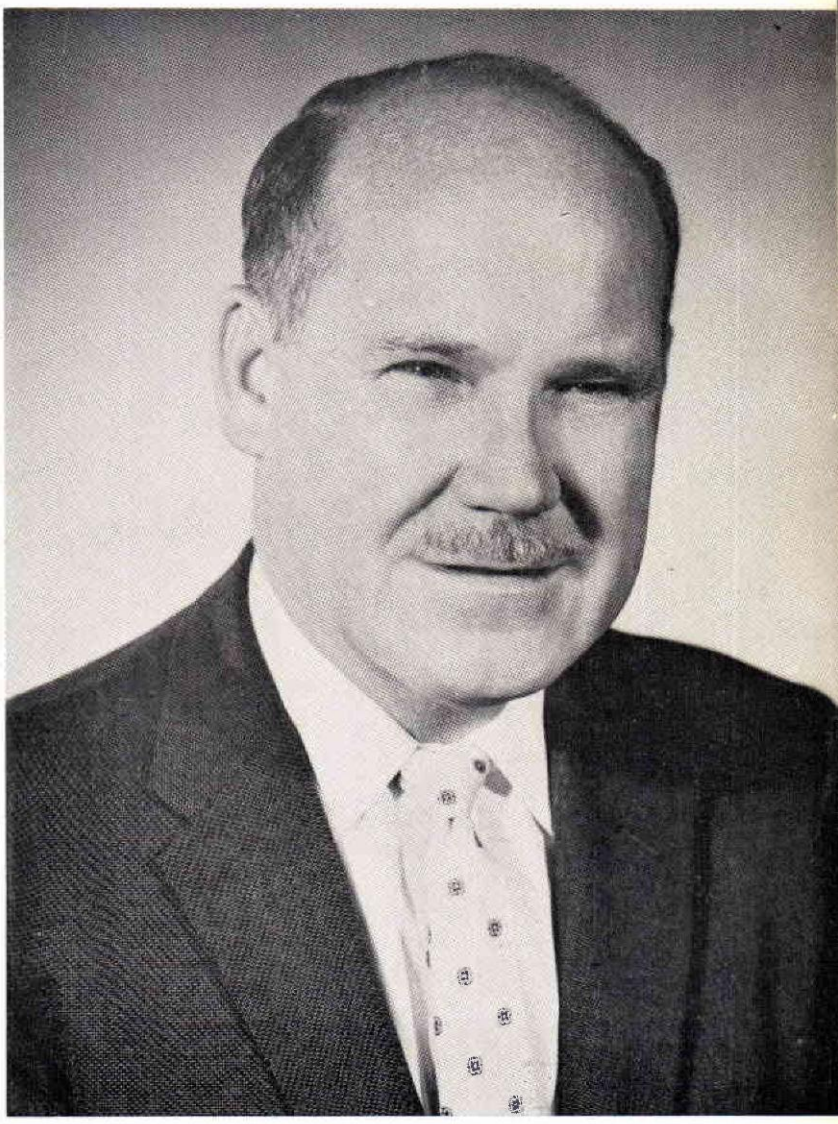
DECEMBER, 1961

ORTHOPEDIC & PROSTHETIC APPLIANCE JOURNAL

The Journal of the Limb and Brace Profession



FRED QUISENBERRY

President 1961-62, American Orthotics and Prosthetics Association

publisher: American Orthotics and Prosthetics Association

Calendar of Regional Meetings of the American Orthotics and Prosthetics Association

Listed below are the dates and meeting places of the eleven regional meetings which will be sponsored by the Association in 1962. These meetings are open to all those interested in the rehabilitation of the orthopedically handicapped.

Requests for reservations and program suggestions should be addressed to the Director of the particular Region concerned. The names and addresses of these Directors are included in the list.

Additional information concerning the programs and speakers for these meetings will appear in subsequent issues of the *Almanac* and *Journal.*

March 30-31—Region VIII, at Houston, Texas, Rice Hotel. (Director, David C. McGraw, Snell's Limbs & Braces, 1833 Line Avenue, Shreveport, Louisiana)

April 6-8—Region IV, at Jackson, Mississippi. (Director, Wilbur Floyd, W. L. Floyd Brace Co., 131 King Street, Charleston, South Carolina)

April 13-14—Region V, at Akron, Ohio. (Director, Durward R. Coon, D. R. Coon Company, 4200 Woodward Avenue, Detroit, Michigan)

April 27-29—Regions IX and X Jointly, at Yosemite, California, Awahnee Inn. (Director, IX, Charles D. Neal, Adroit Prosthetics Mfg. Co., 2224 West 7th Street, Los Angeles, California; X, Rex Sobers, R. E. Huck Co., Inc., 2058 Market Street, San Francisco, California)

April 27-29—Region III, at Philadelphia, Pennsylvania. (Director, Louis Pulizzi, Williamsport Orthopedic Company, 138 East 4th Street, Williamsport, Pennsylvania)

May 4-5—Region II, at New York City, Summit Hotel. (Director, Mrs. Mary Dorsch, Dorsch-United Limb & Brace Co., 109 East 29th Street, New York, New York)

May 17-18—Region VII, at Kansas City, Missouri. (Director, Erich Hanicke, P. W. Hanicke Mfg. Co., 1009 McGee Street, Kansas City, Missouri)

May 25-26—Region XI, at Gearhart Beach, Oregon, Gearhart Hotel. (Director, August W. Pruhsmeier, K. E. Karlson Co., 718 S. W. 11th Avenue, Portland, Oregon). Arrangements: William L. Bartels, 1120 N. W. 21 Ave., Portland, Oregon.

