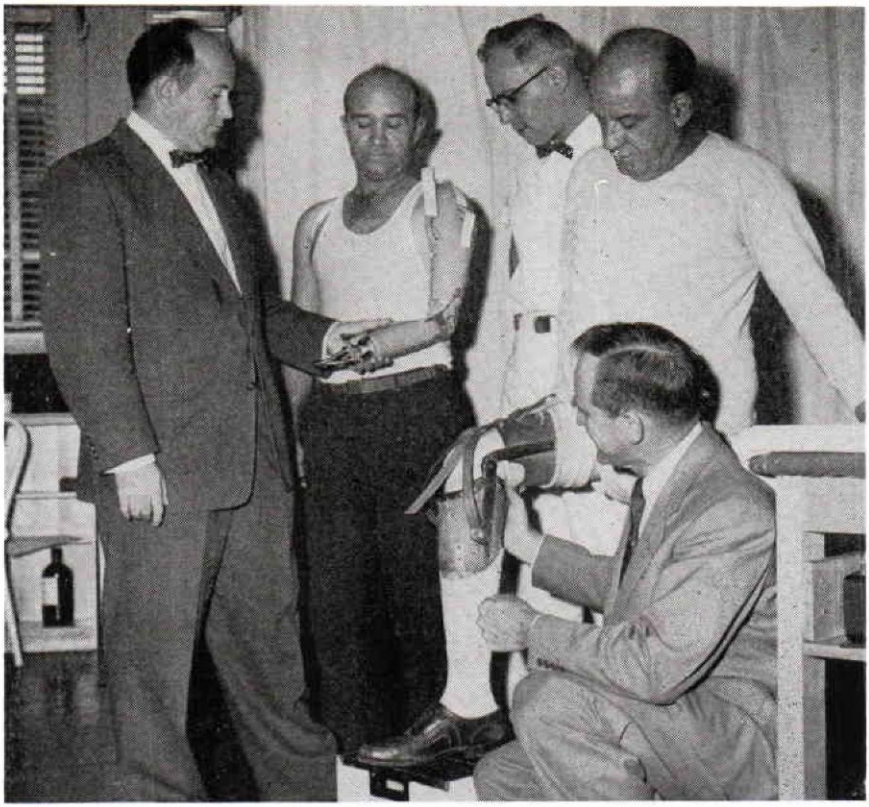
C. W. White Co., Inc.,
Boston 8, Mass.

Wm. H. Wires Co.
Toledo, Ohio

Wiseman Limb & Brace Co.
Dallas, Tex.

Worcester Orthopedic Appliance Co.
Worcester 4, Mass.

New Amputee Clinic at Jacksonville



Clinic personnel in the above picture are, left to right: Dr. George Raybin, Wm. Norman, patient; Sam Garfinkel, P.T.; Harold Davis, patient; and Wilmore Bremer, C. P. & O. The Clinics are held under sponsorship of the Duval County Society for Crippled Children and Adults.

Know Your Suppliers

The Bennington Stump Sock Corporation of 2400 Merrick Road, Bellmore, N. Y., is a manufacturer of stump socks under the brand name "Bessco" (The Superior Amputee Stump Sock). Milton Katz, the president, joined the company in 1949 as Superintendent and General Manager, when it was known as the Bennington Knitting Mills, Inc. In 1953 he bought control and changed the name to the Bennington Stump Sock Corporation.

Mr. Katz, a veteran of World War II, is a graduate of the New York State Textile School and has had advanced training in the field of textile engineering. He has had over 21 years' experience in the knitted goods industry. Under his direction the company has grown in size and has become an associate member of OALMA.

(This is one of a series of notes about the Associate members of OALMA. Our purpose is to tell about the many institutions and firms which though not engaged in the prosthetic-orthopedic field at the patient's level, are genuinely interested in the advancement of the artificial limb and brace field, and offer substantial service to artificial limb and brace facilities.—The Editor.)

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ANKLE MOTION
For the AMPUTEE . . .

Satisfied Customers, Increased Profits!

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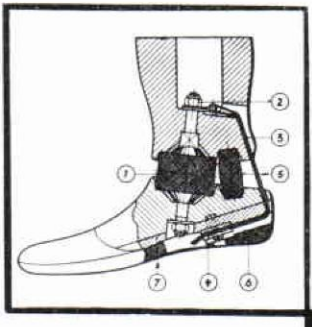

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prevents skin abrasion caused by twisting the stump in the socket.

BLOCK RUBBER MOUNTS
provide noiseless, gliding motion with no lubrication necessary.

FULL SOFT RUBBER SOLES
reduces sock wear to a minimum.

ENTIRE ANKLE IS CONSTRUCTED
to decrease shock, give cushioned weight bearing, which is important to wearer's comfort and activity.

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2. Stop Nut
3. Nylon Strap
4. Pinch Fitting
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6. Foam Latex Rubber Sole
7. Hardwood Base

Fidelity Orthopedic

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Words and Their Usage; Comments by the Editors of the Prosthetic Research Board

Editor's Note: Words are tools but we all have some trouble finding the most useful "tool"—the one that will express our thought most exactly. The editors of the Prosthetics Research Board prepared the following statement for their writers but it deserves wider reading:

"One of the problems that has always hampered the growth of science and technology in general is that of the meanings of words. Since words constitute the medium of communication among men, the proper choice and usage of words is essential to understanding. Like many another area of study, the entire field of limb prosthetics has long been plagued by faulty or illogical nomenclature that has, like Topsy, "just grow'd." In the interest of clarifying the reports literature, those responsible for report preparation ought in the future to give careful thought to the choice and use of terms. . . .

Do not use the word "shin" to mean "shank." The "shin" is the anterior margin of the tibia. The "shank," known anatomically as the "leg," is that portion of the lower limb between knee and ankle.

Do not speak of the "amputated shoulder" to mean the shoulder on the amputated side. An "amputated shoulder" can only be somewhere in the trash basket.

Do not use the word "palm" to mean the volar surface of the hand. If you do, there's no word left to describe the entire metacarpal section of the hand. Refer to the "volar surface of the palm" and to the "volar surface of the digits." They're two different things.

Do not refer to "flexion" of limb segments without explaining what, exactly, is meant. You can not, for example, flex your forearm without breaking it. You flex the elbow.

In the fields of human anatomy and limb prosthetics, it is obviously desirable to avoid certain common idioms which, in other context, might be quite acceptable. Expressions like "on the other hand," "not a leg to stand on," "foot the bill," "hang it over a hook," and the like usually lead not only to inept puns but to confusion as well.

Do not speak of the "distal stump" to mean the distal *portion* of the stump. There is no such thing as a "distal stump." Similarly, there is no such thing as a "proximal stump." We have only proximal *parts* of a stump.

In limb prosthetics it is, of course, common to speak of the "amputated side" (to mean the side on which the amputation was performed) and the "opposite side" (to mean the sound side). Actually, there are not likely to be many "amputated sides." "To amputate" means to prune or lop off." One could not very well lop off a side without getting into trouble. Although the expressions "amputated side" and "opposite side" are perhaps acceptable in loose usage, it is sometimes profitable to know the adjectives "ipsilateral" (the selfsame side) and "contralateral" (the other side).

For much the same reasons, it is best to avoid reference to an "amputated stump" or to "a person who has been amputated." One amputates the part that is discarded, not the part retained. This being the case, there would not be much point in trying to fit "an amputated person." Speak rather of "a person who has undergone an amputation," or simply of "one who has lost a limb through amputation," or more simply still of "an amputee."

(Continued on page 79 (bottom)

STUMP SOCKS . . . as amputees like them!

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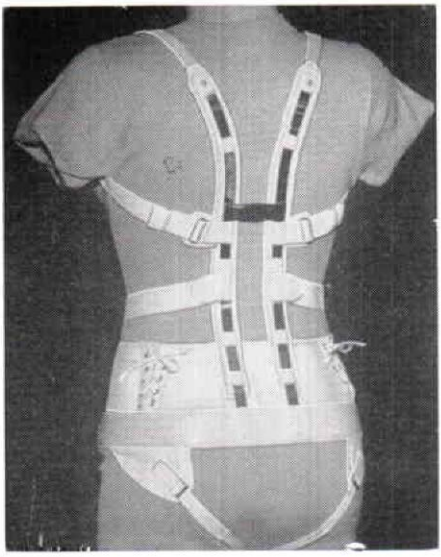
Full description and ordering information on pages 12-13 Knit-Rite Catalog.

