SEPTEMBER, 1955

The journal of the Limb and Brace profession

Orthopedic and Prosthetic Appliance Journal

Advice to the Amputee

The Role of Physical Therapy

Improving Relationships

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

DATES TO REMEMBER — 1955

What • When • Where

OCTOBER

14 - 15	EXAMINATION FOR PROSTHETISTS AND ORTHOTISTS—Conducted by the American Board for Certification.	*New Orleans, La.*
16 - 19	NATIONAL ASSEMBLY OF THE LIMB AND BRACE PROFESSION	*New Orleans, La.* *Jung Hotel*

NOVEMBER

16 - 18	NATIONAL REHABILITATION ASSOCIATION—Meeting. (Section on *Physical Restorations,* November 16 to be presented by a panel from OALMA.)	*St. Louis, Mo.* *Jefferson Hotel*
28 - 30	EXPOSITION OF EMPLOYMENT AND REHABILITATION—and the 1955 Annual Convention of the National Society for Crippled Children and Adults.	*Chicago, Ill.* *Palmer Hotel*

WELCOME TO NEW MEMBERS OF OALMA

These firms have been elected to membership in the Orthopedic Appliance and Limb Manufacturers Association:

Falls City Limb and Brace Company, A. L. Hudnall, President, 1825 West Broadway, Louisville 3, Kentucky. (Telephone: Cypress 2959)

Charles Greiner Company, Charles Greiner, President, 218 S. 8th St., Philadelphia 7, Penna. (Telephone: Walnut 3-0144)

Henry Saur Company, Inc.. Henry J. Saur, Secretary. 515-517 N. 8th St., Philadelphia 23, Penna. (Telephone: MAin 7-3400)

Reinhard Wurth, Albany Hospital, Albany 3, New York. (Telephone 8-4617)

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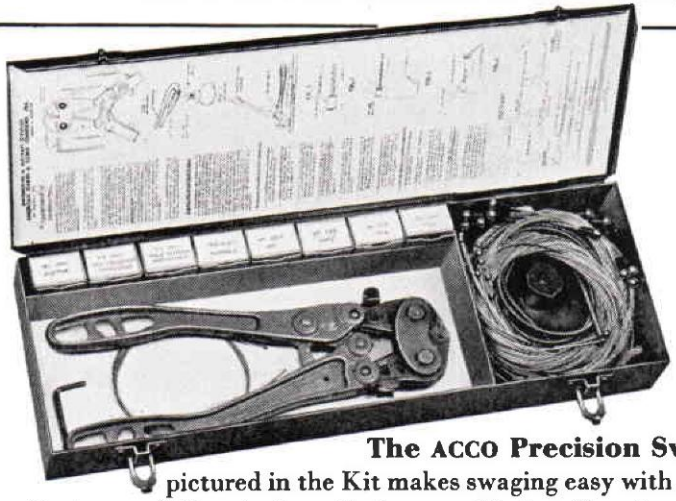

The ACCO Precision Swaging Tool pictured in the Kit makes swaging easy with ACCO Tru-Loc Fittings and Terminals... eliminates soldering. Swaging is unquestionably best... provides 100 per cent bond between cable and terminals... and there is no acid to corrode the cable... no heat to weaken it.

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.

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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

100 Buttons per kit

To assemble—
Insert Cable and Swage

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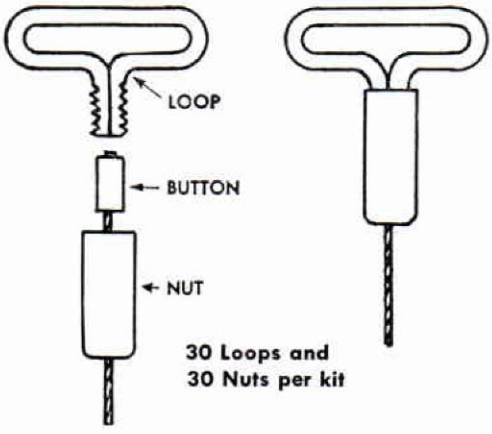
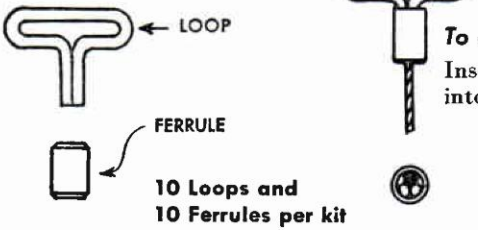


30 Loops and
30 Nuts per kit

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

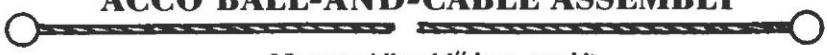
ACCO ELBOW "T" HANGER



10 Loops and
10 Ferrules per kit

To assemble—
Insert Cable and Loop
into Ferrule—then Swage

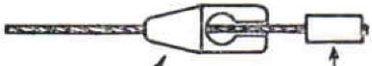
ACCO BALL-AND-CABLE ASSEMBLY

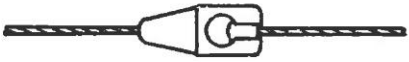


15 assemblies 64″ long per kit

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



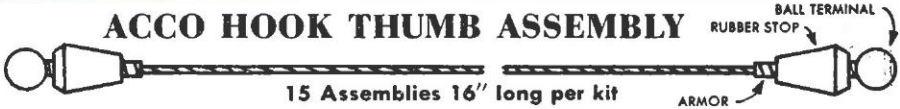


65 Connectors per kit

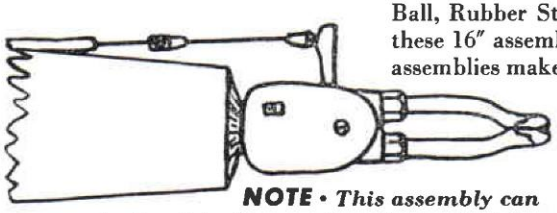
Ball Terminal drops easily into Connector. This Button and Ball assembly is ideal for quick disconnects on Hook and Hand exchanges.

***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.

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Stainless Steel—Designed for use with Standard Retainers

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Orthopedic and Prosthetic Appliance Journal

(Title registered U. S. Patent Office)

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LESTER A. SMITH
Editor

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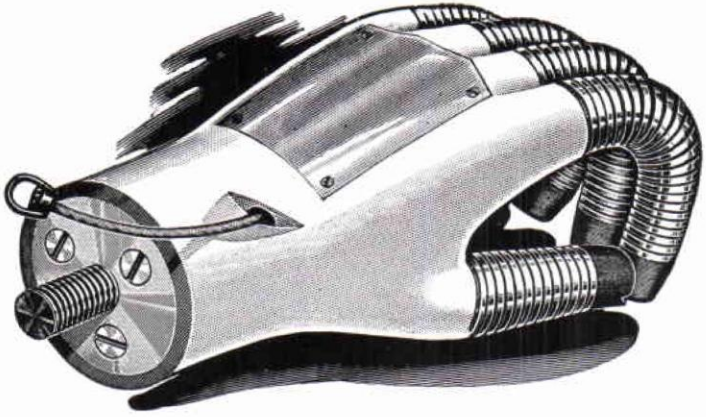
DEPARTMENTS

SEE THE NEW LOCKGRIP HANDS



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

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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.

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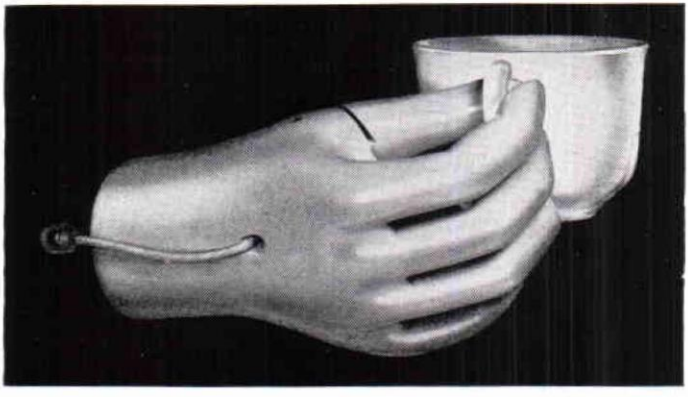

SNAP THUMB

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A Report from The President of OALMA

Time Flies, and here, before we know it, is Assembly Time approaching. Plans for the meeting are shaping up very well, and I know it is going to be a meeting you won't want to miss.

During the year, many of our members have devoted long hours of work to the progress of our Association and our Industry as a whole. I want to thank every one of them for their support of OALMA's program.

Particularly, we should appreciate the Prosthetists who have volunteered to become teachers at the Regional Schools. Carrying out this assignment has meant three weeks away from their shops every time they are called on to teach a Regional School. Obviously, this involves a substantial sacrifice on their part, but one which our Prosthetists are glad to make as a contribution to the progress of the Industry. Therefore, a special bow to these nine Certified Prosthetists who enrolled in this historic "Pilot" School: John J. Bray, Donald F. Colwell, Henry F. Gardner, Charles A. Hennessy, William E. Hitchcock, Alvin L. Muilenburg, George A. Scoville, Howard Thranhardt, William A. Tosberg.

I am sure we will all look forward to hearing further word of the plans for the first Regional School.

Hoping to see each one of you in New Orleans in October,

Sincerely,

McCarthy Hanger, Jr.
President

A Report from The President of the Certification Board

Serving your fellow men is one of the best things that can happen to any individual in this world.

I realize this more and more as the date of the National Assembly approaches.

The New Orleans Assembly will mark the end of a nine year period of active duty as your officer. Yes, it is nine years since I was first elected to the Regional Board of OALMA. It is three years since I was elected to the Certification Board. It is hard to realize that with the coming Assembly my days of active service to all of you are at an end.

However, the natural regret is mixed with a keen satisfaction over the development of the Certification Board. Progress made by our Certified people and the activities of the Board have kept the standards of Certification at an all-time high.

Let me mention just one bit of evidence: There have been over 100 applications for the New Orleans examination this fall. About fifty of these applicants have been found to meet the qualifications and will be taking the two-day examination.

May I take this opportunity on behalf of the Certification Board to welcome these candidates to this year's Assembly. I hope that they will take time after the examination to attend the three-day session of the Assembly.

I shall be looking forward to seeing everybody in New Orleans October 16, 17, 18, and 19.

Louis Trautman

On to N'Orleans!
The National Assembly Opens Oct. 16

The 1955 National Assembly opens October 16 at the Jung Hotel in New Orleans. Advance registration from the United States and the Dominion of Canada indicates that it will be one of the best attended sessions ever held by OALMA.

Instructional Courses are scheduled for October 16, 17 and 18. The Assembly-visitor may register for:

1) Demonstration of the Milwaukee Brace and through its various Stages of Fabrication and its Application.

Dr. A. C. Schmidt and Richard Bidwell, instructors, have scheduled a question-and-answer period for the second session of this Seminar.

2 Making and Fitting the Lower Extremity Prosthesis.

Chester C. Haddan and Lucius Trautman will have valuable material for the two sessions.

3) Brace Problems Related to Mechanics and Fracture Healing.

Dr. Charles O. Bechtol, head of the Department of Orthopaedic Surgery at Yale University, is the teacher of this three-hour class.

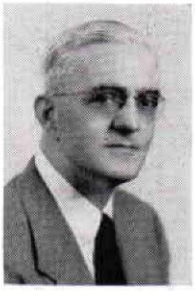
President McCarthy Hanger will preside at the October 17 session. After a group discussion of "Successful Management," a progress report on the "OALMA Brace Dictionary" will be given by W. Frank Harmon of Atlanta, Ga.

Two programs of major importance are scheduled for the morning of October 18:

1. "Bracing for the Arthritic," a report by C. Stewart Gillmor, M.D. and Erich Hanicke, of Kansas City. Discussion will be initiated by Herbert Hart, John R. Cocco and Albert J. Amsterdam.

2. "Prosthetic Appliances for the Child"—based on the work of the Michigan Crippled Children Commission. Appearing at this session will be Carleton Dean, M.D., Director of the Commission, Charles H. Frantz, M.D., Orthopedic Surgeon of Grand Rapids, and John Steensma, Prosthetic Instructor with the Commission.

A. C. Schmidt, M.D.



C. S. Gillmor, M.D.

A demonstration-discussion of Labor-Saving Equipment and Efficient Shop Procedures will be lead by Lucius Trautman of Minneapolis. Among those invited to take part in this "Operations Clinic" are Charles Ross of Washington, Ted W. Smith of Kansas City, Charles Wright of Philadelphia, Fred Eschen of New York, and Carlton Fillauer of Chattanooga.

Dr. Robert E. Stewart, Director of the VA's Prosthetic and Sensory Aids Service, will be interviewed by Glenn Jackson, at a Manager's Conference the evening of October 18. This will be Dr. Stewart's first appearance at an OALMA session since his recent promotion to the post he now holds. The new VA contracts will be discussed.

Professional Success and the new Prosthetics Schools are featured at the final session October 19. E. B. Whitten, Executive Secretary of the National Rehabilitation Association, will discuss "The National Picture in Rehabilitation."

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REMARKS ON "IMPROVING RELATIONSHIPS BETWEEN ORTHOTISTS, PROSTHETISTS, AND ORTHOPEDISTS"*

WILLIAM E. KENNEY, M.D.

Orthopedic Surgeon, Truesdale Hospital; Medical Director, Cerebral Palsy Training Center in Fall River.

The trend in Medicine for sometime now has been for the development of specialties and subspecialties. The advantages of such a situation carry an inevitable corrollary that the specialist soon becomes unaware of the advances in fields other than his own. Those engaged in the profession of making, fitting, and applying braces and limbs are in the process of emerging as an individual and integral part of the field of surgery, and particularly the specialty of orthopedics. In order that the best interests of the patient be served, it is of the utmost importance that orthopedists, orthotists, and prosthetists understand the several basic problems which affect their relationships, one with the other. Such an understanding will create a more efficient and more harmonious cooperation between them with resultant better service to the patient. A presentation of at least some problems may be of help.

Much has been made of the shortage of physicians, but certified orthotists and prosthetists are rarities compared with even such relatively uncommon specialists as orthopedists.

In order for the orthopedist to deal adequately with his patients, he should have access to a certified orthotist. The problem of training and supplying more men in the field of brace-making falls squarely upon the American Board for Certification and the Orthopedic Appliance and Limb Manufacturers Association.

It is not commonly known among physicians that a specialty board for orthotists and prosthetists exists, and that there is a required period of training with regular examinations to be completed successfully. The physician has in mind the bracemaker and brace shop which were (and still may be) relegated to the basement of the hospital in some dingy, out of the way place. He has in mind the braces produced which appeared crude and cruel, and which were used in some mysterious fashion by "cripples." These poor unfortunates wore braces as a badge of some catastrophe or as a cross to be borne, not as something to aid function and to relieve pain. The correction of this misconception is by education of the physician carried out through the various associations of orthotists and prosthetists.

To men in the appliance field, the types, variations, and functions of braces and limbs are of elementary knowledge, but physicians as a rule are unfamiliar with at least several appliances which are available. Furthermore, many doctors do not clearly understand the functions of different braces, nor do they know just what to expect of any given brace. In general they expect more of an appliance than is possible. They are ignorant of its weight, its material, its strength, and its exact capacity to aid function and give comfort to the patient. It is up to the appliance maker to educate physicians along these lines.

As a result of the rarity of certified orthotists and prosthetists, and as a

*Based on presentation made before the New England Regional Council of the Orthopedic Appliance and Limb Manufacturers Association in Boston, Mass., March 1955.

result of the usual lack of knowledge on the part of physicians of the several and special appliances available, the physician sometimes turns to a relatively easy solution; i. e. the mail order house and the standard supports. He has available a firm which will supply, for example, low back braces in sizes A, B, and C, small, medium, and large. He can purchase these by the dozen—and does so. Furthermore, he is supplied with a catalogue in which are pictured several braces. If one seems to be almost, but not quite, what he wants, he proceeds to measure the patient, and order the appliance by mail. It is, of course, clear that he is not so skilled in measuring and in choosing as the orthotist or prosthetist, but at least it appears a make-shift solution to supplying his patient with something. The correction of this problem is an adequate number of skilled personnel willing to measure for and produce the proper brace at the physician's suggestion or prescription.

Appliances are expensive, and any physician with a conscience warns the patient on this point. The bracemaker complains that after he has given of his time, and utilized his material, and adjusted the appliance, it is not, in fact, too expensive. There is no disagreement on this point. Braces are not *too* expensive, but the patient still is faced with an expenditure which to him seems a great deal, in fact sometimes excessive, or even prohibitive. It is a good policy for the physician to know approximately how much a brace will cost. It is good policy then to present the matter to the patient and to refuse to order a brace until the patient agrees to pay the estimated cost, or until some other source of funds is found to cover the cost. Furthermore, if the physician has made a gross error of judgment and has ordered a brace which is unsuitable for the situation, he should pay for the brace himself so that neither the orthotist nor the patient is penalized for his mistake. Such a principle would help the physician to exercise special care in deciding if, when, and what type of brace is indicated. Still in the same vein, it seems only fair that the patient be willing to pay in advance for a brace provided he will be refunded his money if the brace is found unsuitable due to an error in judgment of his physician.

Common Errors

There are a group of common errors which plague both the orthotists and the orthopedists. Careful attention to detail can help to reduce the frequency of such mistakes. For example, a brace may be applied to a shoe, the sole of which has of necessity been increased in thickness. The opposite normal sole remains of the original thickness. A discrepancy in leg lengths has resulted where attention to detail and some forethought would have prevented the situation from having occurred. At times a brace is applied to a shoe with the obvious intent of preventing foot-drop beyond 90 degrees with the leg. The caliper is inserted in the heel so that motion is present, sufficient in degree, to defeat the purpose of the brace. Sometimes braces are inserted into the heel in such a manner as to exert an undesired rotary force upon an entire extremity which the patient complains of and which is quite difficult to detect. Repeated breakage of an appliance is annoying to the patient and physician and wipes out the profit of the orthotist. The value of the attention to detail is obvious.