June 8-9—Region VI, at Indianapolis, Indiana, Marott Hotel. (Director, Stanley E. Hedges, Indianapolis Artificial Limb Corporation, 959 North Pennsylvania Street, Indianapolis, Indiana)

Date not set—Region I. (Director, Joseph H. Martino, United Limb & Brace Co., 15 Berkeley Street, Boston, Massachusetts)

Orthopedic and Prosthetic Appliance Journal

(Title registered U. S. Patent Office)

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The *Orthopedic and Prosthetic Appliance Journal* is issued four times a year—in March, June, September and December. The 1961 subscription price payable in advance is five dollars a year, for delivery anywhere in the Western Hemisphere. The subscription rate elsewhere is six dollars a year.

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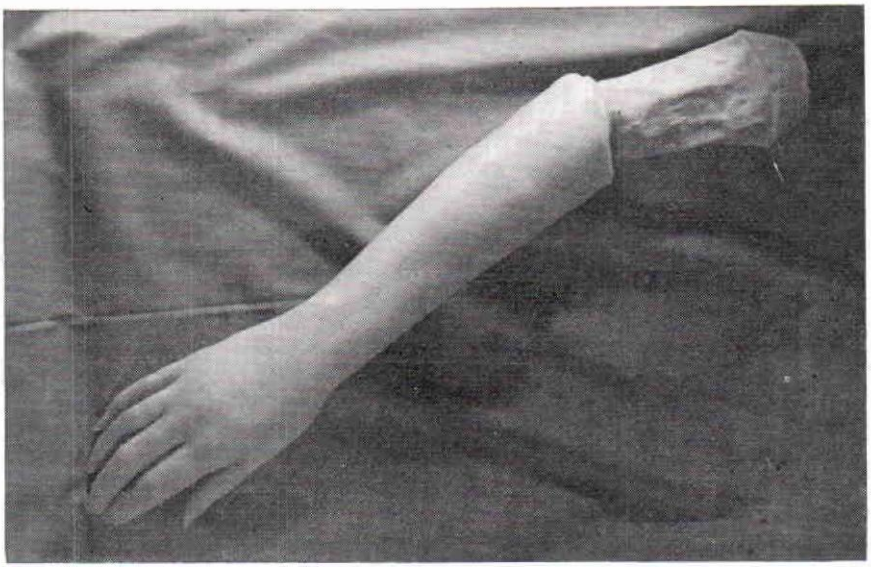

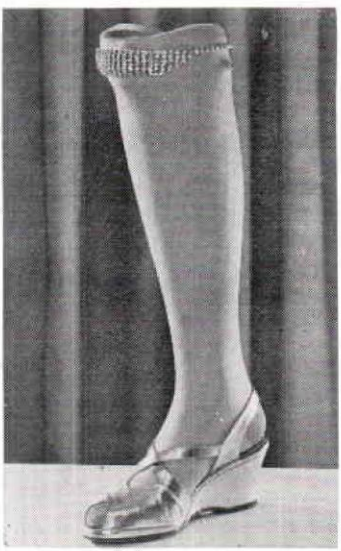

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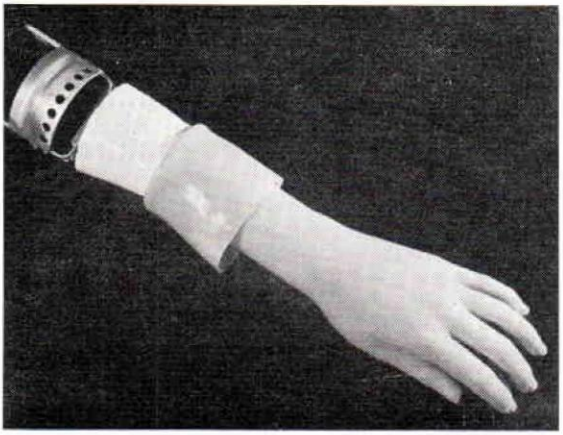

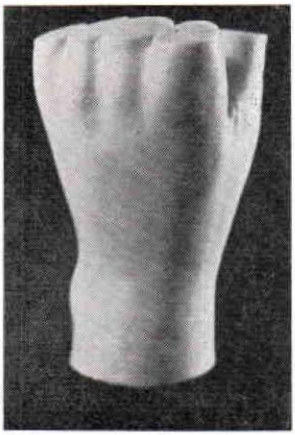

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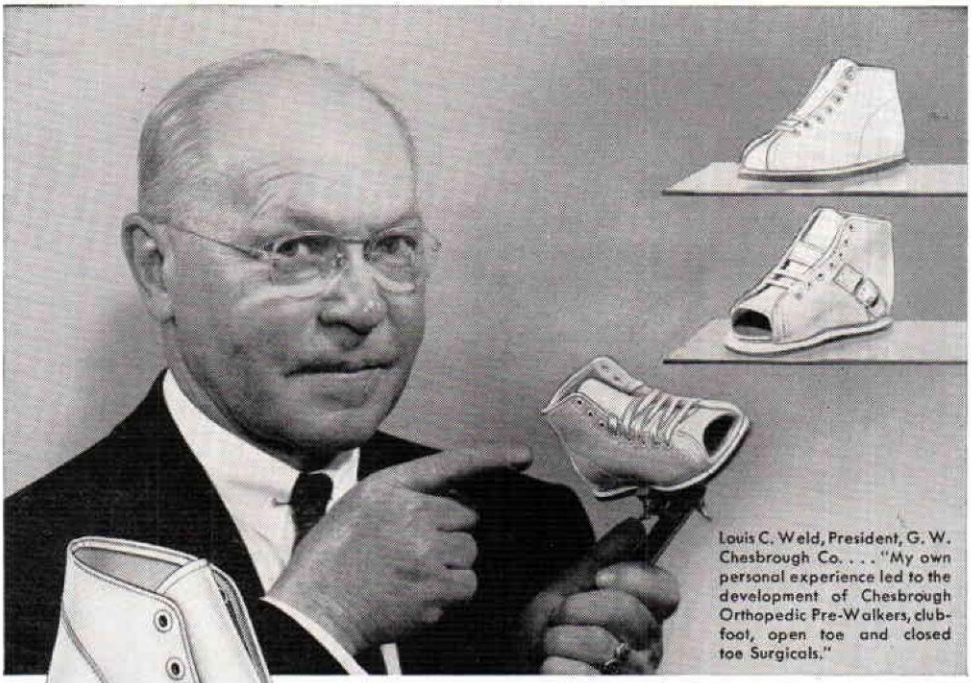