We suggest . . . check the catalog for other Orthopedic and Prosthetic supply items.

Many new products are listed for your convenience in ordering.



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Economic Aspects of the Artificial Limb Industry*

By McCARTHY HANGER, JR.

Member, The American Board for Certification; President, J. E. Hanger, Inc., St. Louis, Mo.

In discussing the economic aspects of the artificial limb industry, I would like to begin with a description of its general nature, then sketch briefly the historical development from the middle 19th century to date. This will enable us to visualize the progress being made and to make some observations as to the future.

An artificial limb or prosthesis is to a great extent a custom-made or individually fabricated device. The variations in size and contour of the anatomy of human beings are practically infinite. Because of the added variations in amputation conditions, such as site of amputation, size, shape and condition of stump, physical condition of the amputee himself, and the uses to which the prosthesis are to be put, the variations that are needed in the prosthesis to properly fit a given individual, are certainly no less and probably much greater than the variations in humans in general. The amputation stumps of new amputees are subject to gradual change in size and shape during the first few months, as they become accustomed to wearing a prosthesis, so that a limb which fits satisfactorily when it is first applied must be adjusted from time to time to maintain a correct fitting.

In prostheses for lower extremity, the principal functional characteristics desired are weight-bearing with reasonable comfort, and ambulation. If the prosthesis does not fit precisely the amputee may not be able to tolerate weight-bearing with any comfort, and the gait will be less than desirable. A small variation from the proper fit in the weight-bearing section of the prosthesis can cause intense discomfort.

In artificial arms or prostheses for upper extremity, the principal functional characteristics are the ability to grasp, to lift, and to put the prosthesis in the desired position. To obtain maximum efficiency in these functions a precise fitting of the prosthesis is necessary.

Therefore it is obvious that prostheses cannot be sold over the counter like an electric toaster, nor can they be sold by size like a pair of shoes. Each prosthesis must be made in accordance with careful anatomical measurements, frequently using plaster of paris moulds of the amputation stump, and must be fitted very precisely to the individual. As adjustments become necessary, these must be performed with a high degree of skill.

The better equipped shops or facilities in the prosthetic field have a considerable variety of tools and equipment. For example, one well equipped facility has 23 different types of power tools in use. One work bench will have 50 different hand tools. Examples of power tools in common use are band saws, disc, spindle and belt sanding machines, electric drills and grinders. Thus, they are more of the nature of time savers rather than substitutes for craftsmanship.

The necessity to handle each case individually, and the knowledge and skill required to perform the task satisfactorily, cause this industry to be much more of the nature of professional service than of mere manufacture and sale of a device.

*Presented at the Symposium on Socio-Economic Aspects of Orthopedic Engineering, Dec. 30, 1955; 122nd Annual Meeting, American Association for the Advancent of Science, Atlanta, Georgia.

Limited Size

There are no accurate figures available on the number of amputations performed, or of the number of amputees in the population. Widely varying estimates have been made by people interested in the problem. After reviewing all available figures, the headquarters of our association, the Orthopedic Appliance and Limb Manufacturers Association, estimates the number of amputations of arms and legs to be 25,000 per year. The number of amputees among the population of the United States is estimated at 840,000.

There are approximately 31,000 prostheses sold per year. I estimate the average selling price at $250.00. This would indicate a total volume of $7,750,000 per year.

When allowance is made for the costs of repairs, and other articles directly related to the use of limbs, such as special stump stockings, the total sales volume of the industry appears to be about nine million dollars per year. Obviously, this is one of the country's very small industries.

In our own company, we find that about one-half of our prosthesis sales are to *new* amputees, and one-half are for replacement of worn-out limbs. If this proportion holds good throughout the country, then only about 15,500 limbs per year are sold to the 25,000 new emputees, leaving 9,500 or 38% who are not supplied limbs. And, the estimated sale of 15,500 prostheses for replacements among the existing amputee population of 840,000 indicates the purchase of a limb by only 1.8% of them per year. If every amputee had a prosthesis this would indicate an average useful life of over 55 years per prosthesis. This is obviously incorrect.

I have estimated above that perhaps 62% of the new amputees receive prostheses. Applying this percent to the amputee population would indicate that approximately 520,000 amputees have received an appliance. The replacement sales of 15,500 per year would indicate that 3% of the amputees replace their appliances each year—an average life of over 33 years. This figure still appears incorrect.

Allowance must be made for persons who for reasons of age, extreme handicap, economic status or location in a remote area, do not receive a prosthesis. Also, because of their ages at time of amputation, many persons only need one prosthesis. Others, unable to master the prosthesis, discard it and so do not need a replacement. It is difficult to believe that these factors explain the discrepancies in the figures, and it would be very worthwhile if a census could be made which would reveal the true situation.

Size and Distribution of Facilities

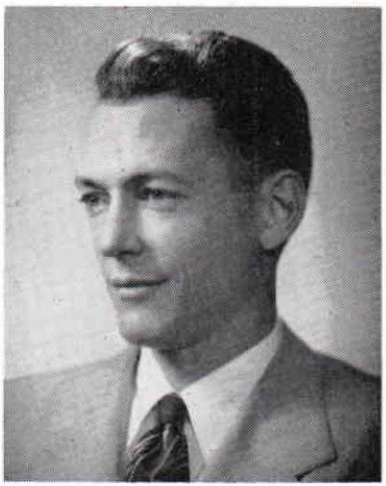
If we can accept the estimate of 31,000 prostheses furnished per year and given a total population in the United States of 165,000,000, then the number of limbs furnished each year is of the order of 1 prosthesis for each 5,300 persons. Obviously, limb wearers form a very small segment of the population. For various reasons, amputees are more heavily concentrated in some areas than in others, proportionate to the general population.

There are approximately 700 qualified and competent Prosthetists (fitters of artificial limbs) in the country. Again using the figure of 31,000 prostheses per year, we get an average of forty-four and a half (44½) limbs fitted by each Prosthetist. At an average cost of $250.00 per appliance, the annual volume per Prosthetist is an average of $11,125. Yet it requires an area of 236,000 population to support each Prosthetist.

It is therefore not surprising that the industry contains a large number of small shops consisting of one to

McCarthy Hanger, Jr., is a graduate of Duke University and took a Master's degree in Business Administration from the University of Pennsylvania. He has been associated with J. E. Hanger, Inc., since 1938 and is now president of J. E. Hanger, Inc., of Missouri. During World War II, Mr. Hanger was an officer in the U. S. Naval Reserve.

Mr. Hanger was elected one of the seven directors of the American Board for Certification in 1955. He is a past president of the Orthopedic Appliance and Limb Manufacturers Association. In 1954, he received the C. H. Davies Award for Outstanding Service to the Artificial Limb and Brace profession.



McCARTHY HANGER, JR.

four persons. Furthermore, many of these shops furnish not only prostheses, but orthopedic braces, surgical supports and other similar products. In large metropolitan centers, there are commonly shops staffed by from 5 to 15 persons and a few which are even larger.

Some Prosthetists are also qualified to fit orthopedic braces. There are other fitters who are qualified to fit orthopedic braces only. The latter are called "Orthotists." The combined total of qualified Prosthetists and Orthotists is about 1,100 persons.

There are approximately four hundred (400) qualified establishments where limbs or braces may be procured.

In view of the large amount of population required to sustain one Prosthetist, it is evident that very few are located in smaller towns or sparsely settled areas. Hence a considerable number of amputees living in such areas must travel long distances to have prostheses fitted and serviced. The industry at least partially offsets this inconvenience by the use of field representatives, or by shops operated part time.

In some such areas, there have been a few shops established by hospitals or similar institutions. Although figures are not available, I believe it could be demonstrated that the industry, which operates on a highly competitive cost basis, can furnish amputee service at a lower cost than a shop of this type. Where there are not enough amputees to support a commercial shop, a hospital shop is justified by the need for service, but when such a shop encroaches on the trade area of established shops, reducing their volume, it can make it difficult for the commercial shop to survive and provide adequate service to its other clients.