One of the most important roles of the orthotist and prosthetist is being developed in clinics, rehabilitation centers, and training centers. Attendance at such clinics and training centers many times is regarded as a very unpleasant chore by the orthotist, and he frequently has upsetting, frustrating, and distasteful experiences in such clinics. All too

often he is treated by the physician in a disdainful and haughty manner. Sometimes he is requested to produce a brace which he knows is inferior to one with which he is familiar, but he may not dare to suggest the alternative to the physician. It is all too common that the physician will criticige a brace, its functioning, and the brace-maker in front of the patient with or without the orthotist present. Amelioration of the situation can come only by understanding several facts by physicians and orthotists.

First, the physician should take the responsibility of the total care of a given case. It must be his final decision as to when, if, and what type of brace or prosthesis is to be used. In making that decision, the physician has a fund of facts about the individual patient which the orthotist does not usually have. The physician might be aware of a deep-seated psychological resentment on the part of the patient against the type of brace which would be conspicuous, or he may know of certain family conflicts regarding braces where father and mother are divided over acceptance of bracing, or disability, or even the diagnosis of a child's condition. The physician may have knowledge of the family's finances unknown to the orthotist. The physician should have a better knowledge of the disease process or disability and its possible future developments than the orthotist. In making his decision, then, the physician should draw upon several facts. His decision may seem arbitrary and somewhat stupid to the orthotist but (please be tolerant), if all the facts are known, the decision might appear more rational.

Second, physicians are human beings upon whom extraordinary responsibilities are not infrequently thrust and as human beings they can be distracted by worry regarding not only the case they are presently seeing but also by several other cases which are simultaneously on their minds. Consequently, at times, the physician appears to be short tempered, and if he is abrupt in dealing with an orthotist, remember that the doctor may be acting so merely because of anxieties rushing in upon him.

WILLIAM E. KENNEY, M.D.

Dr. Kenney graduated from the Arts and Science course at Harvard and took his degree in medicine at Yale University in 1941. He served as instructor for orthopedic surgery at the Yale University School of Medicine from 1943 to 1946. Since 1948 he has been orthopedic surgeon at Truesdale Hospital in Fall River and Medical Director of the Cerebral Palsy Training Center.

Third, the doctor is very conscious of maintaining the confidence of the patient in him as a doctor and in the program of treatment prescribed. Nothing should be allowed to cast doubt in the patient's mind about the competence of his doctor or the treatment program. If an orthotist suggests a brace different from the one prescribed, particularly if done in an undiplomatic manner and in front of the patient, hostility on the part of the doctor can be expected. A peremptory order that so and so be done may be anticipated by the orthotist.

Fourth, it is well to realize that physicians are not trained in brace work and in types of braces. Education of doctors by orthotists along these lines skillfully done, diplomatically carried out and almost insidiously suggested might do a great deal for improved relationships. A poor choice of appliance might mean nothing more than his own ignorance of available products, and some of his quick temper might (understandably) be on the basis of his

feeling of insecurity in the appliance field.

Fifth, realize that doctors, as a rule, are unaware of the time and type of training necessary to qualify as an orthotist and prosthetist. It is up to the individuals in the profession to make these facts known to the medical profession, particularly to orthopedists, and by individual standards of behavior to demonstrate themselves as of professional level ready to do service and not simply as salesmen ready to increase their business.

One Solution

The above problems of relationship between orthopedists and orthotists have been worked out on a practical basis at the Cerebral Palsy Training Center of Fall River. Specific reference is now made to the Cerebral Palsy Training Center of Fall River because at this institution the author has his most intimate contact with an orthotist and because the experience at this training center might suggest at least one way of solving certain of the basic problems under discussion. Undoubtedly many other solutions are possible which may prove either as satisfactory or perhaps even better. Be that as it may, at the Training Center the orthopedist is the medical director, i. e., there is a single administrative and professional head. The majority of the patients are children who have cerebral palsy. Excluding doctors, the staff consists of a speech therapist, an occupational therapist, a physiotherapist, a crafts worker, and a Public School teacher (engaged in special teaching). To this paid staff, an orthotist has been invited. He is regarded as one of us. The first Monday of every month, the orthopedist spends the whole day at the Training Center with the staff checking the patients, noting improvements, redirecting lines of therapy, etc. The entire staff assembles in a room and each individual case is discussed before the patient is brought in. Every member of the staff, including the orthotist, expresses his opinion regarding the patient. At this time the orthotist has every opportunity to state what type of brace he recommends, if any, and his reasons for his opinion. In this way, he can not feel frustrated; he has had a chance to educate the doctor regarding the various appliances available; he has not angered the doctor by an undiplomatic maneuver; he has not endangered the patient-doctor confidence, nor the confidence of the patient in the bracemaker.

The doctor then makes a tentative decision having the advantages of all the opinions expressed. He also defends his tentative decision with his reasons. The word "tentative" is used because examination of the patient may reverse the decision. The patient is then brought in and examined in the presence of the whole staff. If a brace is to be applied, the orthotist then proceeds to measure the patient and to give an estimate of the price. Financial arrangements are made at the time to cover such cost either through agreement of the parents to pay or by application to various charitable organizations for assistance. If there is any complaint regarding the functioning of a brace, or any adjustment to be made, such are carried out courteously, openly, sincerely, and without rancor or recrimination right on the spot with the staff, patient, and orthotist all present.

The Medical Director of the Cerebral Palsy Training Center of Fall River dares to say that the orthotist considers this day a month as a pleasant day in which he has been treated courteously, and during which his knowledge and services have been utilized as a part of a team whose job is better service to the patient.

Every month the parents of the patients and the staff meet at the home of the Medical Director to discuss any general problems which

concern the running of the Training Center and any problems they may have individually. The orthotist is of course invited to attend so that he may become acquainted with the parents and so that he may give them advice regarding the braces on their children and what to expect of the appliances, and when they may be ready for use, etc.

Summary

In summary, the group of orthotists and prosthetists are emerging as a special group seeking recognition. Several problems of inter-relationships between them and the medical profession, particularly the orthopedists, have been touched on. To improve the general situation, an understanding of several different viewpoints is needed. The orthotists and prosthetists must understand that: (1) Doctors have many facts in mind when they request a certain brace and that they must take the responsibility of decision; (2) doctors can be burdened by anxiety and some of their abruptness might be sympathetically excused because of it; (3) the confidence of the patient in his physician as well as in the orthotist should be protected by the behavior of both professional groups; (4) physicians are not trained in brace work and diplomatic education by orthotists would be helpful; (5) many members of the medical profession are unaware of the training of certified orthotists and it would be well to inform them of it.

On the other hand, physicians must learn: (1) to treat orthotists courteously as members of a team; (2) not to regard orthotists simply as salesmen, but as people of professional level ready to serve patients: (3) to depend on orthotists for advice regarding types and functions of braces and for the measuring of braces: (4) to expect greater production of skilled personnel; (5) to expect greater attention to detail to combat common errors that plague both professional groups.

"What's New(s)"

• *Clyde A. Aunger* is currently serving as President of the Arizona Automobile Association. He was one of the delegates to the National Convention of the Association in Washington on September 18-22.

• *Charles A. Hennessy* of Los Angeles has been elected President of *Active International*, a young man's service club devoted to the aid of cerebral palsy cases. He has long been a member and originated the club's motto "A Man never stands so high as when he kneels to help a child." Mr. Hennessy is President of the Peerless Artificial Limb Company, and is serving his first term as Second Vice President of OALMA.

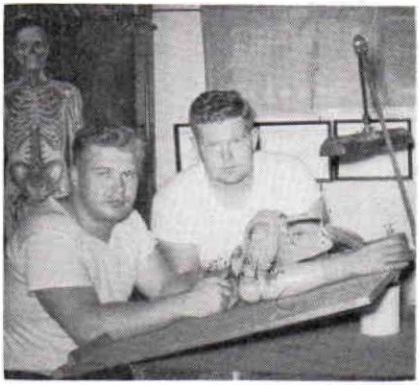
• *The Freeman Manufacturing Company*, new Associate Member of OALMA, was established in 1891 and has been continuously in the surgical and orthopedic appliance business since that time. It is now operated by George F. Freeman, President and Richard L. Freeman, Secreary-Treasurer. The company is now located in Sturgis, Michigan, having moved from Detroit in 1934. It is housed in a large modern steel and concrete block plant and employes several hundred people on a steady year-round basis. The products include orthopedic braces and other surgical supports of the corset type. Other products are elastic hosiery and elastic fabrics. Products are marketed to orthopedic dealers and other eithical surgical stores over the entire United States.

Abduction for Shoulder Disarticulation Prosthesis

William E. Hitchcock, C.P.

President, Boston Artificial Limb Company

Shortly after returning from the Upper Extremities School at University of California at Los Angeles, several shoulder disarticulation prostheses were prescribed by the various participating clinic teams in this area. These were fabricated in the usual manner, with standard forearm, humeral section, and shoulder cap. (These sections were fabricated in one piece, or laminated separately with mating sections in each, called bulkheads. These were fastened securely together.) The forearm lift and terminal control were operated by scapular excursion. The elbow lock could be controlled by several methods, a perineal strap, chin nudge, or by an additional loop to the un-amputated shoulder at a higher level than the chest strap. The perineal strap operated the elbow lock by a cable which passed over a pulley or curved housing on the shoulder cap and distally to the elbow unit. Elevation of the shoulder actuated the lock. This system was undesirable because the strap length had to be changed as the amputee assumed different positions i.e., standing, sitting, also because of awkward motions involved in operation. The chin nudge control was quite simple in that very little amputee training was necessary, but it was bulky in appearance. The amputee actuated the lock by depressing with his chin a button located on the anterior superior border of the shoulder cap. The remaining elbow lock control system, opposite shoulder loop, is possibly the most desirable. The only disadvantage to this system was the inability of some amputees to differentiate between the two rather similar motions involved in locking the elbow and forearm flexion.



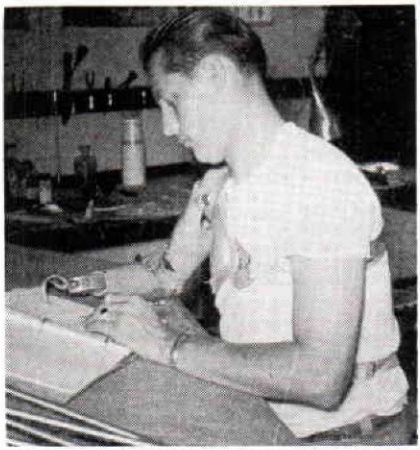
Robert N. and William E. Hitchcock.

Not long after fabricating and fitting several of these prostheses, we began to receive comments from the amputee such as, "I'm having difficulty in learning to operate my elbow lock," or "I can't get the forearm of my prosthesis on the desk to hold my papers," and "I have difficulty in putting on my shirt and coat with my prosthesis on." This type of complaint became quite common among our Shoulder Disarticulation Amputees and it became increasingly apparent to Bob* and me that we should do some thinking along these lines.

The most urgent problem was that of designing an abduction joint at the junction of the humeral and shoulder cap sections. This would allow the forearm to lie flat on a desk while sitting and to some degree solve the problem of dressing. On most cases the axis of the joints passes through a portion of the remaining shoulder

*Robert N. Hitchcock in Vice President of the Boston Artificial Limb Company, Inc., and conceived many of the technics herein discussed.

stump, so this precluded the use of a "thru-bolt" type of assembly. Because of this a small compact child's size Below Knee joint was indicated. We decided that the axis of these joints should not be exactly parallel with the sagittal plane but inclined anteriorly so that the humeral section would describe an arc anteriorly as well as laterally when abducted. (Our experiments showed that an angle of from 15 to 20 degrees to be optimal angle of inclination.)



When the prosthesis is fabricated with an abduction joint the forearm is permitted to lie flat on the table.

After the type and location of the joints are determined, they are placed on the laminated shoulder cap. This lamination has been fabricated in the usual way, following the contour of the stump, and forms the inner shell of a double wall shoulder cap. The joint heads are held in proper alignment by a spacer rod, which is cut to length, drilled and tapped for machine screws at each end.

A negative template for the outer contour of the shoulder dome is made from 1/8" aluminum or other suitable material. This template will be from 4" to 6" in diameter, depending on distance between the joint heads and have a radius of from 2-3/8" to 3" depending on the site of amputation and extent of atrophy in the amputated shoulder. (An accurate anterior-posterior drawing is taken of the entire shoulder area. From this, the difference in contour and hence the template radius becomes apparent.)

The wax may now be applied by building a paper cylinder and pouring in the molten wax. (Always allow the wax to cool to 150 degrees F., before attempting to pour a build up. The wax may be applied with a spatula if wax is cooled to 125 degrees F.) When the wax has hardened, it may be shaped into a hemisphere using the template. The remaining areas of the shoulder cap not covered by wax should be roughened to insure proper bonding of the outer lamination. The portions of the joint heads which are to remain exposed should be suitably protected from the resin. This may be done by coating with silicone compound, (Dow Corning #DCa) or by a wax dip. Protect joint heads with wax only if promoter is used.

The 4 to 6 outer layers of stockinette are now added and the impregnation completed in the usual way. (Before placing laminate in curing oven, be sure to make a small hole (1/8"), in the under side of the dome for a wax escape.)

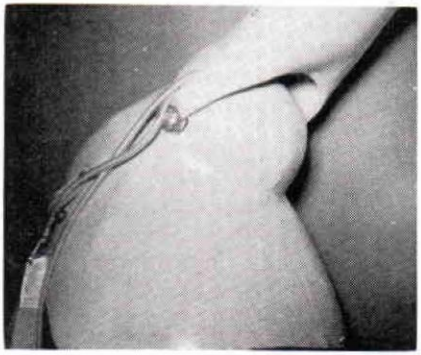
The fabrication of the humeral section is fairly simple. A paper cylinder is made of the correct humeral length with the elbow turntable at one end and a male template of the dome at the other. This cylinder is sealed with tape and poured with wax. A 1/2" dowel is inserted at the proximal end through the template for ease of handling during lamination. When the wax has cooled and the paper removed, appropriate grooves are made in the proximal end for the lower joint straps. Care must be exercised to keep the heads of the joints in proper alignment, and at the same distance apart so as to mate properly with the shoulder section. This may be assured with a spacer rod. When these are in place and the

entire humeral section shaped to a pleasing contour, the laminating again is carried out in the usual manner. After curing and trimming, the prosthesis is assembled.

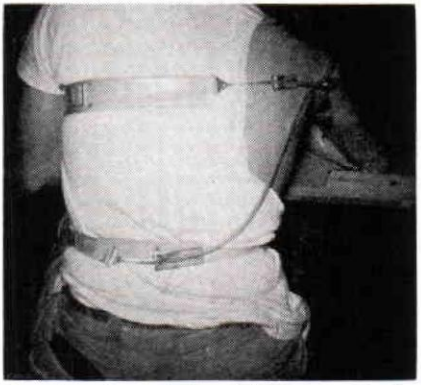
Thus we overcame one of our most difficult problems and we now turned our attention to some way of improving the control system. Here the problem was one of obtaining sufficient excursion to elevate the forearm to the face level (135 degrees) and then operate a terminal device. We noticed that at the mid-scapular level where we had our chest strap, the average amputee had more than enough force, but a limited amount of excursion. A simple 2:1 pulley system was indicated. The pulley was placed in the control system. This increased the amount of force required to operate the terminal device, but also gave us two times the amount of harnessable excursion. In our first models the pulley was placed on the proximal end of the control cable at the mid-scapular level and incased in clear plastic tubing. This system enabled the amputees who could not get sufficient excursion, to operate a terminal device. A further refinement was to place the pulley within the humeral section itself. It may be well to note here that any control cable originating in the humeral section and passing to the shoulder cap over the abduction joint must pass through a housing which is secured at each end. This is done so that when the arm is abducted the cables will be free to operate without sharp bends.

Our remaining problem was to design if possible an easier way to operate the elbow lock.* Any control system must meet three basic requirements:

A. Ease of operation.



Posterior view showing forearm lift, and terminal devise control, and elbow lock control by abdominal band.



Posterior view of the abductive prosthesis. Note that the control cables pass out of the humeral section as close to the joint head as possible.

B. Must be inconspicuous under clothing.

C. Position of the amputee must not affect operation.

Most of the elbow units in use today require a travel of $\frac{3}{8}$" to $\frac{1}{2}$" to operate the lock, so we had to find some place where we could obtain the necessary excursion. The lower extremities were ruled out because of the length differential in the control cable when the amputee assumed a sitting position. The opposite shoulder control was not desirable because of the similarity of motions previously mentioned. At last, we decided to see how much excursion could be harnessed around the abdomen. To our surprise even thin pa-

*In the case of shoulder disarticulation with pectoral cineplasty, this problem is resolved with the use of an inertia type elbow lock. Here the scapular excursion operates the forearm lift and elbow control. The terminal device is operated directly by the cineplasty tunnel.

tients whom we tested had an excursion of upwards of 2" (We had 4" each). Here we felt was a good site to attempt control. A 1½" Vinyon abdominal belt was made with a buckle in front and the entire posterior third of 1" elastic webbing. The standard elbow lock control cable was replaced with one long enough to reach the waist level, and placed in a plastic covered housing. The housing emerged from the humeral section near the head of the abduction hinge. The entire control cable assumes an "S" shape terminating at waist level. A "T" bar is installed on the housing and a hanger soldered to the cable end. This arrangement enables the lock to be operated when the circumference around the abdomen is increased. This type of control has been used on several cases to date and has proven satisfactory. I believe the procedure herein described represents a definite improvement in the fabrication of shoulder disarticulation prosthesis, however, it is by no means the final answer to the difficult problems in this the most challenging field of upper extremity prosthetics.