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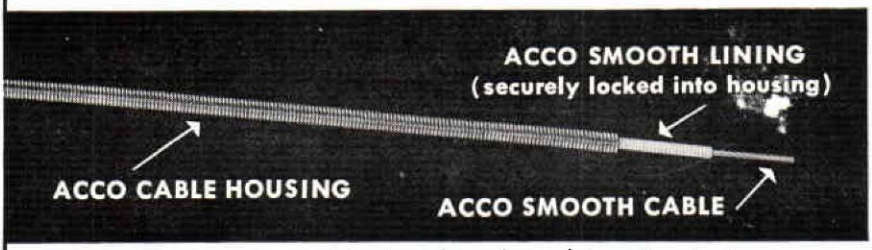

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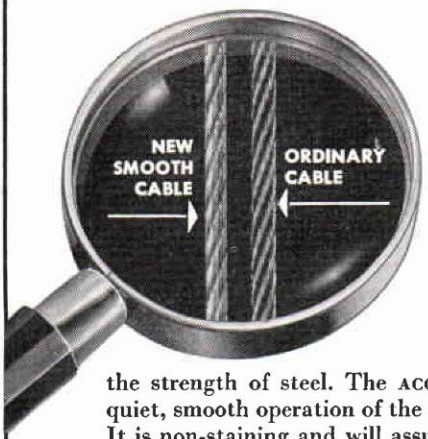

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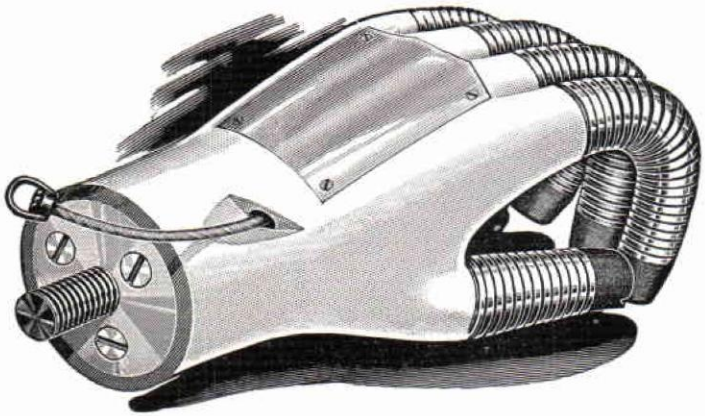

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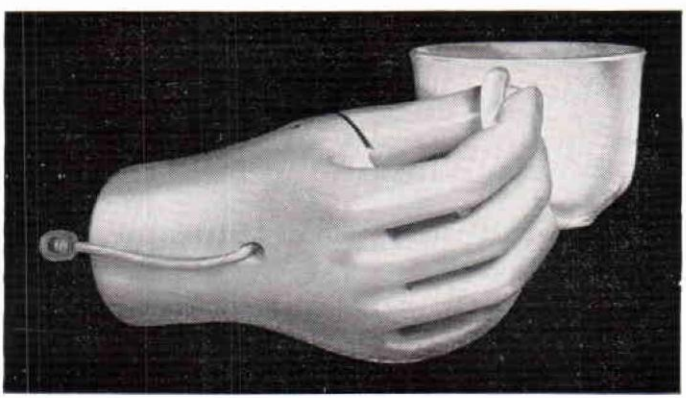

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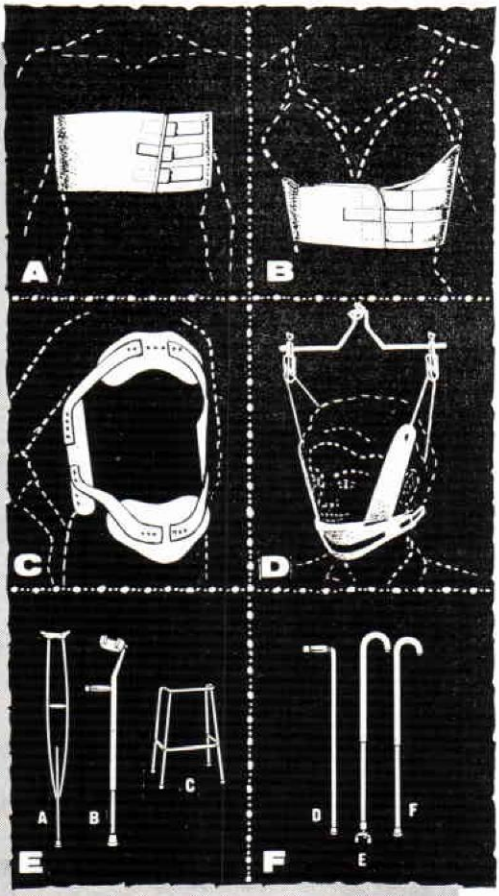

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What We Are Trying To Brace In Cerebral Palsy

By ROBERT P. KEISER, M.D.