Historical Development

Man's attempt to find an adequate artificial substitute for the loss of an extremity begins with the earliest history of mankind. Throughout ancient writings we find many references to amputation stumps and artificial limbs. References to leg supports and to artificial hands are found as early as 500 BC.

Many ingenious devices, presenting evidence of skilled craftsmanship, and a gradually increasing knowledge of basic principles, were made

throughout history. I will omit details however and cover only developments in the United States since the middle of the 19th century.

In 1846 the "Palmer Leg" was invented in Philadelphia and was claimed to be a great improvement over the Anglesby Leg, a somewhat earlier English design. The Palmer leg had a foot made somewhat on the modern American pattern but with a catgut cord and an anterior spring instead of rubber bumpers in the foot. The "Bly leg," invented and patented in 1858 by Douglas Bly, M.D., of Rochester, New York had lateral or side motion at the ankle like that of the natural leg. Dr. Bly is said to have been the first to introduce the curved knee joint, which is now generally used on all below knee limbs.

The Civil War gave great impetus to artificial limb development in the United States.

A. A. Marks was the first to introduce the use of the rubber foot, eliminating ankle motion because the resiliency of the rubber foot was thought to make it unnecessary. J. E. Hanger, the first to perfect the cordless ankle, also introduced and made popular the wood socket.

Many of the limbmakers of this period wore artificial limbs themselves, and while many of them actually thought they had achieved the maximum improvement in artificial limbs, newcomers were constantly announcing something better. Many of the claims made for their products were extravagant; nevertheless a great development in artificial limbs in the United States was made during this period.

The beginning of the twentieth century saw many new names contributing to the development of artificial limbs: the Rowley Brothers of Chicago, Detroit, and Pittsburgh; Frees and Pomeroy of New York; Milligan of Los Angeles; Gaines-Erb of Denver; Hittenberger of San Francisco; Trautman, Winkley and Buchstein of Minneapolis. At the time the United States entered the First World War there were about 200 established artificial limb manufacturers in this country employing approximately 2,000 skilled workmen.

Until the time of World War I the limbmakers in this country, as in all others, were an unorganized group of rugged individualists, each going his own way, rarely speaking to his competitor, and much less consulting with him. There was little or no cooperation between the limbmakers and the surgeons; in fact the surgeon sometimes looked upon the limbmaker as some sort of shyster preying on the amputee, and avoided contact.

OALMA Founded: 1917

In October, 1917, the Surgeon General of the United States Army issued an invitation to the limbmakers of this country to come to Washington, D. C., to discuss the problem of supplying artificial limbs to war veterans. This meeting, no doubt, contributed more to the development of the science of prosthetics than any other occurrence in its history up to that time, for from this meeting originated the organization which is now known as the Orthopedic Appliance and Limb Manufacturers Association. Through the medium of this national organization, limbmakers and bracemakers meet on common ground and discuss their common problems. As a result, an entirely new conception of this industry has developed, as well as a great improvement in the ethical standards of the limbmakers and bracemakers, not only in their own business relationships but in their relationship with the medical profession as well. Through their national association, they have developed scientific and educational programs that are helpful

to the limbmaker, the surgeon, and the amputee alike.

Inventions

Some of the more outstanding of the mechanical devices invented by members of the industry in the last 50 years are:

Many different designs of artificial hooks, which are designed to fulfill particular needs such as those of the farmer, mechanic, or office worker, as well as the needs of daily living; ball bearing joints of several different designs for amputations below the knee or at the knee; the hip control or pelvic belt method of suspension of above the knee limbs; limbs made of aluminum alloy and of fiber; all-rubber functional ankle joints; mechanical hands of several different designs, which have contours resembling a human hand, and which provide grasp; non-functional hands with cosmetic plastic coverings which are quite life-like in appearance.

Government Research Program

Even though history records substantial progress, up to ten years ago there had never been an organized scientific program of research and development in the field of prosthetics.

Toward the close of World War II, the War Department undertook a program of research in limbs, in order to solve more adequately the problem of rehabilitation of the large number of veterans who had suffered amputations in active service. There was established, through the National Academy of Sciences—National Research Council, a Committee on Artificial Limbs, supported first by the office of the Surgeon General of the Army alone, and later by the Veterans Administration.

The research program can be classified broadly into four phases or types of activities:

First, fundamental studies of the nature of locomotion and related problems to form a basis for development of artificial legs, and fundamental studies of the normal and amputee biomechanics of the upper extremity, to form the basis for the solution of upper extremity problems.

Second, invention and development of devices.

Third is amputee case study and application of the first two phases to solution of specific amputee problems.

The fourth phase is the dissemination of the knowledge gained and the evaluation of its use in the field.

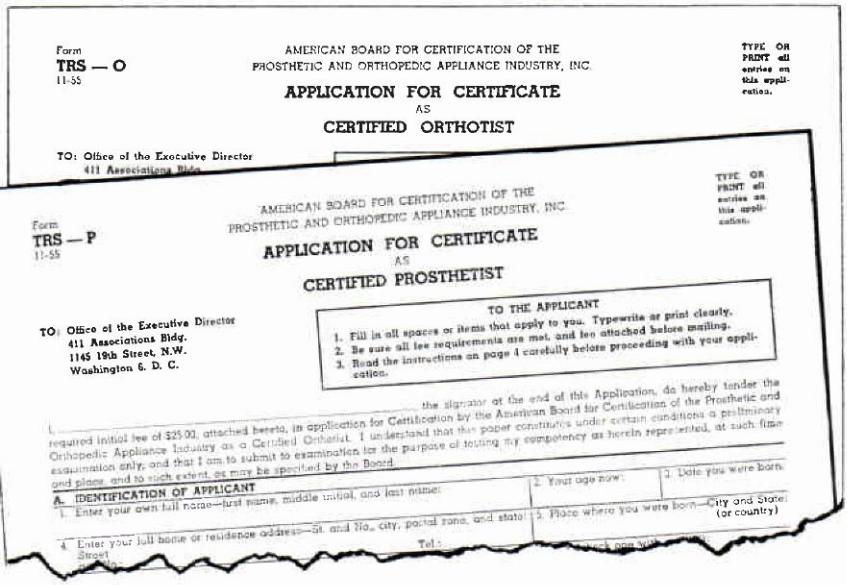
The outstanding development in lower extremity devices which has come into common use up to date is the suction socket method of suspension of the above the knee limb.

The Suction Socket limb represents a tremendous advance over any previous known type of prosthesis for this amputation. Greater control, greater freedom, reduction in the sensation of dead weight and greater neatness of fitting of the clothes, have made this prosthesis the preferred type wherever the conditions for its use are favorable.

Other devices which are gradually coming into use are the Navy type soft socket for below knee, variable cadence knee for above knee, and a new improved functional ankle which provides universal motion.

In upper extremity prostheses, there were developed the use of plastics for sockets and forearms, mechanical elbows and wrist units with greatly improved function, and new terminal devices. The principles of fitting and harnessing were studied and improved methods were developed.

While these new developments have greatly improved the function of prostheses, they also are generally more complicated. They require more time and skill to fabricate, to fit, and to maintain. Thus, they are more expensive.



Form TRS — O 11-55

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APPLICATION FOR CERTIFICATE AS CERTIFIED ORTHOTIST

TYPE OR PRINT all entries on this application.

TO: Office of the Executive Director
411 Associations Bldg.

Form TRS — P 11-55

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2. Be sure all fee requirements are met, and fee attached before mailing.
3. Read the instructions on page 4 carefully before proceeding with your application.

I, _____, the signator at the end of this Application, do hereby tender the required initial fee of $25.00, attached hereto, in application for Certification by the American Board for Certification of the Prosthetic and Orthopedic Appliance Industry as a Certified Orthotist. I understand that this paper constitutes under certain conditions a preliminary examination only; and that I am to submit to examination for the purpose of testing my competency as herein represented, at such time and place, and to such extent, as may be specified by the Board.

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4. Enter your full home or residence address—St. and No., city, postal zone, and state:
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The Certification Forms. Filling out these applications is only one step in the process which includes careful checking, practical work and written examinations.

The artificial limb industry never has had the resources or personnel available to undertake a program comparable to the government research program. The progress being made represents a very substantial improvement in the quality of service available to amputees. Therefore the members of the industry acknowledge and appreciate the great debt which they and the amputees themselves owe to this program.