OALMA Elects New Regional Directors New Board Takes Office at Assembly

In a secret mail ballot the members of OALMA have picked the eleven regional directors who will hold office for the year beginning October 19. The new directors will be formally installed in office at the OALMA Assembly Banquet in New Orleans.

Five of the directors are newcomers to the Board and will be guests at the luncheon meeting of the outgoing officers October 15 at the Jung Hotel.

In announcing the election results, OALMA Director Glenn Jackson, paid tribute to the voters wisdom, declaring that the eleven men chosen all met essential qualifications as a good Director.

The membership of the new Board and the states they represent are:

Region I. (New England States) *Karl W. Buschenfeldt* of Stoughton, Mass.

Region II (New York and New Jersey) *John A. McCann*, of Burlington, New Jersey.

Region III (Pennsylvania, Delaware, Maryland, District of Columbia and Virginia) *Charles W. Wright* of Philadelphia.

Region IV (North and South Carolina, Tennessee, Kentucky, Mississippi, Alabama, Georgia and Florida) *D. A. McKeever* of Atlanta, Ga.

Region V (West Virginia, Ohio, Michigan) *Paul Leimkuehler*, of Cleveland, Ohio.

Region VI (Eastern Missouri, Illinois, Indiana, Wisconsin) *McCarthy Hanger, Jr.* of St. Louis, Mo.

Region VII (Minnesota, North and South Dakota, Wyoming, Western Missouri, Nebraska, Iowa, Kansas, Colorado) *Robert Gruman*, of Minneapolis, Minn.

Region VIII (Texas, Oklahoma, Western Louisiana, Arkansas, New Mexico) *James D. Snell* of Shreveport, La.

Region IX (Southern California, Arizona) *Arthur Ritterrath* of Los Angeles, Calif.

Region X (Northern California, Nevada, Utah) *Matthew Laurence*, of Oakland, Calif.

Region XI (Washington, Oregon, Idaho, Montana) *L. C. Ceder*, of Tacoma, Washington.

PRACTICAL CONSIDERATIONS IN THE FITTING, USE AND CARE OF CORRECTIVE AND SUPPORTIVE BRACES

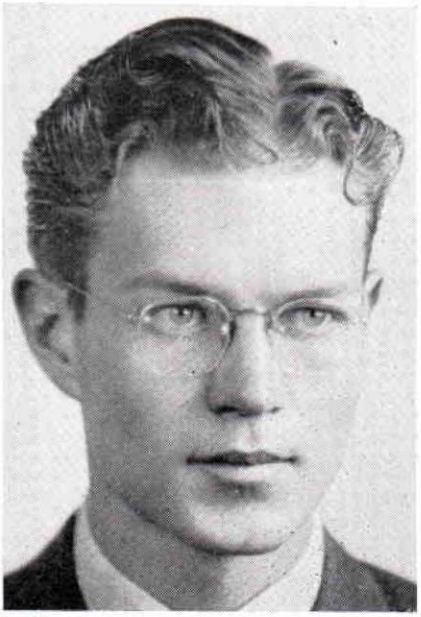
ALBERT E. CORFMAN, JR.
Certified Orthotist

Orthopedics is defined as all work pertaining or related to the prevention or correction of physical deformities. Or, as a noted anthropologist explains it, "The specialty known as Orthopedics deals, in some degree, with bodily difficulties due to man's imperfect adaptation to an erect posture and to a biped mode of progression."

It might be well to explain the bracemaker's part in orthopedics. A bracemaker who has completed his training and has successfully passed his examinations becomes a Certified Orthotist. He then is a member of the team of physician, physiotherapist, and orthotist who work together for the betterment of the handicapped patient. The physician is directly responsible for all decisions and treatment. The orthotist, in turn, is responsible to the physician and must, accordingly, follow his directions explicitly as to bracing the patient.

There can be no over-all specifications for braces. Each case is unique and must be treated as such. Braces are made for each individual patient to accomplish exact requirements. A brace which does not fit or accomplish precisely what the doctor prescribes can frequently hinder a patient's progress rather than help him.

The bracemaker must make the patient's appliance perform the functions for which it is intended. The brace must be fit carefully as to contour, alignment and location of mechanical parts corresponding to anatomical land marks and joints. The brace should be strong, yet light as possible, neat in appearance and easy to manage. Particular care



The Author

should be extended by the bracemaker to familiarize the patient with the proper manner in which the brace should be worn for best results as well as proper care and maintenance.

Braces are generally classified as either supportive or corrective—supportive in the case of fractures and weaknesses which require additional strength, and corrective when a deformity either exists or appears likely to occur. A brace alone can not correct a fixed deformity, especially in an older patient. However, proper bracing can frequently arrest an old deformity and prevent it from progressing. Young patients can usually tolerate correction more readily and early bracing can sometimes eliminate subsequent surgery. On many occa-

sions, corrective surgery followed by bracing has proven satisfactory.

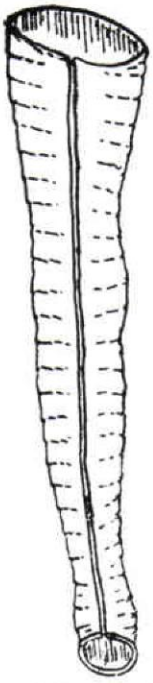
Supportive bracing for leg fractures is generally effective. A light cast is usually made over the patient's leg covering the fracture area where support (Figure Ia) is required. The cast is then removed from the patient, filled with plaster and allowed to harden. Then the outer, or original, cast is removed leaving a positive model of the leg. Leather is soaked and molded over the cast and allowed to dry giving a legging, or cuff (Figure 1b), which corresponds perfectly to the patient's leg. This legging is attached in position on the brace (Figure 1c) and secured to the patient with lacing. The brace can be made to extend well up under the ischial tuberosity so that in standing or walking less pressure is exerted downward through the leg thus further helping to protect the fracture. The knee joints can be equipped with locks which will hold the leg rigid while bearing weight, and can be released to allow the patient to flex his knee in sitting. The locks can be removed when the patient has recovered sufficiently to walk with normal motion of his knee. Provisions can be made at the ankle joint to allow as much, or as little, ankle motion as indicated.

In some instances where extremely tight hamstrings result from long confinement in a cast carried in knee flexion, the patient is sometimes unable to straighten his knee despite treatments of heat and massage. An attachment can be added to the leg brace just under the knee consisting of serrated discs (Figure 2) which fit closely together and are secured with screws. The screws can be loosened from time to time and the discs rotated slightly to progressively straighten the knee as the hamstrings relax.

Leg braces are constructed of steel or aluminum. Steel is heavy but affords strength and durability. Aluminum has the advantage of being light but is somewhat weaker and is more subject to wear. The material selected for a brace depends on the weight of the patient and the type of work in which he is engaged. A big man performing heavy work will exert tremendous strain on a brace. A strong steel brace heavily banded with double locks might be indicated. On the other hand, a slight patient who will be seated most of the time will be able to manage with a much lighter single lock brace. It is interesting to note that a brace equipped with locks on both knee joints, although sometimes somewhat more difficult to manipulate, affords much more stability than a single lock which subjects the brace to torsion or twist due to one knee joint being held rigid while the other attempts to function as a free joint.

Oftentimes corrections of various natures are needed. Leg braces can be made with spring type ankle joints to counteract toe drop conditions due to tight heel cords. This type of ankle joint will give the patient normal ankle motion, yet prevent him from dragging his toes and scuffing his shoes. The stretching action working on the tight heel cord is also beneficial. Sometimes the doctor will prescribe a brace of the adjustable "toe up" type to be worn at night which is used in conjunction with the walking brace to consolidate gains made on the heel cord through the day.

Shoe wedges and ankle straps sewn to the shoes are attached to prevent ankles from turning inward and outward. It should be noted that when wedges are employed, they should be attached between the stirrup and the shoe rather than on the base of the shoe heel as it is desired to tilt only the foot and not the complete brace. Shoe buildups and extensions are required when one leg is shorter than the other and there is no hope of equalizing the length of the legs.



wrap cast (over stockingette) to be filled with plaster

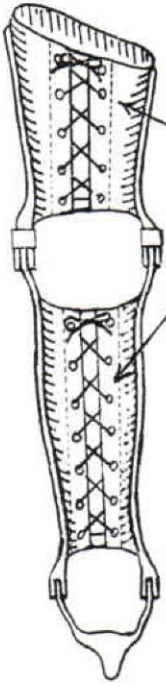
narrow strip of felt down front to help in cutting cast

Figure 1a

pipe inserted in plaster to facilitate handling

leather molded and tacked to positive cast

Figure 1b



cuffs lined with horsehide (tongues and eyelets added) and attached in position on brace

Figure 1c

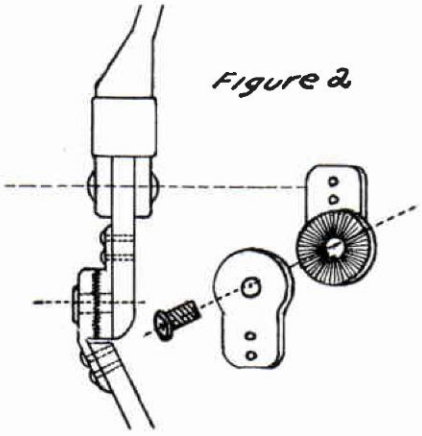


Fig. 2. Serrated discs attached to leg brace just under knee joints.

Knock knee, bow leg, flexed and hyperextended knees are controlled with braces equipped with pull straps and pads which oppose the deformities. Internal or external rotations of the leg through the hip joint are corrected with the addition of a pelvic band joined to the leg brace with a hip joint either free or the lock type as prescribed. The pelvic band lends additional stability and enables the leg to be held in proper position. Another simple arrangement to oppose leg rotation is the so called "twister" which consists of elastic webbing which is sewn to the forepart of the shoe, then spiraled either clockwise or counter-clockwise as the correction requires, around the leg and joined to a light webbing pelvic belt. The "twister" is particularly effective with children's leg rotations which can be held with mild correction.

Tibial torsion, evidenced by a rotation of the knee inward with the foot turned inside the normal line of progression, is corrected by offsetting the ankle joints of the leg brace with the inside joint carried forward in relation to the outside joint and aligned with as much outer rotation (Figure 3) as necessary to bring the knee back into normal position and remedy the twist in the tibia.

When man assumed the erect posture he took a lot upon himself and put an awful strain on his back. Because of man's massive super structure, a tremendous burden is placed on the thin line or vertebrae relied on for support when he stands or walks. Then, when muscle weakness, softening of the spine, or constant poor posture prevail, man's already overworked spine becomes even more vulnerable to trouble.

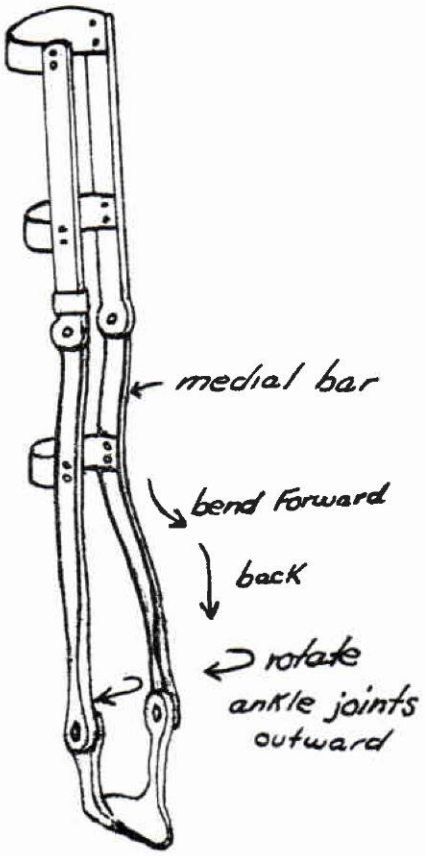


Fig. 3. Right long leg brace.

A normal person's back, from hips to head, consists of three gentle basic curves (Figure 4a) which compensate for each other and are needed for balance. These are the lumbar curve forward, the dorsal curve backward,

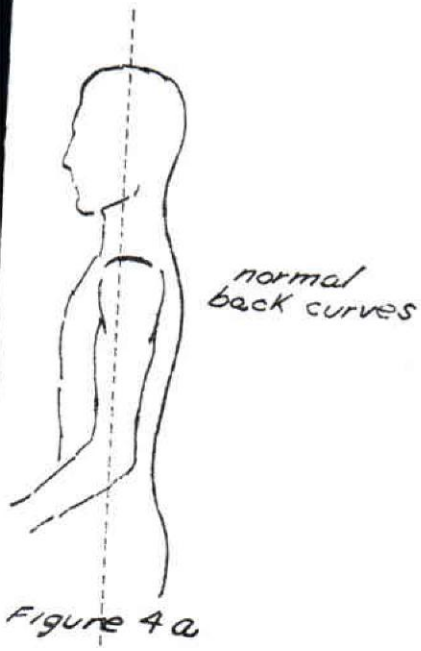


Figure 4a

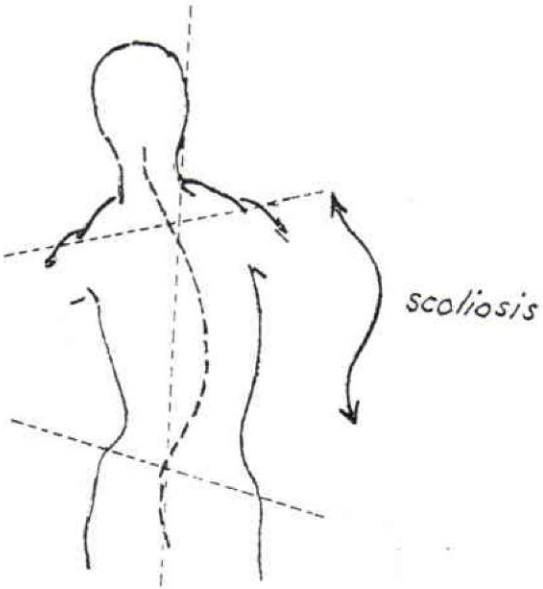


Figure 4d

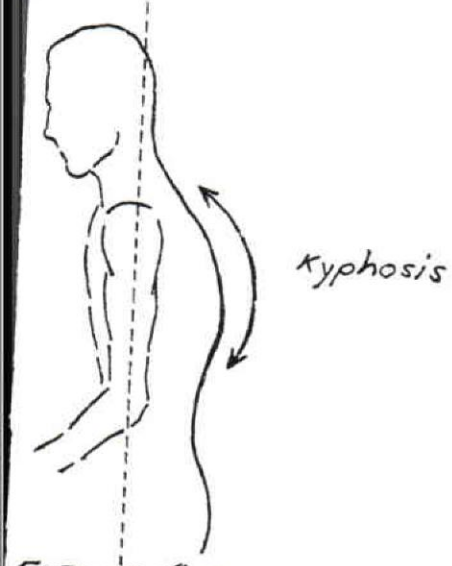


Figure 4c

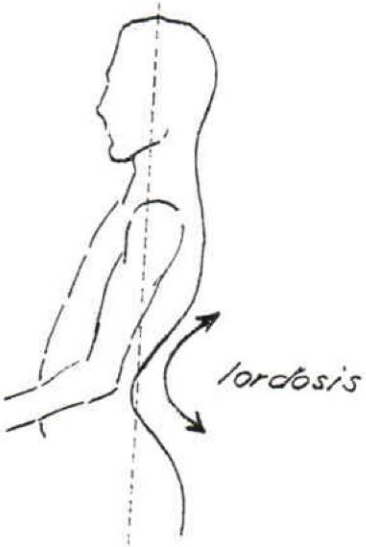


Figure 4b

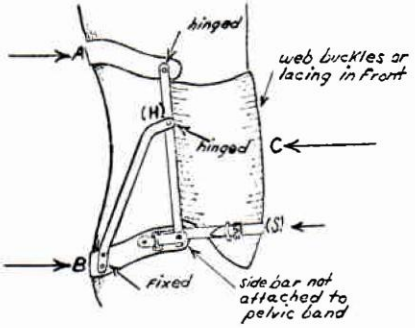


Fig. 5. Low back brace using "3-point" principle in lordosis. Corset drawn tight in front (Force C). Strap (S) works hinge (H) pulling dorsal band (Force A) and pelvic band (Force B) forward in opposition to Force C.

and the cervical curve forward. The keystone, or most important area of the back is the lumbo-sacral angle or the angle at which the sacrum and pelvis is related to the lumbar spine. This angle is important because of the effects it has on the spine above. For example, if the pelvis is tilted forward due to tight hip flexors, an exaggerated curve in the lumbar region is required for balance. Acute spinal curves can cause discomfort and possible injuries such as pinching of nerves, displacement of discs, and actual wear on the edges of the vertebrae.

Corrective types of backbraces (Figure 4b) are designed to oppose spinal deformities such as lordosis (commonly recognized as extreme sway back), kyphosis (Figure 4c) (humpback), and scoliosis (Figure 4d) (lateral curvature of the spine resulting in a pelvic tilt which causes the illusion of one leg being shorter than the other).

In most cases of corrective back bracing, a three point principle is in effect. It is necessary to direct pressure above and below the curvature or deviation, while a counter pressure is exerted in the opposite direction between the first two. As an example, in the lordosis deformity, pressure is directed with a pelvic band against the sacro-lumbar area and with a dorsal band across the lower thoracic region while a corset front presses against the abdomen (Figure 5) tending to straighten the forward lumbar curvature.