Coral Gables, Florida

EDITOR'S NOTE: *The following paper was presented at the 1961 National Assembly of the American Orthotics and Prosthetics Association in Miami Beach, October 19 through 25.*

Cerebral Palsy is one of the most common among the neuromuscular disorders, which for its successful management, requires the skill, knowledge, and coordination of many people, not the least among whom are the Orthopedist and the Orthotist.

Historically, this condition was first described by a London Physician, Dr. William John Little, just one hundred years ago in 1861. Sir William Osler in 1889, first used the term, "Cerebral Palsy," but subsequently, for many years, variable terms were used to describe the condition, which was limited in scope and not too well understood as we understand it today. In relatively recent years, Dr. Winthrop Phelps and others have more or less standarized this term as an all inclusive description of the multiple complexities involved in this disease.

It is interesting to note how emphasis changes over periods of time in the various diseases of mankind. Cerebral Palsy has been known and treated for many years, but until the era of sulfa drugs and antibiotics, the great medical effort was directed toward the treatment of acute diseases of childhood and relatively little attention was paid to the chronic, disabling, conditions. These children so afflicted were kept out of sight, regarded as a mistake or an unfortunate incident somewhere along the line, and for the most part were cast aside. Today, and for the past fifteen years or so, an all-out care program is in effect as well as research as to the cause of Cerebral Palsy and its various types, new approaches to the associated deafness, blindness, speech impairment, mental deficiency, education potentialities, etc., etc., etc.

Today, then, we are facing the problem which affects, according to various statistics in different areas of the world, from one to three children and their parents, out of every one-thousand births.

What is Cerebral Palsy? The American Academy of Cerebral Palsy has defined it as "any abnormal alteration of movement or motor function arising from defects, injury, or disease of the nervous tissues contained within the cranial cavity." A more simple, concise, definition would be "A Neuromuscular Impairment of Cerebral Origin."

Before we can treat these individuals by bracing or any other type of therapy, we should know with which of the various types of Cerebral Palsy we are dealing. There are five main categories.

1. SPASTIC—This is the most common; may affect one or all four of the extremities and the trunk. These are described as Monoplegic, Quadriplegic, Paraplegic and Hemiplegic.

2. ATHETOSIS—This is next most common of the Cerebral Palsies and may be described as those having uncontrolled, involuntary, somewhat purposeless movements of the trunk and extremities. They may present a certain amount of increased muscle tension, but do not have the Hyper-Reflexia or the Pathological Reflexes associated with Spastics.

3. ATAXIA—This is best described as merely an unsteadiness of gait and balance.

4. TREMORS—Rapid repeated Rhythmic Tremor involving the entire body or any of its parts.

5. RIGIDITY—These are manifest by general resistance to movement of joints or parts in any direction. One gets the feeling of bending a lead pipe when attempting to passively move the extremities.

Over a period of years the pendulum of medical opinion regarding bracing in Cerebral Palsy has swung from the opinion of those who feel that no bracing is indicated to the other extreme of over-bracing and depending on braces too much and for too long a time. There are still those who advocate one extreme or the other. However, most men associated with this condition feel that bracing does play a very integral and important part in the treatment program.

We feel that bracing plays an essential role in the treatment of these children and would find it almost impossible to effectively manage them without it.

We must realize that in Cerebral Palsy we are confronted with weak muscles as well as spastic or overly strong muscles. The weakness is due to flaccidity, central in origin, or to weakness from disuse and/or the long term, overpowering reaction of their antagonists.

There are five main objectives toward which we are striving by the use of braces in Cerebral Palsy:

1. To reinforce a certain joint or joints which are unstable for weight bearing or use, because of weak controlling muscles or an over-pull of strong muscles or a combination of both—Spastic.

2. To stabilize or control certain joints or parts for the training of others, or to assist balance either in standing, sitting, or walking—Athetoid.

3. To prevent deformity—Spastics and some of the Rigidities.

4. To assist in correcting deformity—we feel that very few braces can successfully correct deformity of any degree, and particularly in the spastics where they commonly develop. More will be said about this later.

5. To maintain correction of deformity after it has been overcome by other means, i. e., surgery or plaster casts.

Another category which we might add in our objectives are those severe, virtually untreatable cases from every viewpoint, for which there are braces to convert an unmanageable mass of protoplasm to some semblance of shape and stability, thus making the everyday care of such an individual a little easier. This particular objective combines several of those previously outlined.

In general, as all of you know, braces for use in Cerebral Palsy must be of heavier construction and be more durable, particularly at the joints, than comparable braces in Poliomyelitis, for instance.

To enlarge on our previous statement regarding the correction of deformities with braces, it has been our experience that fixed deformity of any degree, or deformities associated with severe spasm, cannot be handled adequately with braces. Despite adjustable knee lock hinges or graduated ankle stops, patients cannot tolerate the more or less localized pressure areas

of bracing for sufficiently long periods to afford correction. This is particularly true at the knee. In the equinus deformities of the feet, shoes of any type do not have an adequate hold or sufficient surface coverage to keep them from slipping. This results either in no benefit or the development of pressure ulcers, particularly on the heels. It is much more efficient and generally more satisfactory in such instances to correct the deformity by casts, or in selected cases by surgery; then utilize bracing to maintain correction, and as a mechanical assist, for stabilization and training purposes.