Progress Toward Professional Status

Although the leaders in the industry starting at the time of World War I recognized the need for improvement in competence and in ethics, progress in this direction was slow and gradual up to 1948. Then the industry set up a voluntary board to establish standards of competence, equipment and ethics, the American Board for Certification of the Prosthetic and Orthopedic Appliance Industry. This Board conducts examinations to determine the qualifications of fitters of artificial limbs and braces and gives qualified candidates the title of Certified Prosthetist or Certified Orthotist.

The Board examines shops or facilities where artificial limbs or braces are made and fitted to see that they are qualified to carry on this work. The progress since the advent of the Certification Board has been greatly accelerated. Certification by this Board is becoming recognized by the medical profession, by others concerned with rehabilitation of the handicapped, and by the general public as the emblem of recognition of qualified firms and fitters in this field.

There are now 345 Certified Facilities and over 1,000 Certified Prosthetists and Orthotists in the United States. They constitute almost 90% of the known qualified facilities and fitters.

The education program in this field consists of three types: Short courses in specialties, apprenticeship courses, and college courses. The Federal Government, the medical profession and the artifical limb industry have cooperated in holding short courses in the fabricating and fitting of the suction socket leg and the newly de-

signed artificial arms. Starting next spring, short courses are to be held to teach the latest developments in principles of fitting above knee limbs, the Navy type soft socket leg for below knee and other related subjects.

The generally accepted method for teaching skilled crafts has been apprenticeship. Through the joint efforts of the American Board for Certification and the Orthopedic Appliance and Limb Manufacturers Association, a national standard for apprenticeship programs was developed and is gradually being put into effect. This embodies the latest principles of apprentice education.

Considerable thought and discussion has been devoted to establishing college courses in prosthetics. The University of Buffalo has explored thoroughly the problems involved in such an undertaking and hopes to establish a school for this purpose in the near future.

Current Prosthetic Methods

This review of the nature of the industry, the history of its development and the latest changes occurring through research gives us the proper background for a discussion of Current Prosthetic Methods—a picture of the industry as it operates today.

The relatively small number of new amputations and of amputees in the population, scattered all over the United States, has required the artificial limb shops to be scattered throughout the country and has tended to cause them to be small. The extremely individual nature of each fitting of a prosthesis, together with the other factors just mentioned, explains why there have not been developed any machines capable of turning out prostheses in large numbers by essentially mechanical means.

Nevertheless, there are certain components of artificial limbs which can be produced mechanically in large job lots rather than individually by hand. For example, wooden or metal knees, shin pieces, ankle pieces, and feet are readily obtainable. Usually these prefabricated parts are capable of alterations so they can be fitted and aligned to the individual. There are also shops which specialize in the construction of complete limbs, made to individual measurements, on a wholesale basis. Through division of labor processes, the greatest possible mechanization, closer supervision, and large scale purchasing, such shops are able to realize increased efficiency and economy of production. There are a total of 12 such factories which made complete limbs, prefabricated parts, or sub assemblies.

Based on a sample survey of representative firms in the industry, it can safely be said that a very large majority of artificial limb companies use pre-fabricated parts to some extent. Probably one-half of the firms use pre-fabricated parts, rather than a hand-made corresponding part, for one-half of their construction requirements or better.

Almost all the metal joints used are produced by machine shops specializing in this work.

In upper extremity prosthetics the production of elbow units, wrist units, joints, and terminal devices, using machine tools and high precision manufacturing methods is prevalent. Mechanical and passive hands and cosmetic glove coverings are specialties which practically the entire industry purchases from one of ten establishments.

New tools are gradually coming into use in this country. There are now available adjustable walking legs, for providing a complete range of adjustment at the knee and ankle. In connection with the adjustable leg a transfer jig is used to transfer the alignment information to the permanent limb. The latest power tool is a high-speed low-powered cutter with automatic clutch, which greatly reduces the carving time required to prepare a wood socket for fitting, yet which eliminates the danger in using a cutter of high power.

Modern Rehabilitation

So much for the mechanical side; now let us cover the personal side, a new concept of amputee management which might be called "Modern Ideal Rehabilitation."

Since World War II, a great deal of thought and experimentation has been devoted to developing means of rehabilitating amputees, using some of the methods which were used in the Army hospitals during and after World War II. The procedures developed have proved to be a marked improvement. The more difficult the amputee's problem, the more valuable become these procedures of "Ideal Rehabilitation." The procedures followed will vary according to the particular needs of each patient, but will include part or all of the procedures described below.

The amputee is examined and his problem evaluated, by an experienced Prosthetics Clinic Team. This team usually consists of an Orthopedic Surgeon, or a Physiatrist, or both; a Physical Therapist, or an Occupational Therapist, and the Prosthetist. During the examination the patient is analyzed as an individual case. Then a course of rehabilitation is prescribed by the physician, including the therapy necessary, the type of prosthesis, and other special treatment or training required. The physician is in charge of the team and responsible for the entire program, but he calls on the knowledge and experience of each member of the team for consultation as well as to carry out their particular phases of the work.

The patient may receive pre-prosthetic therapy in which the stump is conditioned to provide the most efficient use of the prosthesis. When the patient actually begins to wear the prosthesis, the clinic team again works closely together in the rehabilitation program. The prosthesis itself has been fabricated according to the measurements and specifications taken by the Prosthetist. Careful attention is now given to fitting, adjustments, continued therapy, and training exercises, such as walking, sitting, steps, etc. Unusual problems may require a complete review and possible change of the prescription.

In the case of arm amputees, occupational therapy follows the fitting of the prosthesis. The amputee spends part of each day learning to use the prosthesis and to live an independent life. He is taught dexterity and manipulation through blocks, games, doorknobs, faucets, tools, etc.

On completion of training, the amputee must appear before the clinic team again for final Prosthetic Performance Check-out and official release by the physician.

By the use of the Prosthetics Clinic Team, the patient is brought closer to the goal of the physician and the prosthesis-maker—complete rehabilitation. Small problems, which might otherwise cause the patient to discard the limb, can be corrected and the problems which so often disturb the new limb wearer can be explained as they arise, with the result that a much larger percentage of amputees become satisfied limb wearers. Today, Prosthetics Clinic Teams are used throughout the United States, particularly in the large metropolitan centers.

Many clinic teams operate in a Rehabilitation Center, an establishment especially equipped for carrying out rehabilitation of persons having many different types of handicap.

While the procedures of Modern Ideal Rehabilitation are much more expensive, the amputee can return to useful life more quickly, and with a much higher degree of proficiency in the use of his prosthesis. In almost every case, the cost of these procedures is more than saved by the benefits obtained.

What of the Future

From the foregoing facts and trends, it is possible to predict certain possibilities and suggest alternate directions in which the industry may go. Probably the future developments will consist of a mixture of these rather than any one type of development.

With respect to the size and location of facilities, there are certain factors which lead toward centralization of artificial limb services and others which lead toward decentralization. As devices become more complicated, and as the standards of fitting reach higher, one would expect a greater specialization by prosthetists just as specialties developed in the medical profession. Thus, the artificial limb facility of the future would have several different technicians, each of whom specialized in a particular amputation. For example, one prosthetist specializing in arms, another prosthetist for below knee, ankle, and partial foot amputations, and a third prosthetist for above the knee, and hip and knee disarticulations. There might be, in addition, a manager who had a working knowledge of the appliances for all amputations, who could attend clinics, handle inquiries and outside calls, as well as the usual managerial functions.

There might be two or three additional employees capable of performing the tasks requiring less skill, such as repairing, painting and assembling. Such a facility could be quite efficient. It could give prompt service for rush orders and take care of amputees promptly when they come in for repairs and adjustments. However, a trade area of about seven hundred thousand population is needed to justify its existence.

The increasing ease of transportation would seem to foster greater centralization. On the other hand, amputee patients and their doctors in outlying areas seem more and more to demand nearby service. Amputees object to the time and expense involved in travelling great distances. In many instances they are willing to accept a lower quality of service or a less adequate prosthesis in order to avoid excessive travel. If the facilities are to be further decentralized, and the distances between them thereby reduced, then it is axiomatic that they will have to be smaller.