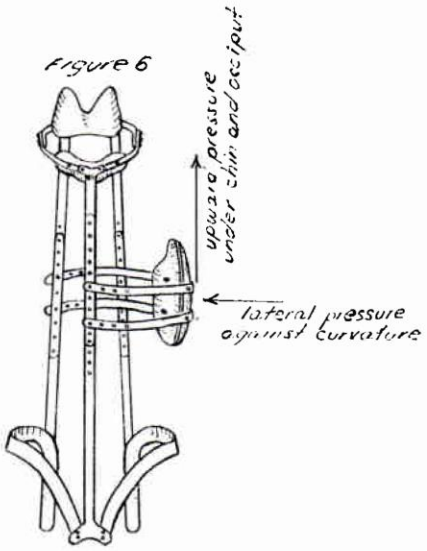


Fig. 6. Extension brace for scoliosis.

Lateral deformities of the spine are also corrected with the three point principle (Figure 6) or by vertical traction coupled with lateral pressure exerted against the curvature. In this type of bracing the hips are held securely and traction is applied either under the arms or to the occipital region of the head and under the chin. An adjustable pressure pad or pull strap arrangement is used to supplement the traction and to oppose the lateral deformity.

Supportive back braces are used in fractures, compressed vertebrae, disc displacements and spinal fusions. There are any number of different backbraces, but the two most frequently used are the Taylor and the Knight or "chairback" brace. The "chairback" brace (Figure 7) used for low back conditions is usually about 10 inches to 12 inches long and

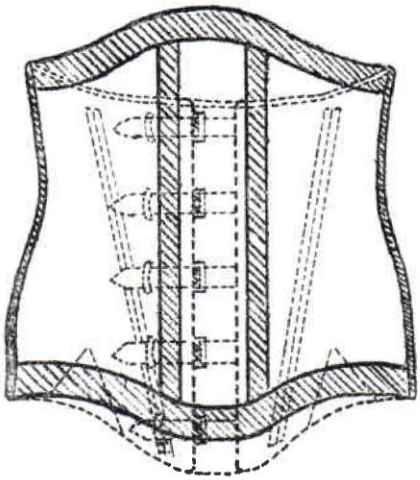


Fig. 7. Chairback spinal brace with corset front.

consists of a pelvic band, two back bars, two side bars and a dorsal band making the appearance of the brace somewhat similar to the back of a chair. It is held in position with a corset front.

The Taylor (Figure 8) brace supports the thoracic or dorsal spine as well as the lumbar and consists of a pelvic band and two long uprights on either side of the spine extending well up to the shoulders. It is held in position with an apron front and shoulder straps.

Back braces sometimes have a tendency to work up higher on the back than is good for either support or comfort. If this happens, peroneal straps may be added to hold the brace down securely in the proper position.

The metal framework of these braces is usually of aluminum which keeps the weight of the brace to a minimum and still affords sufficient strength. The inside of the brace is covered with felt padding and horsehide, and the outside with elk or calf hide which makes the appearance of the brace neater and protects clothing from metal wear against the back of chairs. The fronts, or aprons of braces are made of various types of corset material or merely canvas.

Back support can also be attained with orthopedic corsets and belts such as sacro-iliac belts, lumbo-sacral and lumbo dorsal corsets depending upon how much support is required. These types of supports have ample take up for adjustment and are reinforced with bones or stays for rigidity.

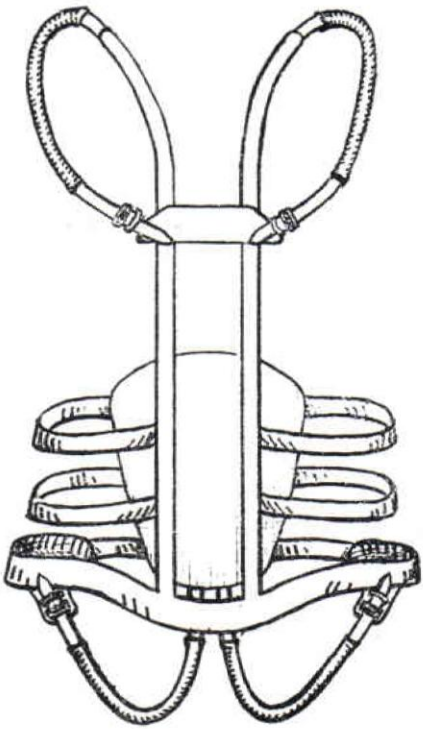


Fig. 8. Taylor spinal brace with apron front and peroneal straps.

Neck or cervical supports and braces are many and varied as to the purpose in mind. The simplest type of mild traction and support is the Schanz, or felt, collar, which is merely a wedge-shaped piece of thin white felt five to six feet in length, about five inches in width at one end tapering to two inches at the other.

This is wrapped around the neck starting with the narrow end and is held in place with straps.

Another simple type of neck support is the duck collar which is made of leather and lined with felt and goes around the neck supporting under the chin and the occipital area, and is strapped in position.

When active traction is desired, a turnbuckle arrangement mounted to chest, back, chin and occipital pieces (Figure 9) is often used, called the Forrester collar. The proper amount of traction may be attained by lengthening the turnbuckles. It should be kept in mind when applying neck supports that the chin should be carried fairly low with most of the pressure under the occipital area to give maximum traction. Forcing the chin too high actually compresses the cervical vertebrae rather than extending them.

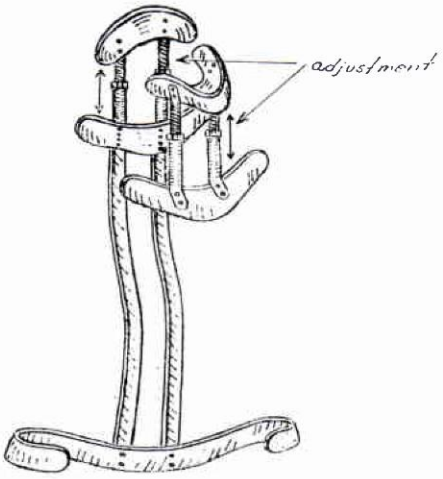


Fig. 9. Forrester cerival collar mounted to spinal brace.

Braces properly fitted and used intelligently, will protect weak muscles as they grow stronger, keep an arm or leg from growing out of shape, and enable the patient to perform all sorts of functions he could never manage without a brace. However, bracing is also expensive, so certain precautions in the way of brace care and maintenance should be observed so that additional expenses can be held to a minimum. It pays to give a brace the very best treatment and attention. Patients should, under no conditions, attempt adjustments to their braces themselves. However, there are many things they can do to keep their braces in good working order.

There is a constant tax on brace joints and locks. Besides the wear and tear of use, lint and dust have a way of gathering on braces, especially in the moving parts, and causing damage by clogging. Keeping a brace free from dirt is all important.

The oil can is the leg brace wearer's best friend. A drop or two of oil on the joints periodically will keep them working smoothly and freely without annoying squeaks and rusting. Excess oil should always be wiped off to prevent soiling of clothing.

Children's leg braces are usually of the extension type so that the brace may be lengthened from time to time to keep pace with the child's growth. It is important to keep all screws tight at all times to prevent weakening of the brace. It is a good idea to have on hand screws of the right size in the event any become worn or lost. Some patients have found keeping a small kit of essential parts and tools handy is good insurance. Ordinarily, however, a few extra screws, a screw driver, shoe laces and some foam rubber to insert in pressure areas which might develop, will see them through emergencies until they can contact their brace man.

Shoes worn on braces must be watched carefully. Heels sometimes are allowed to wear down so that the metal framework touches the ground. Even a slight wearing of the heel may alter the position of the brace and throw knee and hip out of line. If soles and heels are wedged or elevated, they should be kept exactly as

prescribed, otherwise the corrective measures will be lost.

The leatherwork on a brace is most apt to deteriorate quickly. Perspiration and moisture are hard on leather. Saddle soap used as directed is the standard treatment. Dry cleaning agents are to be avoided as they tend to dry and crack leather and may prove harmful to the patient. Coating inside leather with liquid nylon, or other non-toxic leather preservatives will prolong the life of the leather.

If all visible leatherwork is cleaned and polished, and shoes kept shined and in good repair, the whole brace will make a better appearance and improve the patient's psychological outlook toward wearing his brace.

(Editor's Note: The illustrations are by the author.)

SEPTEMBER, 1955

SUPPLIERS SECTION; PAGE INDEX

Please mention the ORTHOPEDIC AND PROSTHETIC APPLIANCE JOURNAL when using the services of advertisers.

THE CONGENITAL AMPUTEE

JEROME S. KESSLER, C.P.

President, Kessler Associates

The problems presented by the congenital amputee are distinct from, and more complex than, those presented by the traumatic amputee. The psychological problems will usually be more severe and more ingenuity is usually required in fitting these patients with prostheses. Surgery may be indicated for some of these cases, but it will be of a different type than that performed on the traumatic amputee. Selection of a vocational objective for these people, as they approach adulthood, will involve specific career planning rather than adjustment for the patient's return to his previous work, as is the case with patients who have become amputees after reaching maturity.

The etiology of these congenital amputations is still unknown; it is believed to be a biological "sport" for which neither parent can in any way be blamed. Nevertheless, persons working with the congenital amputee will find, in the parents, a persistence of guilt feeling and superstititions which can be extremely damaging to the patient himself.

The incidence of all types of congenital abnormalities is 68 per 10,000 live births and 297 per 10,000 stillbirths, according to Murphy.* His figures show, also, that the birth immediately following that of the defective child is less likely to be abnormal than is the third birth in the series. He summarizes the statistical evidence as follows:

1. Approximately one child in two hundred presents some type of congenital defect.

2. The likelihood of a malformed birth is increased among parents who have already had one defective child.

3. Malformations occur more often among the white race than among Negroes.

4. As the age of the parents increases, so does the possibility that they will have a malformed child.

5. However, a difference in the ages of the parents has no statistical relationship to the incidence of congenital malformations.

6. No evidence can be found for believing that frequency of reproduction influences the birth of a malformed child.

7. However, with the fifth child born in a family with one defective child, a significant and progressive increase in the birth of malformed children is observed.

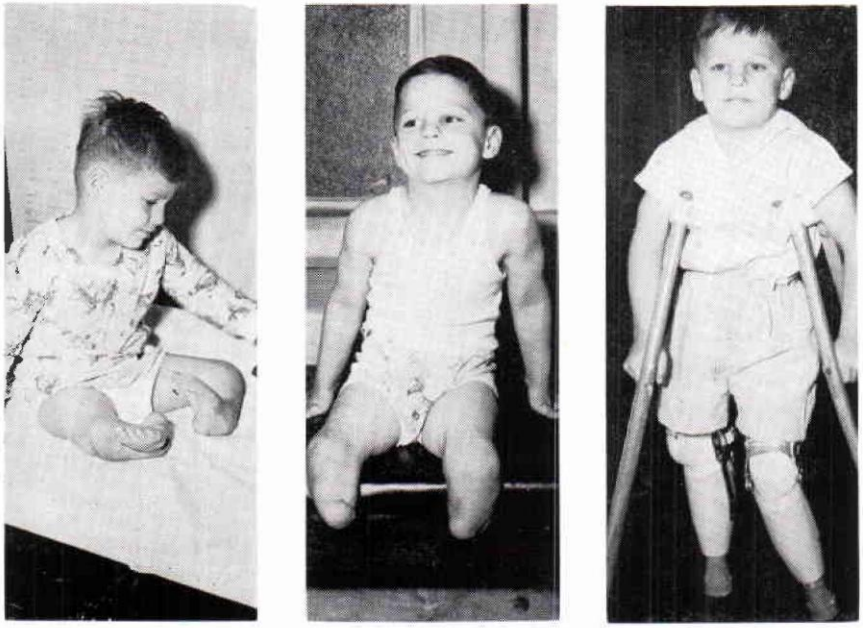
8. Malformed children are more apt to be born prematurely.

9. Between the birth of one defective child and another to the same parents, a normal birth is likely to occur.

10. There is an increased incidence of natal accidents immediately before and immediately after the birth of a malformed child.

11. The birth of a malformed child is more often preceeded by a period of relative sterility than are the births of the normal siblings.

*Murphy, Douglas P.: Proceedings Kessler Institute for Rehabilitation; 1:2; 1953.



1a 1b 1c

Fig. 1a: Bilateral congenital lower extremity malformation. Fig. 1b: Same patient, after surgery. Fig. 1c: Same patient, fitted with primary below knee prostheses.

12. The use of contraception appears to have no influence on the subsequent birth of malformed children.

13. No one season of the year is associated with an increased frequency of malformed birth.

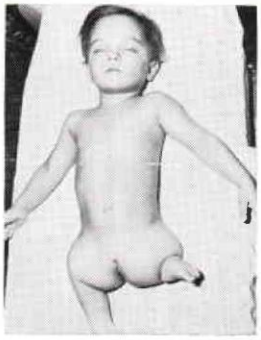
14. No unusual occurrence of placenta previa is observed among defective births.

15. Certain types of congenital malformations are observed more frequently among one sex.

16. When there is more than one malformed child in a family, the chances are one in two that the defect will be duplicated in the subsequent malformed birth.

The obstetrician who delivers a seriously malformed child must prepare himself for a severe reaction from the parents, and be able to render some assistance and reassurance to them. The pediatrician responsible for the child's welfare will determine the nature and extent of the physical limitation to be expected, and recommend suitable procedures. Surgery is indicated for some defects; for the congenital amputee, prosthetic appliances and training is the indicated procedure. Often, a demonstration of competence by an adult amputee will do much to reassure the parents and encourage them to seek rehabilitation for their child.

Surgery for the congenital amputee usually involves the removal of superfluous structure which would interfere with prosthetic fitting. A short below elbow stump is common among congenital upper extremity amputees; rarely, finger "buds" are removed surgically to enable the stump to accept a prosthesis. If the stump is extremely short, or if there is a congenital shoulder disarticulation, the surgical technic of cineplasty may be required to provide upper extremity function. Appendages, sometimes found at the end of the stumps of lower extremity amputees, are usually



2a

2b

2c

Fig. 2a: Bilateral congenital malformation of lower extremities and hip. Fig. 2b: Same patient, after surgery. Fig. 2c: Same patient, fitted with primary hip disarticulation pylon prosthesis.

removed to facilitate the fitting of a prosthesis.

During the past ten years, a trend toward increasing specialization has been observable among prosthetic firms. Nearly all of them have distinct departments for the upper and lower extremity and there is a good deal of further specialization within these categories. One New York firm, for example, has become so proficient with hip disarticulation prostheses that 80% of its work is now concerned with amputees requiring this type of limb. The congenital amputee child benefits from this increasing specialization since some firms will be especially well prepared to deal with his particular problems.

In 1952 the National Research Council's Committee on Artificial Limbs established, in cooperation with the University of California at Los Angeles, a special school for prosthetists, physicians and therapists to provide special instruction in upper extremity prosthetics. Refinement in the use of plastics for prosthetic devices has led to great improvements during recent years. Technics developed in the military services and by the Veterans Administration are being made available to commercial firms, resulting in an increasingly higher level of service which these firms are able to provide.

Plastic laminated sockets, the use of which is relatively recent, are especially desirable for children. They are lighter in weight and the ease of keeping them clean is a special advantage for young patients.

There still exists a great need for parts properly sized for use by child amputees. There are relatively few amputee children and fewer firms which do much work for them; hence, there is little demand for parts and consequently they have not been manufactured in quantity. When they were needed, local prosthetists generally hand-made the parts. However, orthopedists now realize the necessity of fitting amputee children very early in life, and prosthetists can expect an increasing demand for children's prostheses. The lower extremity congenital amputee will often be fitted before he is a year old, so that he may become proficient in the use of his prosthesis as he matures. Prosthetists will face special problems in fitting very young children and should be alerted, therefore, to the fact that their standard technics may require revision in these cases.

Jerome S. Kessler, C.P., was born in Newark in 1924. Before entering the prosthetics field, he studied for two years at the Newark College of Engineering. Mr. Kessler received his professional training at the Winkley Artificial Limb Company, Minneapolis; the Minneapolis Artificial Limb Company; the United States Naval Hospital at Mare Island, California; and the Suction Socket School, Milwaukee.

During 1951 he studied at the Ministry of Pensions Hospital at Roehampton, England, and then toured Sweden, Denmark, Germany, Austria, Switzerland, Italy and France, observing European prosthetic technics. Returning to the United States, he continued his studies at the Henzel Artificial Limb Corporation in New York and returned to the Minneapolis Artificial Limb Company.

Mr. Kessler was certified in 1952, following which he became President of Kessler Associates in Newark, manufacturers of prosthetic appliances. He is married and lives in Cranford, New Jersey.

The problem of growth is not as serious as one might suppose. For example, hip disarticulation prostheses can be made to fit very well for several years. When the socket contains a lining of felt, one-half inch in thickness, part or all of the liner can be removed if the socket becomes too small. A prosthetist can therefore guarantee the usefulness, for at least two years, of a prosthesis of this type. Aside from lengthening the shin and routine adjustments, no major revisions of the prosthesis will be required. Further, one may make the thigh section an inch longer than is required and the shin section an inch shorter. By using an ankle joint with long stems at the top, a series of half-inch blocks can be inserted at the ankle to progressively lengthen the leg. Above-knee limbs are usually routine except in cases presenting a dislocated hip or congenital absence of the head of the femur. In these cases, hip and knee locks can be added. Wooden sockets are satisfactory unless an odd shape is necessary; in these cases, a plastic socket is molded from a plaster cast of the stump. For older children, a wooden socket, conforming to the shape of the stump, is excellent; weightbearing is in the region of the gluteal muscles and especially at the ischial tuberosity. Below-knee limbs are made with leather sockets and shins somewhat larger than usual. The socket collar is made larger than usual so that new sockets can be made to fit the original shin. Again, progressively increasing length is obtained at the ankle joint.