At what age do we start using braces? The simple answer, of course, is at whatever age they are needed. The need varies in each individual case and depends to a degree on how much retardation and damage exists elsewhere, other than simply the motor center. There is no value in bracing an infant who hasn't attained sufficient developmental maturity to make any attempt to sit, let alone walk. When they have reached a level where they make the effort but can't, then simple bracing will assist in the development of muscle control to accomplish the desired end. The same holds true for standing and walking. Although the pressure from parents will be great to "do something," it is a waste of time, energy, and money to attempt the impossible. We must have *something* to work with before we can assist it. These parents should be impressed that they have a long, hard, potentially expensive road ahead and must adjust themselves accordingly.

In regard to specific types of braces, lower extremity, upper extremity, trunk, etc., I am not going to recommend or advocate any name type or go into any particular construction detail. Each physician who is informed and handles these cases has his own preference, and each brace man utilizes his own techniques of construction. It is essential, however, that the appliance as applied to and used by the child be the result of the close cooperation and the complemental thinking and knowledge of the physician and the orthotist to accomplish the purpose or purposes for which it is constructed. This requires a certain amount of knowledge on the part of both, of each other's art, and a willingness to consult freely with each other from the time the prescription is written until proper fitting and all adjustments have been made, to accomplish the desired end result.

In general, with the spastics and athetoids, upper extremity bracing has many shortcomings and in most instances is not too practical. The usual attitude of elbow flexion, wrist and finger flexion with forearm pronation, just does not lend itself well to bracing, except for part time use during training periods, or as a night appliance to prevent impending fixed deformities. Most children learn to use their assistive hand, (and that is all it is, even at best) better without than with a brace. They are for the most part cumbersome, unsightly, require assistance in their application, and the children and parents simply refuse to use them consistently.

In the lower extremity, double bar braces with few exceptions are necessary to provide sufficient control. Static stops at the ankle are more effective than the spring type in most cases, because the spring is apt to trigger the stretch reflex, particularly of the calf musculature, and the heel simply pulls out of the shoe, even though the shoe may be of the high top type.

In the case of severe spastic equinus a short leg brace is inadequate and the knee must be included in the bracing to effect adequate control of the foot.

With the long leg brace, the ring or slip lock seems most desirable at

the knee, with or without an extension spring control, and must be bilateral because of the torsional stresses exerted at this level.

The problem at the hip level is usually one of adduction or scissoring, flexion of the hip and rotation at the hip, more commonly internal rotation or "toeing-in." All elements of the deformity vary considerably in degree in each individual case. Adequate control and satisfactory gait patterns can be attained in mild cases with long leg braces and either elastic or leather rotation control straps. In others, where more severe spasticity exists, and there is associated weakness of their opposing muscles, pelvic bands are necessary. The simple band may be altered in several ways to effect more stability. Gluteal reinforcement pads or straps can be added as the need arises. Interpositioning devices between the leg braces of various ballbearing and other control types are used to maintain an abducted position, taking more stress off the hip joints and still allowing the reciprocal forward and backward motion of the extremities for walking.

For those more severe cases of spasticity or athetosis with associated trunk and hip weaknesses, full bracing of the extremities and trunk are necessary. These are used not only for control purposes, but in athetoids particularly to eliminate the "Athetoid Shift" and to establish over a long period of time, muscle development according to a certain pattern of standing and walking, so that they eventually may eliminate their appliances. Athetoids very rarely develop any fixed deformity. This fact fortunately eliminates one of the problems in the treatment of these most difficult cases.

In summary, I would like to emphasize several points:

1. Bracing is an essential part in the successful treatment of the neuromuscular component of the disease complex known as Cerebral Palsy, in most instances except the mild forms of spastics, athetoids and rigidities. It is of practically no value in the ataxics or tremors.

2. It is just as wrong to over-brace and depend on bracing for too long a time as it is to under-brace or not brace at all when it is needed.

3. It is necessary that both the physician and the orthotist realize the limitations of bracing and not try to accomplish with appliances something that could be accomplished more efficiently and effectively by other means.

4. It behooves both the physician and the orthotist to analyze the problem and the goals to be attained before prescribing or constructing a brace.

5. The end result should reflect the combined efforts and knowledge of the two and should not just be a shiny piece of metal and leather into which a complete body or one of its parts is crammed for better or for worse.

6. It is not enough for the physician to know the etiology, manifestations and types of Cerebral Palsy. He must have some knowledge of mechanics and brace construction and their application to a patient. Neither is it enough for the orthotist to mechanically know the component parts of the braces and how they are put together. He must have some knowledge of anatomy, joint function, and its muscle control, the basic problems of Cerebral Palsy and how his appliances can be adapted and fitted to a human being. In other words, there must be a common ground where both can meet to discuss and evaluate the various aspects of the presenting problem.

Application Of External Power In Upper Extremity Orthotics*

ROY SNELSON, C. O., *Chief Orthotist*; ANDREW KARCHAK, JR., B.S., *Research Engineer*; and VERNON L. NICKEL, M.D., *Chief of Surgical Services and Head Orthopedist*
Rancho los Amigos Hospital

In dealing with the patient who has severe paralysis of the upper extremity, the orthotist often is confronted with the problem of lack of available muscle power for the control of a device. It is frequently necessary to resort to an external source of power to operate desired motions. In selecting an external source of power one must consider the efficiency of the source used, its ease of application, availability and cost of replacement.

After investigation, it was found that the source that most satisfactorily provides these essentials is carbon dioxide.[1] Carbon dioxide is a low molecular weight gas which liquefies at 750 pounds, 72° F. It is non-toxic, non-combustible, costs approximately 10 cents per pound in liquid form, and is readily available almost anywhere in the United States.

Before attempting a fitting utilizing carbon dioxide for external power, the orthotist should have a good understanding of the components necessary in order to convert this power into motion. The external power system consists of the following parts: the cylinder for storing gas; the pressure regulator for reducing the tank pressure to a useable range from 0 to 90 pounds; connecting tubing; valve; pneumatic actuator, which may be an artificial muscle, piston and cylinder, or bellows.