One of the leaders of the industry has visualized a practical method of operation for small but highly competent facilities as follows: All components of artificial legs and arms except the socket would be mass produced in a large variety of sizes by factories specializing in this work. The fitter would make and fit the socket of the prosthesis. Such a fitter might be a college graduate, who has been trained in one of the large mass production shops to be an expert fitter only. He spends the great majority of his time in fitting and adjusting limbs.

The typical facility might have one Prosthetist and one Orthotist in a medical center or rehabilitation center working closely with the doctor and the physical therapist. These fitters would be competent to handle the majority of amputees or amputee types, and brace cases. However, the unusually difficult case or rare type of condition would be referred to someone who specialized in that type of condition. There would be only a few, probably four to six, large facilities spread throughout the country where such specialists would work and which would also mass-produce components for limbs.

The use of Clinic Teams and of Rehabilitation Centers is well established, but it seems clear that there will be a steady increase of these in the years to come.

The Research Program is far from finished with its task. Much remains to be learned in this field. As new ideas and principles of fitting and amputee management are developed,

they will be disseminated and become a part of the practices of the industry. In the development of devices, there are many fields yet to be explored, many devices which are in various stages of development. For example, improved methods of control of artificial hands to more closely approach the function of a natural hand will require many years of study. The application of external power to the operation of artificial arms holds possibilities. Hydraulic knees are still under development and test. Methods of providing more natural foot action, such as the solid ankle cushion heel foot, will continue to be investigated.

Many of the devices which will be developed will be much more complicated, more difficult to manufacture and to maintain and inevitably more expensive than the devices in use today. The use of the practices of Modern Ideal Rehabilitation and the more expensive devices, will inevitably mean that a great deal more money will be spent on each patient. However, when one considers the tremendous improvement in the quality of rehabilitation received, this increased cost certainly will be money well spent.

As the industry faces the future, it is well aware that its most important task is to furnish the amputee the best possible service. This will require constantly improved training and education, resulting in ever increasing skill, an ever higher standard of ethics, and convenience of location of service.

A large proportion of prostheses, perhaps as much as 60% of the total, are purchased by welfare agencies such as the Veterans Administration, Divisions of Vocational Rehabilitation and others. These agencies, operating on limited appropriations, are vitally concerned in economical prosthetic service, so they can rehabilitate as many eligible handicapped as possible. Yet they, too, want amputees to be rehabilitated in accordance with the best methods attainable.

Thus the challenge of the future to the industry is clear: it must continually improve its service to the amputee, yet it must do so at the most economical cost consistent with such service.

WORDS AND THEIR USAGE—(Continued)

Exercise caution in using the word "joint." In the language of anatomy and limb prosthetics, it can get you into trouble. In one and the same manuscript, we find "joint study," "joint effort," "joint proposal," "joint torque," "joint lubricants," "joint motion," "joint forces," and so on.

In referring to a normal person, do not speak of a "nonamputee" or a "nonamputated person." If you do, you suggest that to be an amputee is a pleasure afforded only the privileged few. If you mean "normal," say "normal."

Do not speak of "forward flexion of the shoulder" to mean forward rotation of the arm upon the shoulder. "Forward flexion of the shoulder," or more simply "shoulder flexion," means forward rotation of the shoulder upon the chest, as in scapular abduction.

Do not refer to "shoulder abduction" to mean arm abduction. One abducts limbs, not parts of the torso. You may flex, extend, elevate, or depress your shoulder, but there is no such thing as "shoulder abduction."

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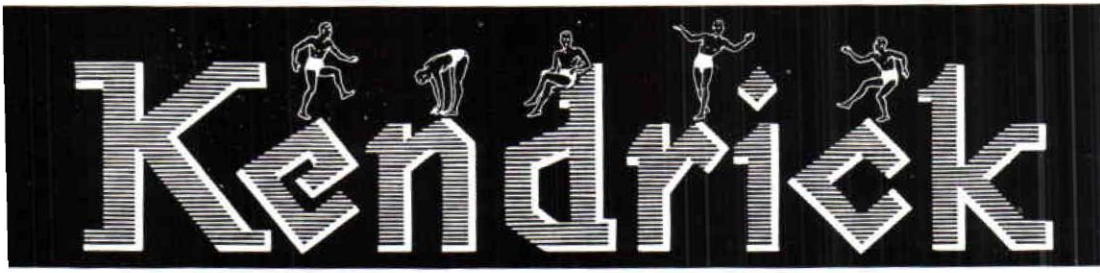

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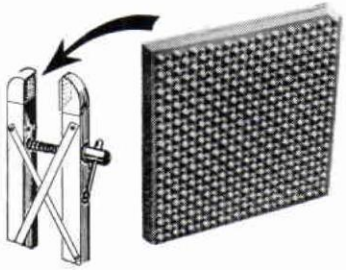

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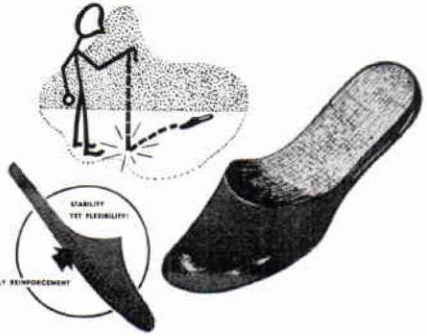

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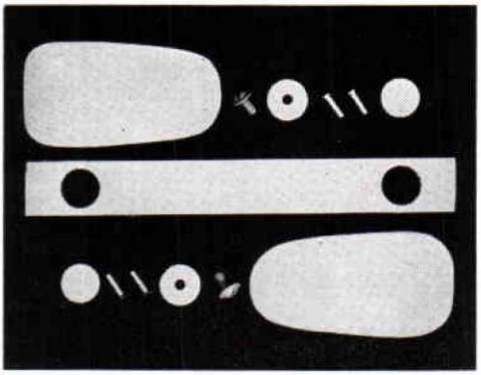

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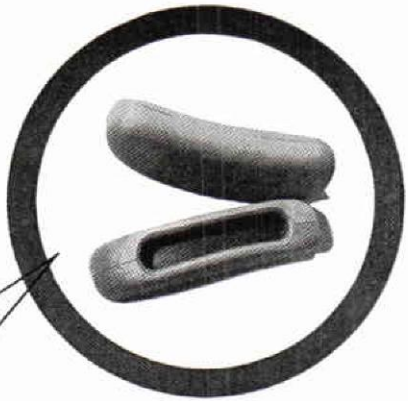

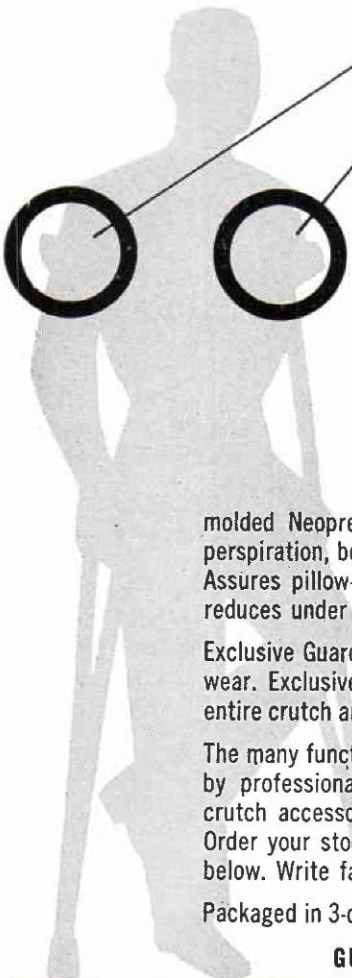

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Cross-Country Report—News from the OALMA Regions

DR RUSK HONORED BY MOALMA

MOALMA honored Dr. Rusk at its Prosthetics Seminar, April 27, with a special citation. Shown above, left to right: Milton Tenenbaum, President of MOALMA; Dr. Rusk; Mrs. Mary Dorsch, Chairman of the Conference; John A. McCann, Vice President of OALMA, and Karl W. Buschenfeldt, OALMA Director for the New England States and a member of the Certification Board. Dr. Rusk is holding the Citation.