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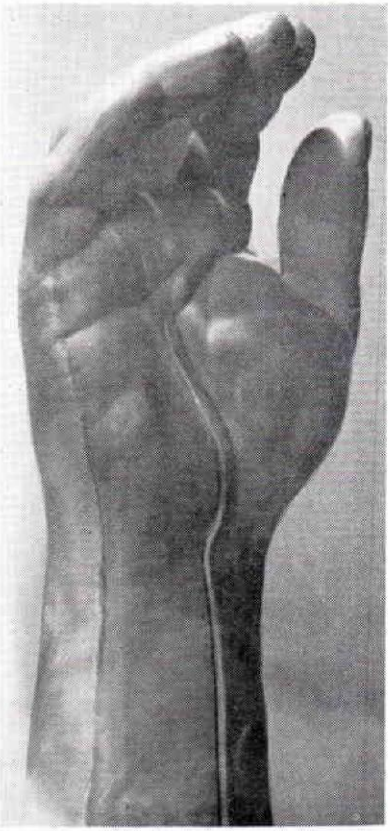

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ADVICE TO THE AMPUTEE

By PRESTON J. BURNHAM, M.D.
F.A.C.S., F.I.C.S.

Clinical Instructor in Surgery, University of Utah
Attending Surgeon, St. Mark's Hospital

(Editor's Note: New amputees are usually worried about their future, and need intelligent advice. This article was written to answer that need. It will also be found useful by the certified prosthetist, who in the course of his professional duties, is called upon to discuss the problems with the new amputee and his relatives.

The Journal is indebted to the National Rehabilitation Association for calling attention to this excellent article. Reprints may be ordered from the Washington office of OALMA.)

Amputation of an extremity is an operation that has been performed for centuries. Many years ago, it was a catastrophic handicap. The amputee then had to overcome his troubles as best he could, possibly with the help of his family.

It is no longer a severe handicap, but often a "blessing in disguise" for the injury is often the turning point in a person's life as it spurs him on to accomplish far more than he would have done in his previous routine existence. The advances in artificial limbs and in medical treatment enable him to walk nearly as well as the normal person, and to stand for the greater part of the day.

However, just as the person with corns on his feet must learn to take care of them, and the person with a short leg or a paralyzed leg must learn many ways of accomplishing what the normal person does, so must the amputee learn how to accomplish many of his daily actions that the non-amputee does automatically. Millions of persons have had amputations in the past. Many of them have become outstanding persons in the same work they performed before amputation, or in jobs far removed from their previous work. The amputee of today and tomorrow can do the same once the dread mysteries and the baseless fears are dispelled.

HANDICAPPED?

So you've lost a limb. You are going to have a difficult time for a few days. It's going to hurt. But so is it with your neighbor who has lost his stomach, or his lung, or his appendix. You will find, however, that the pain is going to be well taken care of by the medicines that your doctor has prescribed for you. And as the acute soreness tapers off, you will receive less "shots," so that, in a very few days there will be no more pain and no more need for hypodermic injections.

There is another type of pain, however, that medicines will not relieve. Whereas, you will have the same soreness that other less conspicuous operations leave and is relieved with drugs, you, if left to your own ideas or to the "tender" care of your friends, will have terrific mental anguish. By this, I mean the anguish that enters with the sudden realization that you have actually lost a limb. *It* has happened to you—something quite revolting and horrifying. This thing which happens to other people has finally happened to you.

If you will stop a minute and try to see before you, the very worst visions that automatically come to your mind to depress you, you will see perhaps John Silver. You will also see the man in your home town sitting on the corner, begging or selling pencils.

But there's something quite different from you and those visions. In the first place, John Silver is wearing old clothes—clothes of another century. And, incidentally, he is wear-

ing the very best prosthesis or artificial limb of his day. Times have changed. We no longer sail square rigged boats.

And the other visions on your wall is a man with an entirely different philosophy from yours. He may have problems far different from yours. He may prefer to sit and receive pennies than to resume his place in life. In other words, he may feel that "the world owes me a living." We do not know.

If you will write to the U.S. Office of Vocational Rehabilitation (Washington 25, D. C.), for a list of the amputees that returned to work last year, you will see that practically no occupation is barred to you. It is this bugaboo of "handicap" that I wish to help you cast aside. You will be depressed temporarily. There's no one who would not be. But let's make it a few days' depression instead of permitting it to stay on and on with you for months and months.

Time is valuable. "You never had it so good." Nurses to rub your back. Three meals a day in bed and in-between snacks. Everyone here to wait on you. It would be a good time to catch up on all those books you have been going to read for years, or start finding out how you can best plan for your future—either by study to advance yourself in your present position, or by continuing your school studies (if you are now in school), or by starting right in on preparation for the great change that you've been toying with for years—preparation for a career that you think you'll like better!

In order to give you the best of help in all things at this time, one should really bring to you a person who has lost his limb at the same place you have, and at your age. And he would best be a person with your own likes and dislikes for vocation and life. This person could tell you of his own experiences, which are still vivid in his memory—of how he felt so depressed until one day —perhaps it was due to something that someone said, or that he had thought of—that changed his whole outlook.*

In a large city, one might find just such a person. In a smaller city or town, he probably wouldn't be found, hence as a second best means of telling you the same story, this paper has been written.

I would like to briefly outline the steps by which you will return to your old job or your new position. All of us treading this path, who do not have the opportunity of the constant companionship of another person our own age who had suffered an amputation at the same spot as we had, and at the same time in the quest for the same career, have the great loneliness of one who is treading a new and awesome path that no one had ventured before. It is inevitable to feel so. Who in our circle of friends then can feel as we feel, or be forced on his own initiative to learn to do things as we must?

One bit of advice returns to my memory of a great fellow who had a very short thigh amputation, yet was an expert driver of all kinds of cars before the advent of hydromatics. I learned to drive while using crutches and long before being fitted with a prosthesis. His suggestion which spurred me on was, "There's no one going to teach you to drive. They didn't learn under your conditions, therefore, get in and drive." I did.

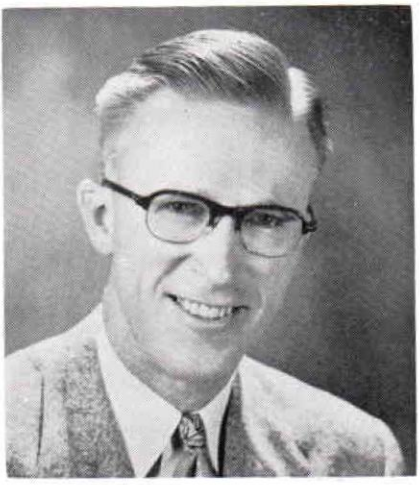
But remember that you are not alone and that you are not the first to break trail. Many, many others have passed this same way and have made great successes of themselves in their own endeavors, and it is not too hard at that.

*It might be well to mention here that rackets used to thrive in the field of artificial limbs as in other industries although here it is being stamped out. It is the racket of having unethical amputees sell limbs to other amputees on false statements. See page 50 on, "Buying a Limb."

Preston J. Burnham, M.D.

Dr. Burnham was born in Lynn, Massachusetts. He attended the University of Massachusetts and graduated from the School of Medicine and Dentistry, University of Rochester. He served his internship at the Royal Victoria Hospital at Montreal. Dr. Burnham served also as Resident in Pathology at Passavant Memorial Hospital, Chicago, and Northwestern Medical School (Surgical Residency at Passavant Memorial Hospital.)

Dr. Burnham is now Clinical Instructor in Surgery, College of Medicine of the University of Utah. He is also attending Surgeon at St. Mark's Hospital, Salt Lake City, Utah. He is the author of fifteen medical articles including "Amputation of the Lower Extremity." In 1952 he was elected a Fellow of the American College of Surgeons. He is also a Fellow of the International College of Surgeons.



To begin with some practical aspects, your incision will be protected for several days by bandaging. At the end of this period, the doctor will remove the stitches which should not hurt. To pull out a hair hurts much worse, and for this reason: the hair is tightly fixed in its place by its roots. It grew there. The thread or suture after a few days has slightly enlarged the opening in which it lies. It and the channel are smooth and do not stick to each other, therefore, once the thread is cut—whether made of plastics, cotton or silk—it will slip smoothly with the lightest pull. Do not expect absorbable or "dissolving" stitches in the skin. They are used only on the skin.

Outside your bandage will be a compressing material such as an elastic bandage. This is used for two reasons: To prevent the swelling that often follows an operation, and 2. To begin preparing you for your prothesis—no time is being lost. You are already being prepared for your future!

As with your jaws in the replacement of teeth by a plate, so it is with your limb: shrinkage must occur before your prosthesis is made and fitted. This shrinkage would occur anyway. But we wish to hurry it up a bit, and this will be accomplished by the gently compressing elastic bandage.

After a day or two you will be sitting up in bed. Sometime later you will graduate to a wheelchair. You'll be weak. Even if you had just gone to bed for a few days with nothing wrong with you, your strength would have ebbed because in our bodies all parts must be used often, else they shrink in size and strength —our brains, our muscles, our skin, our bones, etc.

But don't worry about your weakness. Your strength will return rapidly if you will but exercise as much as your doctor tells you. There are many ways of exercising in bed—pulling yourself up on the overhead trapeze, turning over frequently, moving your extremities, and just lying still but strongly tensing all your muscles including those of your abdomen and back. This will be well worth while for you'll be stronger faster, and you will need to have some strength when you get up for the first time.

TRICKS TO LEARN

You will go to the wheelchair from your bed and thence to crutches if it happens to have been your leg that was hurt. This type of locomotion is not normal—it has to be learned. You will learn faster, the stronger you are.

To drink without spilling, turn without causing pain, lie on your stomach in bed and read a book open on a chair below the edge of the bed, to have all your many belongings—water, the right book, handkerchief, writing materials, etc., just where you want them—within reach; the window at the right height to make the right room temperature, are all tricks you can learn. If it is summer, you will find it best to lie on one side of the bed until the rubber sheet has made you uncomfortable, and then move to the cooler side to give the other side a chance to dry out and cool off. You will learn to carry things on crutches, or to light matches with one hand; to get in and out of wheelchairs or upon crutches unaided, to reach objects with a crutch or cane, to do many things with one hand or with your mouth.

Soon you will feel that this is a world developed by and made for normal, uninjured people. Well, that's true. There's really nothing surprising at your discovery of that fact. It has always been true. You will become proficient at getting in and out of your bathtub or shower stall, only to be vexed at finding an entirely different installation at the next motel or hotel where you stay. What you've got to understand is that there are many ways of doing things.

This article is not intended to thump you on the back, and say, "Be brave!" "Have courage!", and all the other cliches that are used ostensibly to bolster up one's spirits, but which always react like a lead balloon! This article was written to point out that you can do practically anything you wish, but that some functions or duties will be done in a somewhat different fashion from the way you did them before. It's not hard. It just takes a little learning. But the biggest trick of all that you must learn is to get busy right now and keep busy. The average person who has never had a serious illness may constantly complain and even take to his bed for the slightest illness. You have more physical reason to do likewise, but much less right to! Only by keeping busy will you make not only yourself, but your family tolerate you.

RETURNING TO WORK

You may return to your old job some day, [1] embark on a course of study, go in training for a better job in your old plant, or completely abandon your old rut and take off on a course that will lead you to a new and greater niche. Start thinking, talking and planning for this now. In any event, your prosthesist or artificial limb maker will soon be consulted, and you will be fitted with a limb.

What limb to buy? I don't know. But I can suggest that you do not buy any, nor enter into any contract with a salesman or mail order firm until you have investigated another one or, preferably, more. You are old in thinking of cars, but young in considering limbs. Therefore do the same in buying a limb as in shopping for a car. Look around. Read the literature of limb companies and talk with their salesmen. Go to a certified facility (limb company).

An artificial limb is just like an automobile. If you buy a cheap one and abuse it, you can wear it out in a year or two. If you buy a good one and abuse it, you can still wear it out in a few years. But, with reasonable care, repairs, and overhauling, a limb will last like a car. They are both mechanical contrivances made by man.

Your best bet is to follow your

[1] Records indicate that most amputees do return to their old jobs. You may want something better.

doctor's advice. If there are several limb companies in your area, he will advise that you contact all of them in order that you may have the opportunity of choosing the facility where you will buy your limb. If you will choose a certified facility (limb shop) and a certified fitter, you may trust him to make what is best for you.

If the first salesman who visits you can run and jump with his lower leg amputation, but the second one refuses to do so, don't necessarily believe that the first salesman's company makes the better leg. Maybe it does, but this is no proof. Perhaps the second man's stump is bothering him, and, perhaps, the first man is gritting his teeth and rubbing some skin off his stump in the effort to impress you.

When you buy a car, you may want a magic eye headlight dimmer, spot-light, or several other "musts." If you like them, fine. Buy them. There are many different added attractions and detractions in artificial arms and legs. If you like them, or they seem to serve well a particular purpose of yours, buy them. If you are only confused by all the gadgets, remember that the more gadgets there are present, the more things can go wrong, therefore, buy the simplest arm or leg, and leave the special attraction features for your next buy when you are better qualified to choose wisely. In all decisions, follow the advice of your doctor and limb manufacturer.

If there is a choice between a good limb made far away, and an equally good one made nearby, choose the latter. One does not buy a limb in a store then go off wearing it as one does shoes. Each limb is a completely hand-made article made just for you with the exception of bolts and joints that are conveniently made in great numbers from the same mold. After you receive your limb, there will be a variable amount of adjusting to do to the fit or function. It is easier to take it to a firm close by for such alterations than to have to take it or send it far away.

If you wish to know prices, check with any firm.

RIGHT TIME TO TALK ABOUT PROSTHESES

When should you talk with a limb maker? Today, or as soon as possible. Your family may wish to delay the day when you shall meet with reality and begin to take stock of yourself. "We musn't let him see an artificial limb yet." I feel, however, that the sooner you see your future with a clear eye, the sooner you will feel better and return to your vocation. There is no "good" time or psychologically propitious time to see an artificial limb for the first time, or to talk about these things with representatives of the local limb companies. The sooner you take the mystery out of the future and begin to look this thing squarely in the face, the sooner you'll stop reading detective fiction and comic books, and start to do something for yourself.

Most limb fitters have problems similar to your own, therefore they will speak your language. Beside talking prostheses, they will be able to offer you a great deal of help on many other subjects that you will have questions about now.

STATE DEPARTMENT OF REHABILITATION

In every state there is a Department of Rehabilitation with offices in the State Capitol. Unless you will have no financial worries, or unless you know for sure that you will return to an excellent position for which you are well suited, it would be wise for you to write for an interview to the Department of Rehabilitation.

These state bureaus are set up by your state and your Federal Government for you. They will assist anyone that has any questions about his vocational future. Help, as used here, has many interpretations and you may wish for one or many kinds: apti-

tude testing, vocational guidance, job training or financial assistance.

The work of the bureaus is carried on by trained, experienced men and women who are experts at talking things over with you, giving you advice, helping you to find work that you can do, or in giving you economic aid on a training program that will prepare you for a promotion in your old job or for an entirely new job. If you have financial difficulties they will also help you obtain a prosthesis.

Do not hesitate to call for them. You'll probably receive much more help than you expect or realize that you need.

A NEW LIMB

I mentioned that "breaking in a limb" is not so simple as buying new shoes. It isn't. If you know of someone that has broken in a new set of teeth, you'll know that they did not immediately feel like his own teeth. But they are much better tolerated now.

However, in the beginning there were days when he wanted to take them out and either leave them on the shelf, or throw them as far as he could. There will be such days with your new limb—some soreness, discomfort in walking on your leg, or awkwardness in making the arm work. Some people have faltered at this stage and have either taken off the leg to return forever to those "comfortable" crutches, or have simply tucked their empty sleeve in their pocket and prefer to use the stump for any assistance. This business of breaking in another limb or two is not easy.

The best advice that you can obtain on breaking in a limb is from your limb maker. He is usually best qualified to tell you when to be fitted, and to instruct you in wearing the limb. He will caution you to go slowly at first. You will need this advice, because, when you see that new limb in place, you will feel so exuberant that you will want to wear it out the first day. This invariably ends up in wearing you down and out by rubbing off your skin! Remember, neither you nor your ancestors have ever used this type of limb, therefore your skin is not up to it any more than your heels could take a hard game of hand ball after a season's inactivity. However, gentle, cautious, regular use will rapidly build up your skin to the degree that it needs. Stay with it, but go softly.

You are not the first one, nor the last one to travel this way. Census figures indicate that there are approximately 1,000,000 amputees in the United States. Others have and will use this great 'kick in the pants' to better their old rut, and there's no reason why you can't. You can stay on your dole or your pension, your insurance check or your veteran's check if you wish and will probably be able to live on it. But if you want to feel good, you'll take steps to hasten the day when you can tell them that you do not need it any more!

VISITORS

One of your main problems will be that of visitors. Yes, there'll be problems if they do not visit. You'll miss them. But, oftentimes they are worse problems when they do visit! When they come, it will devolve upon you to be their host or hostess. Really, it will be upon your shoulders to make them comfortable by putting them at ease. If you don't they may make you most ill at ease!

There is the typical one who may be a man or woman. He may be one of your own family. When he visits you in the hospital, he'll bring flowers or something equally worthless. He'll fairly run to you, hold your hand for a long tense moment of silence, and just before you expect to hear "Hearts and Flowers," he'll explode in his great feeling of sorrow and sympathy to you. If you let him do this, you'll probably write for a correspondence course in basket-weaving or pencil vending!

Unfortunately, the general public is so completely in the dark about amputees that this booklet might well be written as a text for the amputee's visitor as it is for the patient.

To continue with this all too typical visitor, he may go on in this vein telling you in all sincerity that now your future activities will be sharply circumscribed by your "great handicap." He will even go over the occupations that he feels are now available to you and, if you have been engaged in a work that demanded any physical activity, you will feel that only the most poorly paid of sedentary jobs will be yours in the future. If you give up and accept this unfounded opinion, you'll be lost.