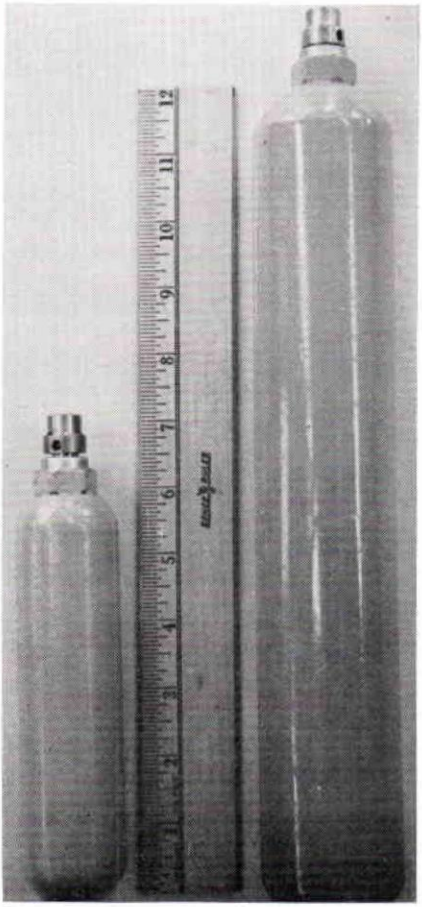


Figure 1

* This investigation was supported in part by PHS research grant No. RG-7088 from the Division of General Medical Sciences, National Institutes of Health, Public Health Service, and in part by research grant No. RD-518 from the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare, Washington, D.C.

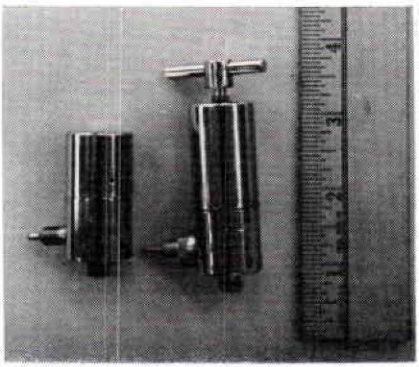


Figure 2

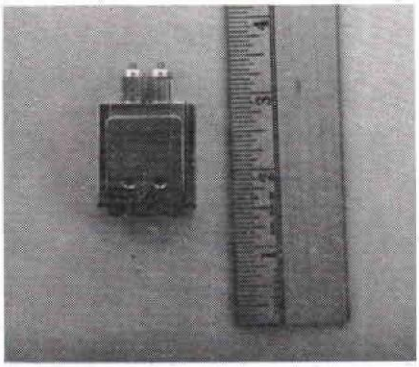


Figure 3

Experience has shown that two cylinder sizes will handle most cases. The small cylinder is satisfactory for use on ambulatory patients where weight is a problem and the large cylinder is satisfactory for wheel chair patients where the weight need not be a consideration (Fig. 1).

There are currently two pressure regulators in use. One is adjustable, and provides pressure in the range of 0 to 90 pounds, which may be raised or lowered by means of the adjusting screw on top of the regulator. The non-adjustable type is pre-set at 50 pounds and provides no feature of adjustment. The only advantage of the non-adjustable regulator is that it is smaller (Fig. 2).

The connecting tubing that has been found to be most satisfactory is .162 O.D. .055 I.D. polyvinyl chloride, 150 pound burst.

The valves most commonly used are the lever valve (Fig. 3), the slide valve (Fig. 4), and the microswitch activated solenoid valve (Fig. 5). All valves have three positions: a position of fill, a position of hold, and a position of exhaust. It was found necessary to provide a position of hold because the amount of force available for control in the paralyzed patient is quite limited. With the position of hold, a patient can fill the pneumatic actuator, close the hand on a pencil for example, and then relax and maintain this force until the valve is actuated to the exhaust position. This enables the patient to maintain prehension with no expenditure of energy.

The lever valve requires about four ounces of activating force and is designed for use where the control source is a push, such as in plantar flexion or dorsiflexion of the foot (Figs. 6, 7), abduction of the thigh, or nudge control using the chin. This valve is used most commonly with wheel chair patients.