The Northwest Meets

OALMA members from the Northwestern states met at the Hotel Winthrop in Tacoma, Wash., June 9 and 10, at the call of Regional Director Len Ceder. Dr. Robert E. Stewart, Director of the VA's Prosthetic and Sensory Aids Service was guest of honor and principal speaker. Dr. Stewart also conducted a question and answer session on contract problems.

"New Techniques in the Treatment of Fractures" were reviewed for the members by Dr. William H. Goering, orthopedic surgeon of Tacoma. Other speakers included Noel Brown and Jerry Leavy of the Dorrance-Hosmer Company. Dr. Miles Anderson described the Schools in A/K Prosthetics which the University of California is offering. Charles A. Hennessy, vice president of OALMA and a faculty member of the UCLA School reviewed the curriculum.

Members of this Region agreed unanimously to hold another meeting in the early fall, to hear first-hand reports from members who are registered for the Prosthetics School at the University of California.

A panel discussion of Public Relations in the Limb and Brace Industry brought forth many comments and questions from the members. Eric Gustavson of Seattle described PR work with the physician, and A. W. Pruhsmeier of Portland commented on PR as it concerns the orthopedic patient. Les Smith, Assistant Executive Director of OALMA, moderated the discussion, and was the featured speaker at the Regional Banquet.

Director and Mrs. Ceder were hosts at a buffet luncheon Sunday at the close of the meeting.

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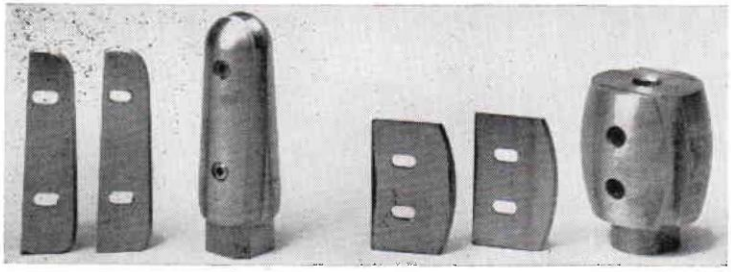

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Dr. Stewart Meets with Regions IX and X

Dr. Robert E. Stewart, Director of VA's Prosthetic and Sensory Aids Service was guest of honor and speaker at meetings of OALMA Region X at Oakland, June 14 and of Region IX at Los Angeles, June 18.

The meeting at Oakland was held at Laurence's Orthopedic Appliance Company, with Matt Laurence, Regional Director, presiding. Other guests included Dr. Miles Anderson, Vice President Charles A. Hennessy, Past President McCarthy Hanger, Jr., Howard R. Thranhardt, of Atlanta, Ga., and Les Smith, Assistant Director of OALMA. Messrs. Hanger and Thranhardt and Dr. Stewart were on the West Coast for the meeting of the Committee on Prosthetics Research and Development of which they are members.

The Los Angeles meeting was held at the Mayfair Hotel, which is the scene of the regular monthly meetings of our Los Angeles brethren. The new directory of the Society of Orthotists and Prosthetists was distributed. Members agreed to plan an exhibit for the OALMA Assembly in October. Mr. Hennessy, who presided, discussed the development of the A/K School. Assistant Director Les Smith spoke on "What's Ahead in the Limb and Brace Field." His most popular prediction: Improved Status and Less Back-Breaking Toil (but more intensive "skull practice").

Region VII

OALMA Region VII held its Sixth Annual Assembly at Omaha April 14. The crowded program arranged by Donald Bohnenkamp and Jack Casey, the Committee on Arrangements, kept some 60 delegates and guests busy all day long. Dr. J. E. M. Thomson of Lincoln, Nebr., was the star of the morning session. His paper, "Relationship of Surgeon and the Brace and Limb Shop" was illustrated with valuable slides.

Ted Smith and Erich Hanicke of Kansas City teamed up to discuss the *Williams and Chair Back Braces,* demonstrating the advantages and the construction details of each.

"Management's Opportunity in Public Relations" was discussed by Les Smith, Assistant Director of OALMA. Fred Novak, Director of the Nebraska Department of Vocational Rehabilitation, was Guest of Honor and speaker at the noonday session, reviewing the role of the State in vocational rehabilitation.

At the afternoon session Voigt W. Baker, Area Chief of Prosthetic and Sensory Aids for the VA, reviewed recent changes in the purchasing regulations. Dr. S. A. Swenson presented a film on "Congenital Deformities," displaying the work done at the Mary Free Bed Hospital in Michigan. Jerry Leavy, Hosmer's "Ambassador at Large," reviewed the making of upper extremity prostheses. After showing new developments in the limb and brace field, the annual Business Session was held, presided over by Chester C. Nelson, President of the Region. The Region agreed to hold the 1957 session in Minneapolis and picked Walter Erickson as President. He will be assisted by Everett Haines of Des Moines as Vice President and Lorrin Madsen of Minneapolis as Secretary-Treasurer.

Pennsylvania Society Meets

A program of high professional merit was presented to the members of the Pennsylvania Orthopedic and Prosthetic Society at the third annual convention held in the Drake Hotel in Philadelphia May 11-13.

After an informal reception the evening of May 11, members gathered early the next morning to take part in the Symposium on Prosthetic and Orthopedic Appliances. Basil Peters presented a case of a five-year-old

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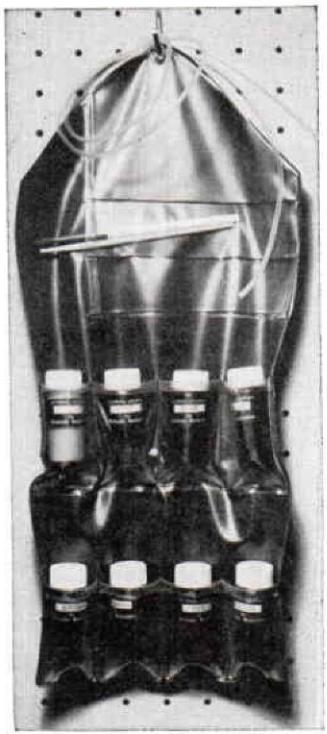

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boy with a congenital abnormality of one arm, wearing the functional prosthesis prescribed by the physician with the added purpose of preventing the developing of scoliosis. Two cases of bilateral arm amputations were presented by Charles Wright. In spite of the age of these amputees these cases showed unusual skill with their newly acquired prostheses.

Alfons Glaubitz, Manager of the brace facility of Elizabethtown State Hospital was featured speaker at the morning session on "Fundamentals of Brace Design and Construction." His talk was illustrated with slides shown by G. R. Zielke of Florin, Pa.

W. R. Bouldin, Chief of the Philadelphia Prosthetic and Sensory Aids Unit, described the VA Service Cards for braces, wheelchairs and limbs. Mr. Bouldin also went over the requirements for service to the veteran and made several helpful suggestions.

In the business session, members voted to hold the fall meeting at Pittsburgh in September. Karl Barghausen of Pittsburgh and Eugene Teufel of Elizabethtown, were elected to the Executive Committee.

President John Cocco presided at the Society's annual banquet and introduced the speaker of the evening, Dr. R. J. Doman, from the staff of the Philadelphia Rehabilitation Center. Floyd L. Kefford, Chief of Physical Restoration of the State Bureau of Rehabilitation and Lester A. Smith, Assistant Director of OALMA, were guests.

Region V Hears Dr. Burke

The annual Spring Conference of OALMA Region V, comprising Ohio, Michigan and West Virginia, was held at the Deshler-Hilton Hotel in Columbus, April 21 and 22. A total of 58 members and guests were registered for the two-day session which was presided over and arranged by Heinz Murka of Fidelity Orthopedic. Dr. Richard Burke, Head of the Department of Physical Medicine and Rehabilitation at Ohio State University, was Guest of Honor and Speaker on the subject, "The Team Approach and Rehabilitation." The address was illustrated with slides.

Jerry Leavy of Dorrance-Hosmer contributed some valuable information on upper extremity prosthetics, and showed the new film, "Are Your Hands Tied?" This, as you know, is the story of one day of his own life in his everlasting struggle against the odds of a double A/E amputation. Truly, he is one of the greatest.

Members voted to hold the 1957 meeting on April 13 and 14 in Cleveland and elected the following officers: L. B. Barghausen, Columbus, Ohio, President; A. E. Kloene, Toledo, Ohio, Vice President; Charles Rosenquist, Columbus, Ohio, Secretary-Treasurer.