Another species of visitor is the one with similar thoughts, but no voice to express them. He will be too embarrassed to say a word, but sit and stare at you. This type you can recognize immediately. Don't become angry with him. He can't help feeling as he does. Don't, as some amputees have done, bait the poor visitor by trying to revulse his sensitive feelings with descriptions of the hospital life. I know that you can read his mind after you have seen one or two of his type. You could draw him out in active commiseration, but then you'll both feel worse. It is best to just have him talk about himself, keep the conversation away from your own problems and you'll both feel better.

There is another type of visitor who is not so sure that you have left the world of the able. In fact, he's not so sure but what this operation isn't the best thing that ever happened. Remember, he is not sure, but in feeling his way along, he may stimulate your thoughts like this:

In the first place he has never seen anyone making a sympathetic demand for money by displaying "his operation" to the public. In fact he may know one or more amputees that are very well adjusted to their old or new jobs—incidently most amputees are quite normally adjusted. He may know of one or more amputees that had more or less shiftlessly worked at a routine job for years—punching their time clocks, expending no particular effort on any sort of advancement, and, had they not lost their arm or leg, would have been in the same spot until death overtook them.

Many amputees did not even begin their quest for higher education until after their operation. It took that to make them sit down and take stock of themselves. It jolted them out of their constant state of inertia. They had always given less than a day's work for a day's pay and were constantly meditating on ways to avoid giving the little they gave. The jolt of work loss, of thinking of their amputation, the passing of time and no advancement in position, and the sudden gift of time in which to think —all collaborated in making them take stock of themselves, harness their shiftless time-passing proclivities into a concerted effort to better themselves. The effort they had spent in avoiding work was nothing compared with the superior efforts they put forth in study after their operations.

There was the paraplegic—paralyzed from the waist down—who had always been an odd job worker, but who studied, borrowed and won scholarships through college and law school after his injury.

There was the boy who was a twelve dollar a week grocery store clerk for years, who, during a three year siege of hospitalization for some seven amputations of his leg, learned to letter and paint signs through correspondence courses and apprenticeship. When he finally received his prosthesis and started a small shop at the age of twenty-six, he decided that he was not satisfied. He applied to college where he was accepted and worked at his sign painting for the three years to augment the scholarship funds that he received.

Although there had been a small spark of desire to become a doctor at the beginning of college, it was successfully buried by a consciousness of the futility of such a seemingly absurd wish while he prepared himself in the basic sciences that could be used in teaching, in a laboratory—or to enter medical school. He finished his medical school entrance requirements in three years by summer and winter attendance then continued his sign-painting to augment his scholarship income in medical school and is now a surgeon.

Ignorance is sometimes a blessing. If this latter type of visitor has no comprehension of the fact that a vocation cannot be attained or that a professional career cannot be carved, he just might communicate this same blindness to impossibilities to the patient who might "foolishly" be encouraged to do the incredible. In other words, if you, the amputee, are not told that you cannot become an engineer or an architect, you may go on to be just that!

In all seriousness, the best doctors are not the "brains" who made A-plus through public school, college and medical school. The best lawyers are not the keen, photographic memoried characters of fiction fame. The great statesmen, engineers, executives, and others that most of us respect are not geniuses. Nor are they sound of body. They are simply people like you and me who, through circumstances or somebody's inspiration have quietly started out in search of something better than what they had. All along their way, although they may have had one goal at which to aim, they have thought of other lesser objectives that would sustain them if they missed their primary one. Many have found happiness in discovering that their secondary objective was more the proper one for them than the original. But, at least they left their lassitude far behind and really worked.

There was a day when our professional schools demanded only the youngest and those with the very best of marks in school. This is, fortunately, no longer true else we'd lose forever some of our very best men and women. There was a day, too, when only he of the rich parents could ever hope for even a minimal education. This, too, is no longer true as you will find when you begin to investigate the fields of your choice. In your hometown are probably unpublicized scholarship funds left by people who have preceded you, men and women who have had to "work up the ladder the hard way" and have left a portion or all of their fortunes to help students. They may specify that the applicants wish to pursue some specific vocation such as architecture, nursing, law, etc., or the funds offered at the discretion of the board of trustees that administer the fund. To find them, ask at your local high school and service clubs.

These scholarship funds are also available in various ways in professional schools usually administered by the Dean or a member of that Department of the University in which the applicant is interested.

Don't let the choice of a field dissuade you. So many men have married on a small income, have started their families and suddenly believe that they are hopelessly stuck in a rut until death. These are people that you know. They have all their limbs and apparently all their wits, but they are done for. Their future consists of working for someone else for a pittance.

"There's no sense in my studying anything because I don't know what I want to do."

They won't study any more about electricity because they don't know for sure whether they want to be the boss of their crew.

They won't study accounting or any other business course because they are not sure they want to progress in the firm where they clerk.

They delay studying the physics and chemistry of the product of the company where they guard the tool supply room because they're not sure they want to "stay here permanently." And they just can't overcome their inertia sufficiently to take a few university courses to learn more of the laboratory in which they wash bottles because they don't quite know if this is really where they want to work!

I hope that these reasons for not studying are as silly to the reader as they are true in life. If we all waited until we knew for sure what we wanted, we'd all be bottle washers and no one would do the other work. But if we'll just make a start,—take a night school course or two, sign up for an advanced carpentry course at trade school, read some astronomy if the stars fascinate us;—just so much rust will be rubbed off the thinking apparatus.

Perhaps you will find that you've wasted your time in studying what you chose, and that you really wanted something else. Fine. That's good. You haven't wasted the time for if you hadn't approached your goal in this roundabout fashion, you would never have begun the approach. Sir James Paget, a great surgeon and scientist, put this thought very aptly in 1840 when he said about the years that he had studied botany, "I cannot estimate too highly the influence of botany upon the course of my life. The knowledge was useless; the discipline in acquiring it was beyond price."

College, for example, is not a place of specialized study where your every effort is aimed at a specific goal. Future scientists, teachers, business men, lawyers, engineers, architects, all take the same courses for the first two years. They all study English, mathematics, a foreign language, history and some science course. Many completely change from their original objective by the time the third year comes, and they begin to concentrate on their ultimate goal. It is the same with studying for any vocation. A few courses in Spanish or Geology or Political Science may well lead the way to knuckling down for a good course in Machine Shop techniques. A few more courses in Public Speaking and Personnel Management may get you a very comfortable raise in salary and position with a lessening of your manual labor. Try it! But with one warning: The higher you go, the longer hours you'll put in, and the more worries will be yours! Maybe you would rather spend shorter hours in putting square pegs in square holes!

YOUR AGE?

Another great problem that may first scare you into hysterics and then disappear like the Cheshire Cat, is your age. It's against you. No one ever starts a new business or to study a new occupation after he reaches *your* age! Nope. You were perhaps not too happy and not too content in your old job, but at least there was SECURITY! You could have remained there until you died and you'd never have been fired. Nope. If they'll only take you back after this horrible misfortune in the shape you're in, you'll go, and gladly!

I can't argue this point for it would take up another book. But I can tell you that you can take any correspondence course, go to any night school, or enroll in any trade school at any age and expect to find people your own age and older. But, you say, you can't go to college or any professional school and not feel humiliated by associations with younger, brighter, fresher students ten or twenty years your junior! No? Either take it from me or talk with any oldster in any school about it. He will tell you that it's hard to recall his anticipated abhorrence of returning to school on this account. But, like the grin of the Cheshire Cat, that nightmare is hard to recall for there is no problem no matter what the age difference once you get there.

Perhaps there's something that you have dabbled in for years besides your regular work—amateur jewelry, photography or furniture repairing. You'll never have a better chance to break into it full time. Really — what's keeping you back? Write it down. Take two sheets of paper and write down all the facts that are against this step in one list, and all that you can think of for it in a second list. Talk both lists over with your family and friends, and watch the second list grow!

Reasons That Absolutely Prevent Me From Preparing To Do The Work I Have Always Wanted To Do.

1. 2. 3. 4. 5. 6.

Reasons For Beginning Preparation For The Work That I Have Always Wanted To Do.

1. 2. 3. 4. 5. 6.

There are some vocations, of course, that may be economically unsound to seek for after a certain age. In the event of such a question, do not hesitate to talk with the Vocational Rehabilitation experts of your state.

QUESTIONS

Will I be able to drive a car? Ask your prosthesist or representative of the Department of Rehabilitation.

Should I still plan to marry? Talk with your Affianced.

Should I continue my social life? What will people say when they see me? What should I say or do?—Say what first comes to your mind. Continue on as much as you can as you did before this operation. As for people seeing you, remember that you must rise above the occasion and put them at ease. Remember, they may be too embarrassed to think properly, hence you will have to graciously make up for *their* shortcomings.

I've heard that the treatment accorded to my lost limb will influence the future comfort of my stump? Will I have phantom pain?—The lost limb story is pure superstition and old wive's tales. Does it matter what is done to your removed tonsils, or appendix, or adenoids? Phantom pain is common to most amputees for this reason: The nerves that formerly went down the middle of your arm or leg, received pain impulses from further down—say from your hand or foot. Now if you strike the end of your stump—arm or leg, you will hit these centrally placed nerves and your brain will interpret that to be pain in the end of your extremity. Very few amputees have persistent pain after their stump has shrunken and been fitted with a good prosthesis.

What will I be able to do physically? Talk with your prosthetist and your doctor. You are probably already doing more things for yourself than you might have thought you would. Continue. Let no one do anything for you unless you cannot do it yourself. You have entered a new world. That's true. It's not so difficult though! You will do things somewhat differently now, but you will get them done.

Whenever you think of a question, write it down before you forget it. Ask your prosthetist, your Rehabilitation representative, or your doctor. A five minute discussion may save you many days' worry.

The only thing you've got to fear is ignorance. If you are in a familiar room in your home with a chair here, a table there, you will have no fear of any kind. However, if you are there in complete darkness, your mind will fill the room with fearful things. Turning on the light switch banishes all of them.

Your future is just like that. As long as you avoid taking steps for your future—learning about it, preparing for your new limb, studying, you will be in fear. As soon as you start doing any thing at all, your fears will abruptly vanish. Over a million of us in your generation have made the step. Perhaps today is not too soon for you to make a start?

The Role Of Physical Therapy In The Use Of The Above Knee Prosthesis

Winifred Belfrage, R.P.T., Angelia Keifer, R.P.T., Verne T. Inman, M.D., and Chester C. Haddan, C.P. & O.

The successful above knee prosthesis wearer is the total achievement of teamwork carried out by the orthopedist in charge, the prosthetist (limbmaker), the physical therapist and the patient, each in his role of cooperative effort to that end. This article is thus concerned with the role of the physical therapist in the use of the prosthesis. This role is carried out cooperatively and coordinately with the orthopedist and prosthetist as the treatment progresses, hence special note of them is not readily suggested but such members are always at hand when occasion arises, especially noted upon boundary limits or the tendency to overlapping boundaries, when decisions are essential.

The management of the amputee before, during, and after the fitting of the prosthesis is a program of systematic continuity of procedure and interest, to the end of achieving the utmost comfort, best possible gait, and satisfaction on the part of the patient. It takes cognizance of the thoroughness of educating and undertaking with the patient, the interesting, varying, and trying procedure through which he must go in order to get the utmost benefit as intended by the maker, the user, and the supervisor of the prosthesis.

The patient must be so carefully instructed from the first meeting with the physical therapist and with the earliest simple exercise, in the reasons for and importance of muscle location and action singly, coordinated, and combined, that he will be able to understand and analyze with as little difficulty as possible his own particular gait when he is left on his own. Much of the treatment bears repetition and slowness of time involved so that the patient can comprehend as well as enjoy his progress.

The physical therapist thinks and treats the patient in total. There is only one goal to achieve—a patient walking with the best possible gait, (good posture or body alignment, freedom from contractures and deformities, good balance, and relaxed and rhythmic gait.) It is known that energy expenditure is higher in above knee amputees than in the normal individual doing the same job. (Walking the same cadence and the same distance.) Why?

a) From an engineering analysis, the energy requirements *should not* be as great as actually measured in amputees (by $C^{\circ}2$ liberation and $O2$ utilization).

b) The high energy expenditure is believed to be due, therefore, to increased muscular activity, either:—

1) More muscles are used by amputee than in normal individuals at any instant (tenseness, balance, etc.).

2. Muscles are used for longer periods of time than normal (not relaxed).

Training, therefore, (physical therapy and gait training) may be the

most important item in rehabilitation of the amputee.

Prior to the fitting of the prosthesis, the stump must be shaped and muscle contractures of the stump and trunk reduced or corrected, postural faults corrected or avoided. All muscles of the trunk, stump, and normal leg are very important. There must be a balance of power for good gait. Prepare the patient for relaxation and rhythmic gait by helping him learn what muscle or group of muscles perform a particular motion as applied to locomotion and select exercises (with sequence and continuity in mind) according to contractures, deformities, weaknesses, hypertrophy, postural and gait achievements. The exercises are passive, active assistive, active, and active resistive according to need and dependent upon the condition of the patient as directed by the orthopedist in charge. The patient is taught in the beginning to consciously contract definite muscles, to definitely understand their function or action at a particular time in the swing and stance phase of the walking step, with no undue fatigue resulting. He is taught to achieve conscious contraction of muscles in an easy, relaxed manner.

The patient is so instructed in knowledge of muscle importance that he usually achieves knee control of the suction socket limb quite quickly. This comes easily during the fitting of the limb by the prosthetist, the physical therapist being at hand to guide the patient in his first steps and to administer balance and weight-bearing exercises, never losing sight of muscle action taking place during each phase of stepping, balancing and weight-bearing. In other words, the patient learns to control his prosthesis by using his stump muscles and yet maintaining good body posture.

The physical therapist finds the limb maker and orthopedist valuable at all times. Features of mechanical construction bear thought when giving gait direction, and consideration for the medical aspects bear attention, both of which are *not* discussed with the patient by the physical therapist. Mechanical construction and medical advice are understood, *not* spoken.

In walking with the suction socket prosthesis, squares, lines, circles, and such gadgets are unnecessary. Stationary adjustable (from raised arm level to dropped arm level) bars, crutches, canes, ramp, stairs, rubber matting on floor, and large full-length mirror are necessary. If a patient has understood muscle location and action throughout his treatments, and applies them during swing and stance phase of walking, he can easily and consciously correct his gait faults and develop a pride in his "*stride.*" When he can bear weight correctly and balance, he can walk relaxed and rhythmically, ascend and descend a stair, fall down and rise, sit and rise from a chair, turn around, side step, back step, ascend and descend an incline, pick up objects from the floor with confidence and ease.

In walking with the suction socket prosthesis, normal leg and stump muscle action is of first importance, necessitated by the fact that a dual purpose exists. Muscle action in the trunk and stump and normal leg during the swing and stance phase of walking is of utmost importance, not only in carrying the prosthesis through but also in providing the adherence of the socket to the stump and thus achieving good gait.

I. Physical Therapy before fitting the above knee Prosthesis

A. Preface:

1. In order to more carefully present the problem and to serve as a review, it is hoped that one might have access to the figure in the manual, "The Suction Socket Above-Knee Artificial Leg," Figure 5—Anatomy of cross section of thigh in suction socket ½ inch below ischial tuberosity. It pictures the muscles which act to maintain the suction and action of the stump in the wearing of the suction socket limb.
2. Note that all the muscles of the trunk, stump and the hip of the stump are very important. There must be a balance of power for good gait. The body must be kept in good alignment during all exercises and often emphasized.
3. Sequence is important except that if one is working directly with the limbmaker it is necessary to get knee control very early.
4. Stump exercises bear such repetition and care that slowness is important.

B. Aims:

1. Shrinking and shaping of the stump.
2. Correction of contractures (thigh flexor, erector spinea, quadratus lumborum, hamstrings, abductors; gastrocnemius and soleus of normal side).
3. Develop muscle strength (all muscles of the stump; quadratus lumborum, gluteals, erector spinea, abdominals, laissimus dorsi, ilio psoas).
4. Develop a balance of power in the trunk and stump muscles.
5. General exercises for good body alignment and balance, and prevention of postural faults. (Kyphosis, extreme lordosis, pronated foot, scoliosis and forward-head.)
6. Prepare patient for relaxed and rhythmic gait. Help him to learn what muscle or group of muscles perform a particular motion. Enable him to analyze his own faults because he feels and is concerned of what is going on in the performance of good locomotion.

C. Procedure:

1. Bandaging instruction. (Thomas-Haddan, "Amputation Prosthesis," page 36-49.)
2. Use judgment in selecting exercises according to contractures, deformities, weaknesses and hypertrophy, and explain muscle action, location, importance and reasons for exercises to the patient.
3. Exercises should be given in sequence (holds interest, effort, and continuity for the patient).
4. Exercises are passive, active, active assistive, and resistive according to need and dependent upon the condition of the patient as directed by the orthopedist in charge.
5. Patient must concentrate on each exercise and each detail of gait and feel *what* he is doing and *why*.

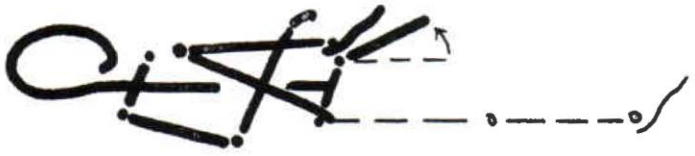
D. Exercises:

Supine:

1. Deep breathing—inhale and increase chest expansion as much as possible. (Chest breathers have better posture and increased tolerance.)
2. Static contraction of abdominals. (Keep abdominals in ready state of contraction. Prevents visceroptosis and gives stability to trunk. Helps body incline and improves posture.)
3. Combine deep breathing and static contraction of abdominals. (To develop normal chest breathing.)