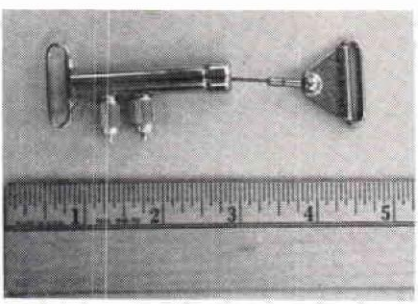


Figure 4

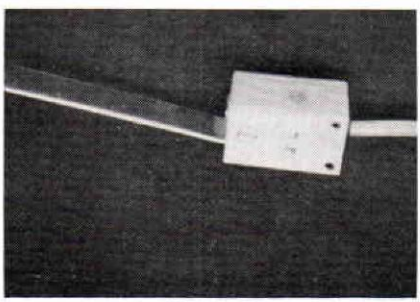


Figure 5

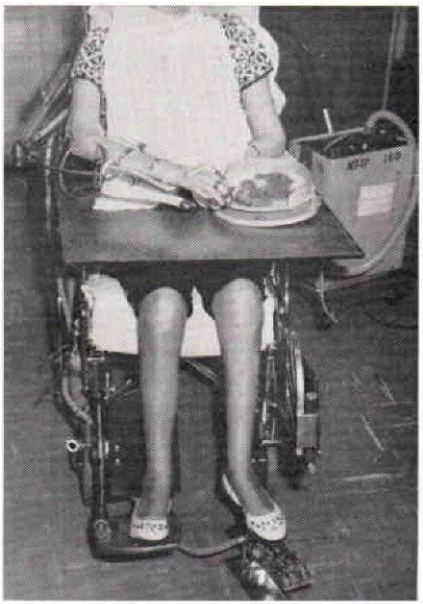


Figure 6

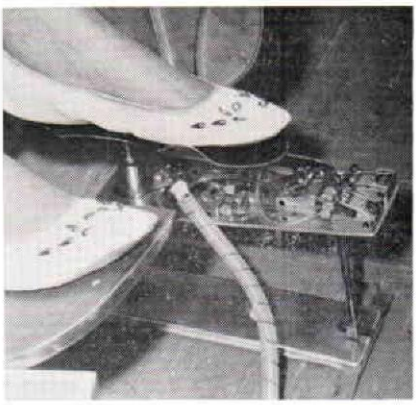


Figure 7

The slide valve requires about eight ounces of activating force and is designed to be inserted directly into the harness (Fig. 8). This valve is primarily for use with the ambulatory patient in conjunction with a shoulder harness.

The solenoid valve has an activating force of about four grams and is designed for application where force and excursion are extremely limited. For example, it can be mounted to utilize trace finger flexion to activate an artificial muscle driven flexor hinge splint (Fig. 9). By wiring the solenoids in parallel it is possible to control two artificial muscles with one activator whereby one artificial muscle will fill as the other one exhausts, thus providing an agonist antagonist action. This can be quite helpful when applying pneumatic actuators to mobile arm supports, such as ball bearing feeders.

The pneumatic actuators most commonly used are the artificial muscle and the piston and cylinder. There are two artificial muscles, weave 100-1 and weave 100-2. It can be seen from the force-tension curves (Figs. 10, 11) that the muscle weave 100-2 has approximately the same excursion but

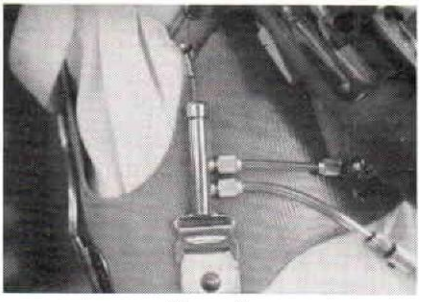


Figure 8

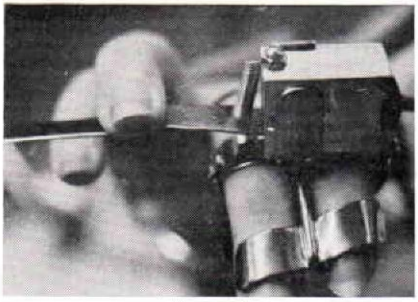


Figure 9

twice the force of weave 100-1. Weave 100-1 has a life of about 1,000,000 cycles, as compared to weave 100-2 with approximately 15,000 cycles.

One advantage of the artificial muscle over a piston and cylinder is that an artificial muscle has no static friction. When gas is ejected at low pressures into a piston and cylinder, there is a tendency for the sealing medium to adhere to the cylinder wall, causing the pressure to build up and then the piston to move. This causes an uneven, jumpy action. This situation does not occur in the artificial muscle or bellows actuator. Another advantage of the artificial muscle is that alignment is not critical. With a piston and cylinder one must be very careful to obtain accurate alignment or the system will not function properly. A third advantage of the artificial muscle is its weight. It is extremely light as compared with a piston and cylinder.

The disadvantage of the artificial muscle is that it is inadequate when one attempts to apply considerable force through great excursion, such as is needed in the mobile arm support for the wheel chair patient, because it will only contract about 30 per cent of its length. In these cases it is necessary to use a piston and cylinder.

We have found it to be more practical in most cases to use the double acting piston which we can control with one valve, as described above in relation to the solenoid valve. This supplies us with a bi-directional power and has a tendency to minimize the static friction inherent in the piston and cylinder.

It is quite often necessary to operate a number of artificial muscles from one power cylinder. This can be achieved by the use of a manifold connection of all the connecting tubes.

This article is the first of a two-part series. The second part will cover fitting techniques, etc.

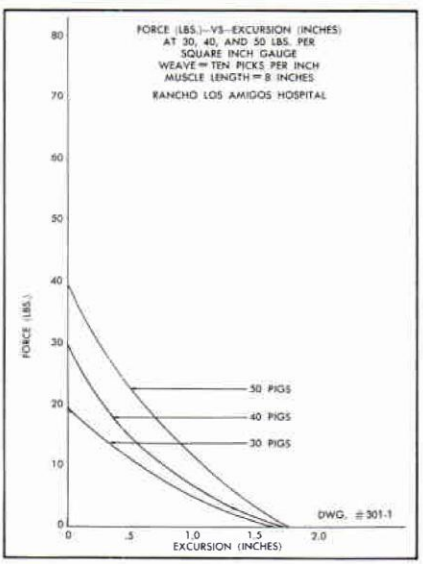


Figure 10

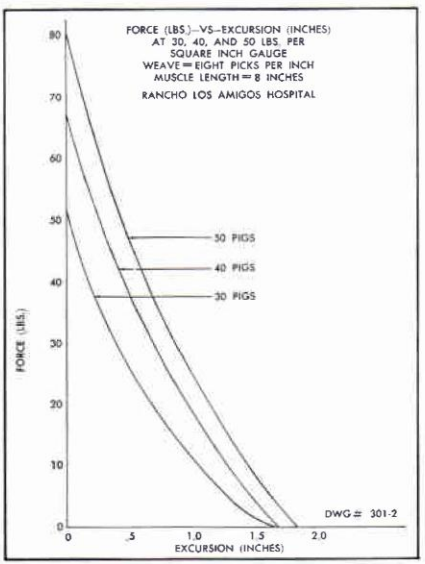


Figure 11

REFERENCE

[1] Snelson, R. and Conry, J.: Recent advancements in functional arm bracing correlated with orthopedic surgery for the severely paralyzed upper extremity. Orthopedic & Prosthetic Appliance J., 12: 41-49, March 1958.