The costs of doing business in the limb and brace field were analyzed at a Financial Clinic Sunday morning conducted by M. P. Cestaro, Treasurer of OALMA, and Director Glenn Jackson.

—L. B. Barghausen,
Council President.

In Memoriam

MRS. EDNA VIRGINIA GUSTAVSON, wife of OALMA member Eric Gustavson, died suddenly at Seattle, June 10. In addition to her husband, she is survived by a daughter, Karem Virginia, and a son, Robert Edward.

A. E. "ART" ARMSTRONG, President of the Colorado Artificial Limb Company of Denver, died suddenly on February 14, 1956, after a heart attack. Mr. Armstrong had managed the company for over twenty years and had long been a member of OALMA. The Company has been purchased and is now operated by Lawrence A. Jones, CP&O.

J. GILBERT PRING, CO, of the Indiana University Medical Center Staff died in Indianapolis, April 9, 1956.

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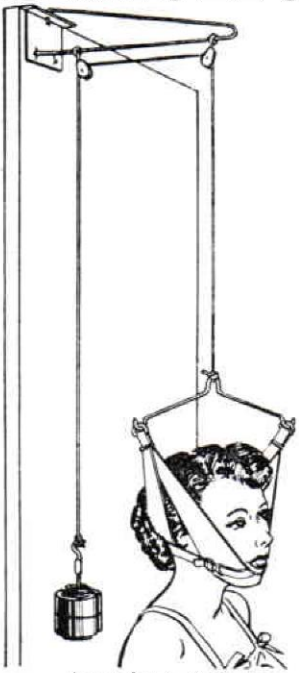

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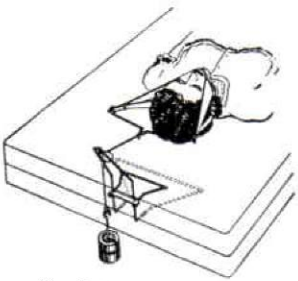

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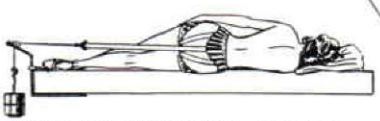

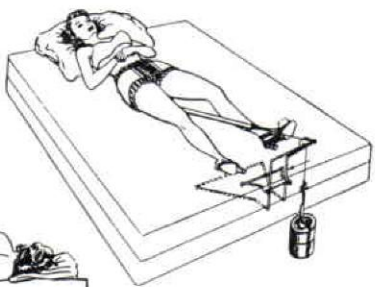

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TO THE LADIES:

from

OALMA's Woman's Auxiliary

These past months have been a very happy experience for me, and while a considerable amount of time has been involved, I have enjoyed every minute of being your President. I have had so many very kind and friendly letters from so many of you and it is just wonderful to be so close to you all.

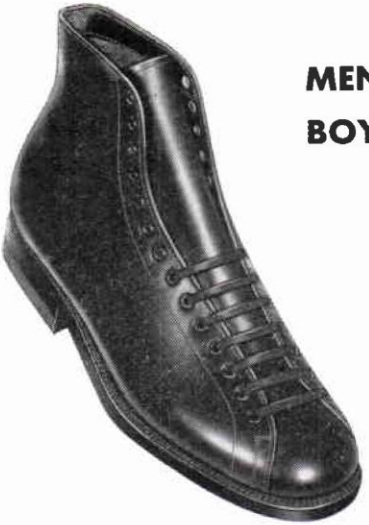
The time of our National Assembly is drawing near again. I am looking forward to seeing you all in San Francisco, and to meeting many more of you from the West that I haven't had the pleasure of meeting before. I thing you will enjoy the Convention very much this year as San Francisco is noted for its many places of interest of such a difference nature than we have seen before. Mr. and Mrs. Lloyd Brown are working very hard in cooperation with Mr. Herbert Hart to make this a very successful convention as well as an enjoyable one.

I will briefly outline the program as it is being worked out, to the best of my ability. On Sunday the open registration will be in progress in the hotel at a flat rate and a bar will be set up for sociability for those who so desire, and an evening of music, greetings and friendship renewals will ensue. Of course, you know there will be less time this year for sightseeing since the Assembly time will be shorter, so I have been in conference with one of our very prominent members and she has agreed with me that one meeting might suffice for us in consideration of this. This will be immediately after the President's breakfast on Monday, and will take in all business. Then we will have lunch at Fisherman's Wharf at one of the very fine restaurants there after which there will be a tour by boat of the Bay. On Tuesday morning, there will be a bus tour of China Tour and lunch at one of the restaurants there. That afternoon will be free for shopping or appointments in preparation of the banquet at night.

Doesn't this all sound inviting to you all ? I hope you will make plans now to spend your vacation or at least part of it with us in San Francisco at this Assembly. Let's make it the best yet.

Very truly,

Florence Kraft,
President.



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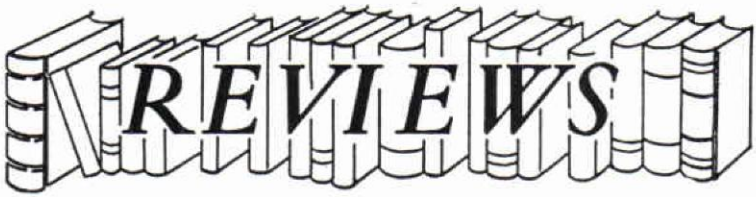

UPPER EXTREMITY PROSTHETIC PRINCIPLES—A 16 mm. color film with sound; 28 minutes running time.

Produced and prepared by the U.S. Veterans' Administration

Reviewed by Ivan R. Dillee, C. P., W. E. Isle Company.

An excellent presentation of the Veterans Administration sponsored research program in upper extremity prosthetics up to its present standing. The description of areas in which research is being carried on, the principles employed, and even some of the methods used, is interestingly and accurately depicted.

The amputees selected as examples are well chosen covering a wide range of amputee type. The prosthetic components used and described are the latest available, and I noticed only one which is not approved for general use. All of these components are accurately described by the commentator as "interim devices," indicating what we all realize, that the final word has not been spoken, that further research is contemplated and that more improvements may be anticipated.

The concept of the team approach "to the upper extremity amputee problem" is strongly emphasized throughout the entire picture and the vital importance to the amputee of each team members' contribution is clearly indicated.

"Upper Extremity Prosthetic Principles" is an interesting, accurate, non-technical exposition of the principles which apply to serving the arm amputee. It will be of interest and of help to anyone who is called upon to explain or demonstrate the best in modern upper extremity prosthetic service.

AMPUTATIONS

By Leon Gillis

(Published by Grune and Stratton, New York, 1954)

Reviewed by Chester C. Haddan, Denver, Colorado.

Much has been written and said about the immense amount of experience and knowledge that has been accumulated in recent years concerning amputation procedures and the fitting of artificial limbs following amputation. Mr. Leon Gillis has shown exceptional skill in combining his own rather extensive experience with the significant contributions of others throughout the world in the field of "amputations," and combining it into a practical, usable volume.

This work is a comprehensive textbook, suitable for any interested scholar in the field of amputations. It is not just a textbook on amputations alone, but rather it covers most every phase of this fascinating subject which the surgeon and prosthetist must both by virtue of their chosen professions interest themselves in. It is no more possible for the competent prosthetist to ignore the "amputation"; the techniques involved; the causes; the possible complications; the post operative care of the amputee and his rehabilitation than it is for the competent surgeon to ignore the prosthetic phase of amputee care. The mere fact that in the past many prosthetists have shown little or no interest in the amputation and many surgeons have shown a similar disinterest particularly in the United States, in the subject of prostheses and prosthetic fittings, makes a textbook such as this one such a valuable contribution toward a better understanding of the whole problem

of the "amputee," particularly for the prosthetist and surgeon who desire to possess as comprehensive a background of knowledge as possible. I am sure no certified prosthetist can afford not to have this book in his reference library and I am equally sure every suregon who claims an interest in amputations and prostheses will want it.