4. Pelvic tilt—with arms in T position—pull abdominals up and in, tilt pelvis and flatten back to table. Hold and relax.
   a. Repeat, combining with deep breathing. (Prevents extreme lordosis, relaxes low back muscles, strengthens abdominals, prepares patient for correct body alignment and posture.)
5. Active stretching of thigh flexors and strengthening of thigh extensors. Bend normal leg up on chest and hold this position with hands. (Fig. 1) Keep lower portion of back flat. From flexed position, extend stump to table. (All motion is true hip motion, to correct contracture of hip flexors. Patient learns location, action, and importance of Gluteus Maximum and Abductor Magnus.)
6. Stump adduction — With position of the pelvic tilt, adduct stump to normal leg. (Patient learns location, importance and action of the Adductors: Adductor Magnus, Adductor Brevis, Adductor Longus. Important at beginning and during swing phase and end of stance phase in gait.)
7. Repeat No. 5, combining it with No. 6. Deep breathing, etc. Extend and adduct stump.
8. Internal rotation of the stump. With patient in position of pelvic tilt, internally rotate stump. (Patient learns location, action, and importance of internal rotators.)
9. External rotation of stump. With patient in position of pelvic tilt, externally rotate stump. (Patient learns importance of external rotators, action and location.) Important at weight bearing of stance phase in gait.
10. Hip shrugging. (Fig. 2.) Shrug one hip then the other. (Patient learns location, action and importance of Quadratus Lumborum. To avoid flexing chest laterally and forward and hiking of hip. Especially in gait training.)
11. Abdominals:
    a. *UPPER* With arms at sides and slightly off table, raise head and shoulders off table. until thorax is flexed on pelvis. (Patient learns location, action, and importance of upper abdominals.)
    b. *LOWER* With arms in T position and normal knee bent and foot on table, patient in pelvic tilt position, straighten leg by sliding heel down and return. Keep stump flat on table during exercises. (To eliminate thigh flexion as much as possible by distinguishing it from abdominal contraction.)
    c. Combined upper and lower abdominals—also active back and hamstring stretching. Patient comes to sitting position with well rounded back and arms reaching to toes and slightly beyond. (Fig. 3.) Patient learns action of the entire abdominals and stretches back muscles. Abdominals very important to pelvis motions.)
       Note: Legs are supported as pelvis begins flexing on thigh. Abdominals aid in body incline to 45° when hip flexors take over.
    d. Lateral abdominals. With leg and stump abducted and right arm across chest with hand clasping left shoulder, reach left hand to right toe, and vice versa. (Abducted legs prevent anterior abdominal action and patient learns location, action, and importance of lateral abdominals.)
       Note: Abdominals and quadratus lumborum aid in lateral stability to

a



b

c

Fig. 1. Flexion contracture and taut low back muscles.

a. Body in neutral position. Flexion contracture and taut back muscles not apparent.

b. Body position for stretching of the hip flexors and low back. Indicates several degrees of flexion contracture which should be removed by holding this position while extending the stump.

c. Body position for stretching of the hip flexors and low back. Flexion contracture removed as indicated.

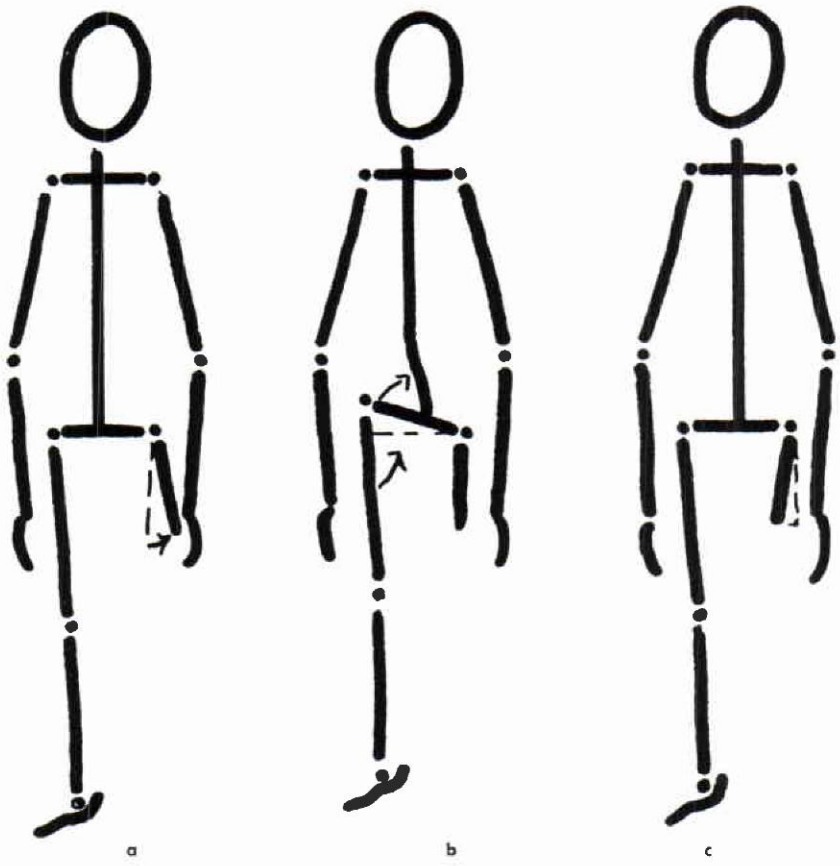


Fig. 2. Abduction contracture of the stump
a. Body in neutral position shows several degrees of abduction contracture which must be relieved.
b. When patient attempts to realign his stump, he is likely to relax the low back area of the stump side, contract the low back area of the normal side and adduct the hip of the normal side.
c. Body in neutral position after patient has learned to control the pelvis and remove the contractures and freely adduct the stump. Stump in slight adduction.

trunk to 45° when hip flexors take over. Strengthens them for trunk stability and improvement of gait.

12. Body in pelvic tilt position, alternately flex one thigh then the other rhythmically as in walking. Watch that one leg flexes while the other extends. (Patient learns combined and coordinated action of adductors, flexors, quadriceps, gluteals back, abdominals, and quadratus lumborum.)
13. Normal foot. Bring foot in and up. (Patient learns action, location, and importance of Anterior Tibial, Posterior Tibial, and Peroneus Longus.) Aids in prevention of foot eversion and pronation.
14. With arms straight at sides and legs and body straight and in

good postural position. Keep upper body and arms flat to table and roll lower body and legs, slightly from side to side, lifting one buttock then the other to rotate the pelvis on the lower spine. (To demonstrate the alternate forward and backward rotation of the pelvis which might be too extreme in gait patterns.)

Side Lying: Lying on stump side.

1. Side bends:
   Bring head and shoulders off table and reach hand toward toes. (To stretch and strengthen erector spinea, lateral abdominals, quadratus lumborum. Lateral flexibility and strength are important to gait.)
2. Adduction of stump:
   Abduct normal leg, with knee extended. Adduct stump to abducted normal leg. Abduct stump, adduct normal leg to starting position. (To stretch abductors and strengthen adductors. Emphasize action and location of adductors.)
3. Gluteus Medius.
   Abduct, externally rotate and hyperextend normal straight leg. (Strengthen gluteus medius and prevent limp in gait.) (Patient learns location, action, and important of gluteus medius.)

Side Lying: Lying on normal leg side.

1. Tensor Fasciae Latae.
   From neutral position, abduct, internally rotate, and slightly flex stump. (Patient learns location, action, and importance of tensor fasciae latae.)
2. Gluteus Medius.
   Abduct, externally rotate and hyperextend stump. (Strengthens gluteus medius.) (Patient learns location, action and importance of gluteus medius.) (Important at weight-bearing of stance phase in gait.)
3. Combined abduction, adduction, internal rotation and flexion from neutral position.
   In sequence as named, abduct, internally rotate, flex and adduct stump. Extend to neutral position. (Important sequence in swing phase in gait training to suction socket wearers.)
4. Combined abduction, external rotation, extension and adduction. Abduct, externally rotate, extend and adduct stump. Flex to neutral position. Important sequence in stance phase in gait training to suction socket wearers.)

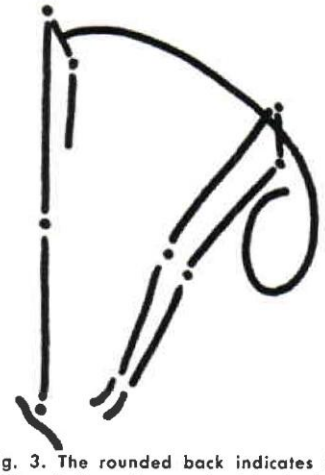


Fig. 3. The rounded back indicates flexibility of the spine, and abdominal tone both necessary to the ease of pelvic motions.

Prone:

1. Gluteal pinch.
   Pinch buttocks as if holding a coin between them. (Patient learns more fully the location, action, and importance of the gluteus maximus.)
   Note: Gluteus Maximus is an extensor of the leg onto the pelvis. It is important at the end of the stance phase, aided by the Gluteus Medius and the Adductor Magnus.
2. Gluteus Maximus.
   Patient lying with stump side of body over the edge of the table. With stump flexed, extend stump to neutral position. (Resistance essential.)
   a. Repeat adducting during ex-

tension phase. (Patient learns importance and action of adductor magnus during the latter part of stance phase.) (Adductor Magnus very important to wearing the suction socket.)

3. Extension of stump.
   Lying prone on table. Body in neutral position, extend and adduct stump from neutral position. (Patient learns location, action, and importance of back muscles, adductor magnus, and hamstrings.) (Important at end of stance phase and beginning of swing phase. Low back muscle, latissimus dorsi, and gluteus maximus stabilize trunk in hyperextended position.)
4. Alternate extending of normal leg and the stump in slow rhythm as in walking. (Fig. 4.) Patient learns combined and coordinated action of gluteus maximus, quadratus lumborum, latissimus dorsi, erector spinea, hamstrings, and adductor magnus.)
5. Extension of neck and back.
   With arms at sides, adduct scapulae, and raise head and shoulders. Hold and relax. (Strengthening of erector spinea,, shoulder adductors, and depressors and is important in good posture.)
   Repeat, taking side bends.
   Note: Lateral abdominals, quadratus lumborum.

Sitting:

1. Pectoralis stretching. (Off the edge of the table with normal knee bent.)
   Arms abducted to shoulder level at T position. Physical Therapist places knee between shoulders of patient and helps him slightly abduct, externally rotate, then extend arms. (Aids in prevention of kyphosis. Develops shoulder adductors and elevators, and stretches shoulder flexors.)

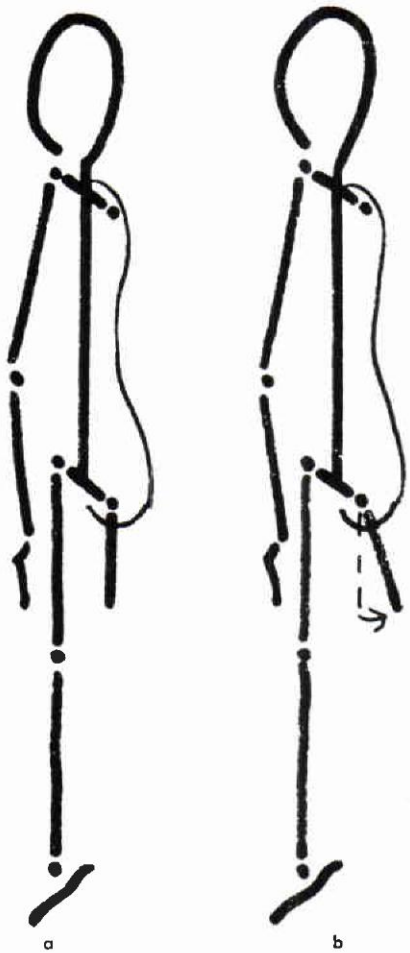


Fig. 4. Body in prone position, shows stump in complete extension with deep gluteal fold. Hyperextension would carry the strain onto the low back and is to be discouraged. (Note) The stump is lifted only a few degrees.

2. Erector Spinea and Quadratus Lumborum.
   Sit Indian fashion (if possible) and bend forward, curling back and keeping buttocks to floor; bring forehead to floor between bent knee of normal leg and stump.
   Note: (The three pelvic motions should be well understood and their function depends upon a back which is not taut.)

Standing: On normal leg.

Note: Begin to stress importance of pelvis motions, especially the pelvic tilt or find the "tail under."

1. Check total body alignment. Begin exercise with both arms supported at bars. Repeat with one arm supported at bars. Repeat with no support. Repeat with arms abducted to shoulder level. Repeat with arms flexed at 90° with body at proper incline.
2. Knee bend on normal leg with good body alignment. Repeat with two arms supported at bars. Repeat with one arm supported at bars. Repeat with no support. Repeat with arms abducted. Repeat with arms flexed at 90°. (Test for balance on normal leg. Essential to sitting, rising, picking up objects, stair climbing, walking, etc.)
3. Hop on normal leg. (Develops coordination, balance, and proper body alignment.)
4. *Muscle Education and Coordination* for the suction socket wearers.

   At very slow rhythm when in motion:

   a. In neutral position statically contract all stump muscles and hip muscles active in holding body in good alignment.
   b. Stump in (flexed) swing phase.
      Flex stump from neutral position, bring into coordinated action ilio psoas, adductors. tensor fasciae latae, quadriceps, quadratus lumborum. then extend to neutral position.
   c. Stump hyperextended in stance phase.
      Hyperextend stump from neutral position, bringing into coordinated action, gluteus medius, adductor magnus, gluteus maximus, erector spinea, latissimus dorsi, and hamstrings. Flex to neutral position.
   d. Gluteus medius.
      Extend slightly, externally rotate, and contract gluteus medius. Importance of muscle realized in weight-bearing of stance phase.
   e. Gluteus maximus.
      With stump in flexed position, extend and hyperextend stump. (Important in end of stance phase and beginning of swing phase and stabilizes pelvis.

II. Physical Therapy after Fitting the Above Knee Prosthesis

A. *Review the patient to see if he can relax and contract muscles performing definite motions.* He will need to be sure as it enables him to analyze his own gait and solve gait problems as they occur.

B. *Patient should be taught balance exercises in the above knee prosthesis, especially the suction socket.* Essential before he does too much walking.

C. *Balance or body alignment (with prosthetic limb on.* Stress repeatedly the importance of finding the "tail under".)

   Balance exercises done between bars with both arms supporting, then repeat with one arm supporting, then repeat with no support. (Fig. 5.) Also in front of mirror.

   1. With stump in neutral position, contract stump muscles against socket. (Patient to get feel of contraction of muscles against socket—Important.)
   2. With stump and prosthesis in flexed position, contract stump muscles against socket. (Patient gets feel of contraction of stump flexors and adductors against socket.)
   3. With stump and prosthesis in extended position, contract muscles against socket. (Im-

portant to get feel of contraction of muscles against socket.) These muscles provide the suction ability in controlling the management of such a limb, gluteus maximus and adductor magnus, mainly.

4. With legs about 8" apart, shift weight from side to side without moving feet from floor. (Get feel of evenness and confidence in prosthesis. Be sure to check for lateral stability.)
5. With normal leg forward and prosthetic leg back, shift weight forward and backward, rocking from one leg to the other without moving feet from the floor. Repeat with prosthetic leg forward and normal leg back. Check muscle action in beginning of swing phase and end of stance phase.
6. With prosthetic leg in forward walking position, bring normal leg forward and backward as in walking, shifting weight rhythmically in line of balance.
7. With normal leg in forward walking position, bring prosthetic leg forward and backward as in walking, shifting weight *slowly* and *rhythmically* in line of balance. *(Slowly* to emphasize specific muscle action as patient places prosthetic leg in swing and stance phase of the walking step. *Bears much repetition.)*
8. Full weight-bearing on the prosthetic leg. Bear full weight on prosthetic leg in neutral position. Knee of normal leg slightly bent and normal toe touching floor. Emphasize control of gluteus medius, *(Bears repetition.)* Quadratus lumborum for lateral trunk stabilization.

D. *Walking. (Thomas and Haddan, "Amputation Prosthesis," p. p. 126-135)*

In walking with the suction socket prosthesis, leg muscle action is of first importance, necessitated by the fact that a dual purpose exists. Muscle action in the trunk and stump during the swing and stance phases of walking is of utmost importance not only in carrying the limb through but also in providing the adherence of the socket to the stump, and good gait.

Three components of excellent walking with an above knee pros-

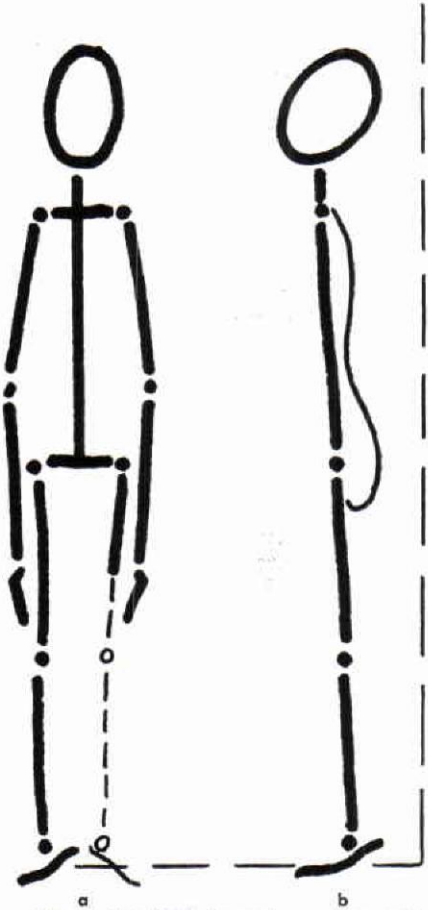


Fig. 5. The body in good standing position.
a. In the frontal plane. Shoulder girdle and pelvic girdle well aligned.
b. In the sagittal plane. Shoulder girdle and pelvic girdle well aligned. (Note "tail under.")

thesis are balance or body alignment, muscle coordination in motion, smoothness and *relaxation in walking rhythm.*

Muscles fitting into the performance of good walking with the suction limb are:

The *Quadriceps* come into action as the weight is coming over and directly after weight comes on the leg during the stance phase.

The *Hamstrings* come into action in picking leg off the floor and they relax as the leg is brought forward.

The *Abductors* contract strongest when the weight is heaviest on the leg and relax as the extensors take over.

The *Adductors* come into play just after the leg is put down, helping to pull the body forward and then when the individual begins to raise the leg bringing the body forward.

The *Gluteus Maximus* comes into action at the end of the stance phase and at the beginning of the swing phase.

The *Gluteus Medius* comes into importance when bearing full weight on the prosthesis and begins to relax as hyperextensors take over.

The *Quadratus Lumborum* aids in flexing chest laterally and forward during weight-bearing phase when normal leg is in flexion, and vice versa.

The *Erector Spinea* maintains erect posture in early stance phase.

The *Ilio Psoas*, a hip flexor, internally rotates when hip is in extension and externally rotates when hip is in 30° flexion.

It is felt that with the attachment of *Lattissimus Dorsi* on spine, pelvis and ribs, that it aids in hyperextension of pelvis and gait. It hyperextends on normal side when stump side is in weight-bearing and vice versa.

1. Walking with both arms supporting at bars, then with the arm opposite to the prosthesis, then with no support. Walk also in front of mirror.
2. Check with limb-maker and surgeon on total fitting of prosthesis as related to alignment and gait.
3. Beginners begin advancing normal leg first.

Walking Training:

1. Standing in neutral position shrug hips alternately and relax, bringing foot slightly off floor.
2. Alternately pick up and set down the prosthetic leg and normal leg. (Develop rhythmic control and motion. Emphasize contraction of Ilio Psoas, Adductors, Abductors, Quads, Tensor Fasciae Latae, Erector Spinea, Quadratus Lumborum, and Latissimus Dorsi.)
3. With normal leg in forward walking position, bring prosthetic limb forward and back as in balance exercise several times to get the feel of walking and developing momentum, then go directly into two full walking steps. (Keep emphasizing muscles used in swing phase and stance phase. Repeat, increasing number of steps each time until good walking develops.)
4. Facing the patient, physical therapist places her hands on the shoulders of the patient, and walks backwards as the patient walks forward. Resistance is offered with the patient pushing against physical therapist's hands, thus moving the trunk forward. (Help patient to get the feel of the body position in space.) (Note difference in sides.)

   Note: Importance of abdominals, lateral trunk, stabilizer, erector spinet and gluteus maximus.

   Repeat, placing only one hand to the shoulder of the side opposite to the prosthetic side.

   Repeat, gradually lessening resistance as patient maintains inclination and good gait.

5. With no aid from the physical therapist, patient bends elbows to bring back of hands toward shoulders and walks as if pushing. Repeat with hands in same position except pushing against hands of the physical therapist.
6. With arms abducted and elbows flexed at shoulder level (as in putting arms around an object or dancing) walk forward maintaining incline of trunk.
7. At a position behind the patient, physical therapist places hands just above anterior thigh joint (bilaterally) and offers resistance as the patient walks forward. (Note difference in stride and strength.) Repeat, placing one hand on the thigh opposite to the prosthetic side. (Note how offering of resistance aids the strength of the posterior muscle on the prosthetic side.) (Important in equalization and rhythm of stride.) Repeat gradually lessening resistance while the patient maintains good gait.
8. Walk swinging arms at sides.
9. Walk carrying objects.
10. Walk with arms flexed at 20°.
11. Walk with arms abducted to shoulder level.
12. Walk with hands clasped behind body.
12. Side stepping, side step from either side.
14. Stepping backward. Shorten stride. Keep knee locked in extension. (Gluteus Maximus.)
15. Pivoting: With normal leg forward and supporting all the body weight, pivot on the ball of the normal foot and turn in the direction of the prosthesis. This leaves the artificial foot in forward position and the normal leg in position to step forward.
16. Picking up objects from the floor: With weight on normal leg and prosthetic leg slightly behind normal leg, flex both legs and bend forward from the waist.
17. Sitting and rising from a chair: Approach from the front, pivot and bring prosthesis back beside normal leg. Weight on normal leg, hands on knees, bend slightly forward and sit into chair. On rising from chair, place normal foot close to chair and behind prosthetic foot, bend forward, place weight on normal leg and rise.
18. Walking up and down inclines: Shorten stride or if steep walk sideward from normal side. Walking down inclines, shorten stride, incline trunk forward so as to keep center of gravity anterior to knee center of prosthesis. Keep gluteals contracted to hold artificial knee in extension. (Confidence is important.)
19. Stair climbing: Normal foot placed on step first, body weight shifted over normal leg, bringing the artificial foot to a position beside the normal foot. In descending, artificial foot is placed forward over lower step so instep is over edge of tread. Body weight is shifted forward over prosthesis and normal foot brought to position on next step below, as prosthesis bends at knee, the foot rolls over the edge of the tread. (Fig. 206-7, Thomas and Haddan, "Amputation Prosthesis." Confidence is important, and comes with practice. Learning should be begun at lower step.)
20. Sitting and rising from floor: Sitting on the floor with prosthetic leg slightly forward position, and trunk inclined forward, bend with weight on normal leg and lower body to floor as knee bends. Support with hands on floor. Rising from the floor, supporting body with hands on floor, bend normal knee to set foot on floor. Push with arms and normal leg to raise body upward until the normal leg can take over the balance and complete the bringing of the body to an upright position.

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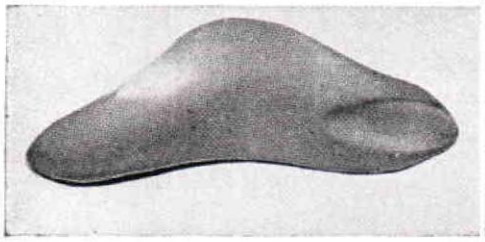

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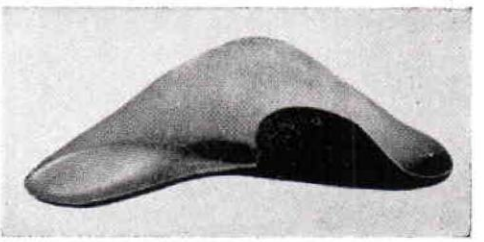

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REVIEWS

JUVENILE AMPUTEE TRAINING PROGRAM.

(Published by the Michigan Crippled Children Commission, Carleton Dean, M.D., Director. 30, pages, illus., and charts. 1955. Reviewed by Anthony Filippis, C. P. & O.

This booklet serves as a progress report to the Governor, Legislature, and the People of the State of Michigan. Its well-illustrated format may well serve as a guide to doctors, therapists, field nurses, social workers and prosthetists interested in the welfare of the juvenile amputee.

The armed services amputation rehabilitation program of World War II challenged the Michigan Crippled Children Commission to investigate the needs of its child amputees. A Statewide survey revealed the inadequacies of services to this group; consequently, in 1946, a pioneer project in this field originated. The nation-wide interest which it has aroused proves its effectiveness.

A comprehensive program stressing the "team" approach, emerged with the following organizational pattern:

I. Initial examination, evaluation and prescription
II. Physical therapy
III. Fitting of the Prosthesis
IV. Prosthetic training
V. Occupational therapy
VI. Field Service follow up
VII. Clinical follow-up

It is essential that the parents be made part of the "team" and understand the value of the prosthesis and its importance in the child's adjustment to life. They must realize that the training only begins at the center. Their co-operation in the home and with the clinical follow-up program will provide the necessary stimuli for the successful wearer. Parents who question the validity of early prosthetic fitting are introduced to parents of children with similar conditions who have proven the value of wearing a prosthesis. Field nurses maintain the rapport between the home and clinic and serve as consultants to the local health agencies.

The prosthetic training section summarily outlines a program of graduated activities to meet the demands of the various age groups. Children receive training to meet the demands of school and play activities. This section, therefore, demonstrates that the goal in training is a well adjusted, well co-ordinated, active youngster who is able to compete with his playmates in the normal activities of children. The larger percentage of successful wearers in both the lower and upper extremity cases speaks volumes with the respect to the success of this approach. The evidence contradicts the philosophy that parents should delay fitting child amputees until their late teens.

In Memoriam

THOMAS EDWARD GRIFFITH, Vice President and Secretary of the Board of Directors of J. E. Hanger, Inc., died September 8, 1955 at his summer home at White Point, Maryland. He had been ill for several months. Mr. Griffith began his affiliation with the J. E. Hanger organization in 1906. He organized the first office in France in 1915 and opened several branches in that country. He returned to Washington in 1921 and had been in charge of production since that time. Among his survivors are his son, Thomas E. Griffith, Jr., a Certified Prosthetist.

GEORGE M. MORRIS, Former Secretary of the Artificial Limb Manufacturers Association and for many years an employee of the W. E. Isle Company, died July 14, 1955. Mr. Morris was former editor of OALMA publications and is reported to have been the person who originated the name "Almanac."

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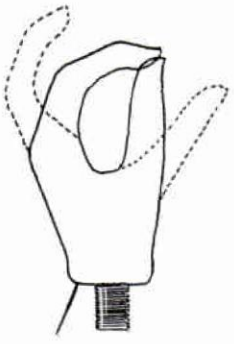

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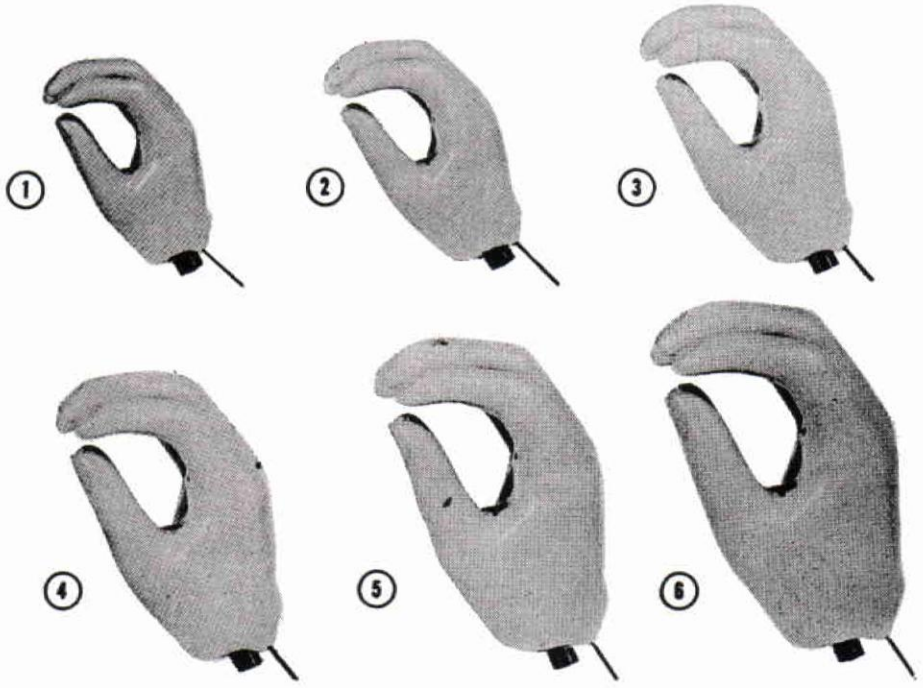

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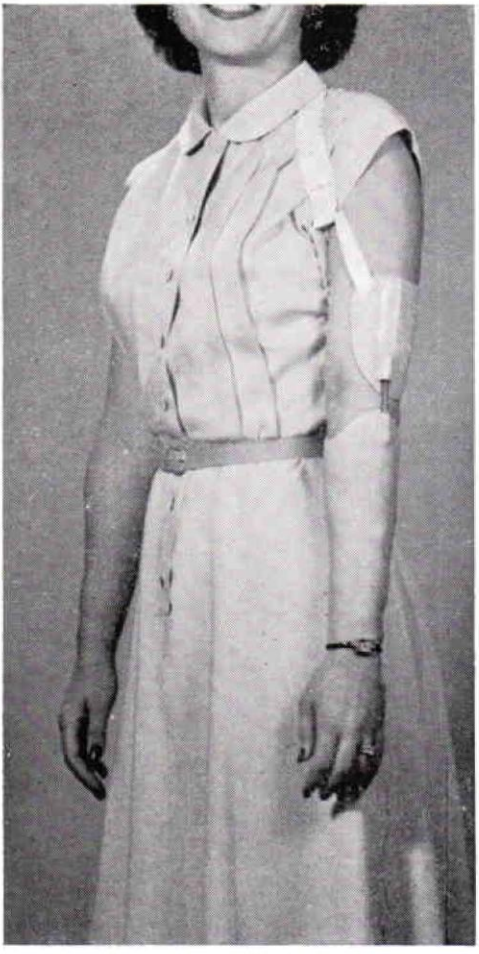

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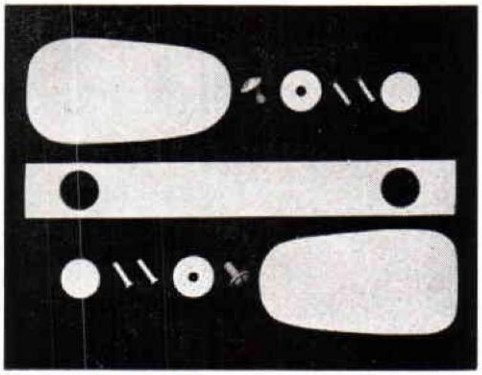

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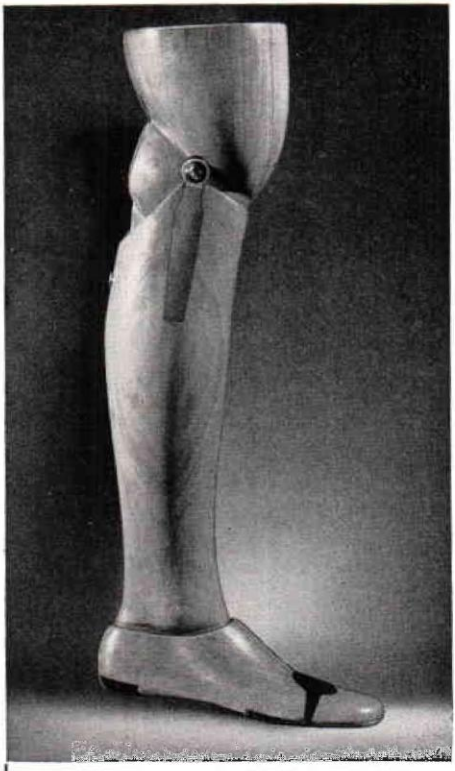

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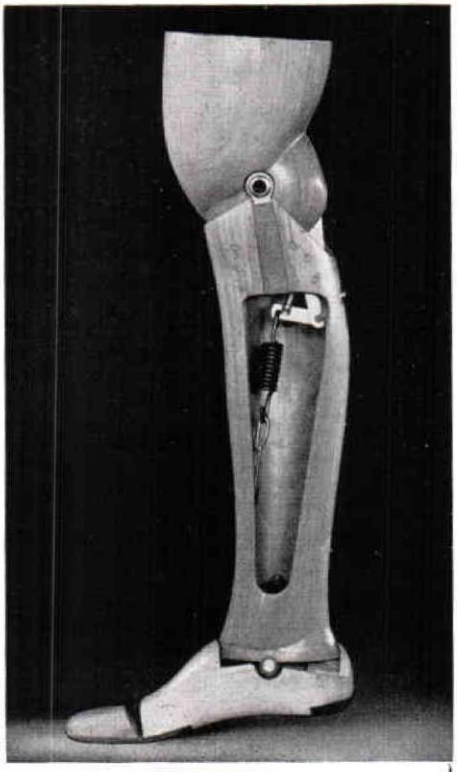

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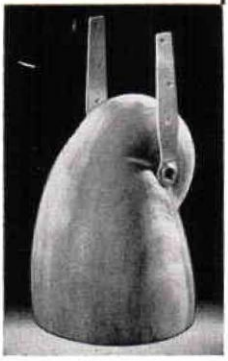

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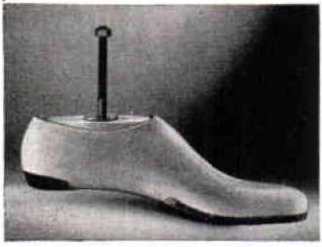

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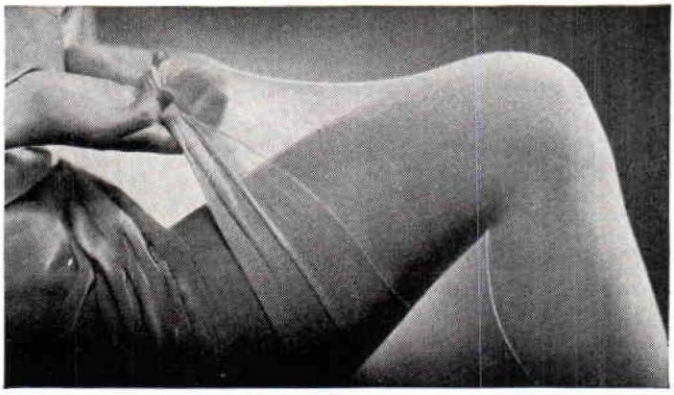

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CONSULTANTS

Chester C. Haddan, *Consultant to the Board*, Denver
David E. Stolpe, *Consultant on Examinations*, New York

STAFF

Glenn E. Jackson, *Executive Director*, Washington
Lester A. Smith, *Assistant Executive Director*, Washington

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 the industry member is possessed of the requisite competence to assure his ability to fulfill such guarantee. A prosthetic device is not to be considered as fitting or an orthopedic appliance 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.