The book begins with a very fascinating chapter on the History of Amputations and Prostheses, followed by three chapters on general principles of surgical technique. A chapter on "Amputations of the Hands and Fingers" should be of particular interest to the prosthetist. Other subjects covered in succeeding chapters of particular value to the prosthetist are: "Amputations for Gangrene and Vascular Diseases; Developmental Anomalies of Long Bones Requiring Artificial Limbs; The Management of Short Limbs and Amputations in Children; Re-amputations; Plastic Procedures; Healing Processes; Painful Stumps; Phantom Pain and last but not least, Nursing and After Care of Amputation Patients."

The author's philosophy and extremely practical approach to the subject is exemplified in the closing paragraph of his preface to the book:

"Manufacturers of artificial limbs have been supplying their products and recommending for years the type of limb which in their past experience has been found the most suitable. It has been discovered, however, that the surgeon and limbmaker have often been working in watertight compartments, the surgeon designing operations which, although surgically excellent, have not in the experience of the technician always been capable of ensuring the best prosthetic results. What is now required is closer collaboration between the two. It is hoped this work will be condusive to that end."

KUNSTLICHE HANDE
KUNSTLICHE ARME
(Artificial Hand and Artificial Arm)
By Fritz Puschel. Published by Technischer Verlag Herbert Cram, Berlin, 1955, 162 pages.
Reviewed by C. Fillauer and Hans R. Lehneis.

This is without question the most advanced book in German on the present and past state of the art of upper extremity prosthetics. In true German thoroughness the subject is covered from A to Z.

Beginning with the physiology of the arm the author proceeds to describe and discuss hand functions, artificial mechanisms and the history of hand designs from 1509 up to the contemporary models. Some 22 German hands—all that received any recognition, are illustrated but only five American makes are described. In contrast, however, in the field of hooks Germany has had little experience. It is interesting to note that their two hooks in present use are both of a "two-load" design and spring actuated.

Next, Mr. Puschel discusses stumps and amputees as to type and classes much as was taught to those who attended the Upper Extremity Prosthetic School at UCLA. Only by an understanding of this aspect can one have a clear picture of the proper relationship of prostheses and their components to amputee needs. Throughout the book this pattern of first explaining the natural and then comparing it to the artificial substitute is followed. So after a chapter on biomechanics he goes into the construction of wrist units and elbow joints and then into methods of fitting, harnessing and control cable problems, which are thoroughly explained with clear cut photographs and line drawings.

It is interesting that he devotes several pages to the technique of elbow flexion operating the terminal

device. One illustration of this control shows the cable operating off of the biceps cuff. Beyond 75° of flexion the hook remains closed. Full hook opening is obtained at 20° of flexion. Of course, varying degrees of control can be put into the prosthesis by adjusting the reaction point near the elbow joint and by the length of the lever arm above the elbow joint.

Cineplasty prostheses for flexor and extensor tunnels of the forearm as well as for biceps and triceps motors of the upper arm are described in detail. Also, several designs of Krukenberg prostheses are shown. Other chapters can be found on the following specialized aspects: psychology of amputee handling; prostheses for bilaterals, blind amputees, and advice for prosthesis for children and ladies.

For those who can read German this book offers a very complete summary of many well known and accepted techniques of fitting and harnessing. Unfortunately very little is mentioned or illustrated in regard to plastic laminate construction. It is also an excellent reference book for historical purposes.

CANADIAN HIP DISARTICULATION PROSTHESIS —a 16 mm. color film, silent

A new 16-mm. color motion picture on the fabrication and fitting of the Canadian hip-disarticulation prosthesis has been completed by the Prosthetics Education Project at the University of California, Los Angeles Campus, under the supervision of Dr. Miles H. Anderson, Educational Director, and Raymond E. Sollars of the PEP staff. The film covers the entire process from the first examination of the amputee to the final fitting, complete with cosmetic covering. Included in the coverage is an x-ray of the pelvic area of the subject, ample indication of the general physique, and studies of the gait pattern with the completed limb.

James Foort, chemical engineer on the staff of the Prosthetic Devices Research Project at the University of California, Berkeley Campus, appears in the film as the "prosthetist." A report, covering the same subject matter as the film but going into greater detail, has been prepared by Foort and Charles W. Radcliffe, also of the Berkeley group. Copies of this report may be had free of charge by addressing a request to the Prosthetic Devices Research Project, University of California, Berkeley.

The hip-disarticulation prosthesis shown in the film, commonly referred to as the "Canadian type," was originally developed by Colin A. McLaurin, with the Department of Veterans Affairs of Canada. As seen in the film, it utilizes McLaurin's principles, but with the addition of certain fitting and alignment modifications and certain plastics-fabrication procedures. The original design has been published previously in ARTIFICIAL LIMBS (September 1954, p. 30). See also the article by C. A. Bell, "Canadian Hip Disarticulation Prosthesis" in the March, 1956 issue of this *Journal.*

Two copies of this new and informative motion picture are available on loan. One is from the library of the Audio-Visual Department of the University of California at Los Angeles. The other has been placed with the Veterans Administration. It may be obtained upon request addressed to William M. Bernstock, Chief, Prosthetics Education Division, Prosthetic and Sensory Aids Service, U. S. Veterans Administration, 252 Seventh Avenue, New York City.

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CODE OF ETHICS FOR THE ARTIFICIAL LIMB AND BRACE PROFESSION

The Federal Trade Commission has approved fair trade practices for the field of artificial limbs and for orthopedic appliances. Both codes have been adopted in their entirety by the American Board for Certification as a guide for the Certified Prosthetist and Orthotist. The full text of the Codes may be obtained by application to the American Board for Certification Headquarters.

The following digest of the rules is printed for ready reference.

It is an unfair trade practice:

(1) To deceive purchasers or prospective purchasers as to any of the qualities of a prosthetic or orthopedic appliance, or to mislead purchasers or prospective purchasers in respect to the service of such appliances.

(2) To infer an artificial limb is equivalent or nearly equivalent to the human limb, complies with any government specifications, or has the approval of a government agency unless such be wholly true or non-deceptive.

(3) To fail to disclose to a purchaser, prior to his purchase of a prosthetic appliance, that the degree of usefulness and benefit will be substantially dependent upon many factors, such as the character of the amputation, condition of the stump, state of health, and diligence in accustoming oneself to its use.

(4) To promise that any industry product will be made to fit unless such promise is made in good faith and industry member is possessed of the ability to fulfill such guarantee. A prosthetic device or an orthopedic appliance is not to be considered as fitting unless properly shaped for the body member to which it is applied, and in proper alignment and conformity with the physique of the person to wear such a product, and affords the optimum of comfort and use on the part of the wearer.

(5) To deceive anyone as to his authority to represent and make commitments in behalf of an industry member unless such be fully true.

(6) To use any testimonial or use any picture which is misleading or deceptive in any respect.

(7) To demonstrate any appliance in a manner having the tendency or effect of creating a false impression as to the actual benefits that may be reasonably expected from it.

(8) To use any guarantee which is false or misleading.

(9) To represent that any appliance conforms to a standard when such is not the fact.

(10) To publish any false statements as to financial conditions relative to contracts for purchase of appliances.

(11) To engage in any defamation of competitors or in any way to disparage competitors' products, prices, or services.

(12) To use the term "free" to describe or refer to any industry product which is not actually given to the purchaser without cost.

(13) To wilfully entice away employees of competitors, with the purpose of injuring, destroying or preventing competition.

(14) To take part in any concerted action with other members of the industry to wilfully fix prices.

(15) To promote the sale of any appliance to any person who can not be expected to obtain reasonable benefit from such appliance.

(16) To refrain from giving every assistance to doctors before and after amputation or crippling condition, or to fail to do everything possible to promote mutual trust and confidence between the industry and the members of the medical profession.

(17) To undertake to supply an artificial limb by mail-order specifications without personal fitting thereof unless conditions are such which make an exception desirable, and in any case, no misrepresentation shall be made as to fit.

(18) To unduly exploit features of appliances less important than proper fit and alignment.

(19) To fail to recognize that the interest of the amputee and the handicapped is the first concern of this craft and therefore any failure to make available to all of its members and the general public any improved technique that may be used as to making, fitting, aligning or servicing of industry products shall be an unfair trade practice.

(20) To pay anything of value to any doctor for the purpose of obtaining a referral of a patient by the doctor to the industry member.

Further, the industry desires to be an active and cooperative factor in all progressive developments of improved techniques that will contribute to the welfare and comfort of all who wear its products.