Excerpts from "A Survey of Research Activities in Western Europe for Selected Areas of Biotechnology"

By HILDE GROTH, Ph.D.
Department of Engineering
University of California at Los Angeles

EDITOR'S NOTE: The following excerpts of special interest to prosthetists and orthotists are reprinted by permission of the author from the report of the same name, published by the UCLA Department of Engineering. Complete copies may be obtained from the Biotechnology Laboratory, Department of Engineering, UCLA, Report 61-30.

This continuing project is conducted under the sponsorship of the Veterans Administration with coodination by the Prosthetics Research Board, National Academy of Sciences, National Research Council.

Upper Extremity Prosthetics Research

Organized prosthetics research comparable to programs in the United States apparently does not exist in the European countries visited. Personal initiative of individuals interested in prosthetic problems seems to determine both the extent and direction of developments taking place. Since most of the investigators are working either in clinical settings or for private enterprise, current developments reflect these conditions and seem to be the result of a considerable amount of trial and error "gadgeteering" rather than controlled engineering research and analysis. Lack of sufficient financial support from interested government agencies for necessary basic research apparently is another important factor contributing to the observed trends.

Implied by discussions was one rather serious reason that may contribute to the relative lack of research effort in this field. Prosthetics is considered to be a specialized handicraft and lacks status as a legitimate field for scientific inquiry. The general emphasis on hardware component developments seems to discourage capable talent among theoretical and analytical investigators and may account for the presence of a disproportionately large number of inventor-technicians with vested interest in prosthetics development.

Since man-machine-systems concepts have found far less consideration in engineering design in Europe than in the United States, it was not surprising to find the integrative systems approach missing altogether in prosthetics.

The specific influence of socialized medicine in Great Britain and quasi-socialized medicine in West Germany cannot be evaluated adequately without further study. In these countries great importance seems to be attached to factors of low cost, high reliability, and easy maintenance. This emphasis apparently exerts a retarding effect upon support and encouragement of implementing more progressive design ideas.

In the following sections, the state of the art of upper extremity prosthetics in Great Britain, France, West Germany, and Spain will be discussed in more detail.

1. GREAT BRITAIN

a. *Queen Mary's Hospital, Roehampton*

A visit with Dr. McKenzie and Brigadier Swettenham of Queen Mary's Hospital Limb Fitting Centre, Roehampton, provided first hand impressions of the present philosophy of this institution concerning artificial arm developments.

Simplicity, low cost, easy maintenance, durability, and reliability are considered the most important criteria for replacement limbs. As every amputee must be treated as a special case, developments directed toward fabrication of standardized prostheses for given levels of amputation are considered unrealistic and impractical. Whatever type of prosthesis and terminal device will fulfill an amputee's personal desires is determined, and components are supplied accordingly. For example, if the amputee indicates a preference for specialized terminal devices to a general purpose hook, his wishes are taken into consideration and a suitable armamentarium is prescribed.

Utilization of available materials for prosthesis fabrication is deemed more important than a radical shift to exclusive use of new products like plastics. Consequently, there appeared to be more leather sockets than plastic sockets in the Centre's storerooms and repair shops. The general feeling is that although leather is sweat absorbent, such sockets are more comfortable and total sweat secretion seems to be less than in plastic sockets.

With regard to external power, little need for it was seen at the Centre, which supplies most prosthetic demands in Great Britain. McKenzie and Swettenham felt that the majority of amputees have adequate strength for limb and terminal device activation. "Even if a need could be created, why would one want to create such a need?" expresses the general philosophy of the Centre.

Both investigators felt that it would be much more important to establish valid criteria for evaluating existing prostheses before deciding that the state of the art must be advanced. At present there are no well defined goals, only some vague concepts advocating a "principle of least effort" as the criterion for functional rehabilitation. Rather than embarking on new, high cost projects which show dubious prospect of success, more studies on a fundamental level are felt necessary. For example, and in close agreement with our own views, Swettenham was convinced that present technology can supply all necessary components for an externally powered arm, but the man-prosthesis interphase problem has not changed since the original U. S. IBM-Alderson electric arm. The conclusion indicated was that assessments of the sensory feedback-control input problem should receive priority attention and be solved before new hardware developments are initiated if such an arm should be developed at all.

Utilization of cineplasty tunnels for either power sources or control sites is looked on with little favor in Great Britain, and the operation is apparently no longer performed.

b. *West-Hendon Polio Centre*

Development of a simple pneumatically powered polio brace by Dr. Kinnier-Wilson and Mr. Dalrymple at the West Hendon Hospital Polio Centre in London looked very promising. Basically, the device is a modification of the CO_2 activation principle used by the West German group in Heidelberg for their pneumatically powered artificial arm. The power unit consists of a dual arrangement of two pistons and cylinders, one acting as agonist (biceps), the other as antagonist (triceps) "muscle." The storage

unit contains a sufficient amount of CO_2 for 48 full cycles of arm flexion and extension. Arm motion is controlled by pressure of a muscle bulge against a sensitive small plastic bladder. In order to hold the arm in position, the pressure against the bladder must be maintained at the given level. At present, no provision for control of movement rate is made.

The brace had not been fitted to a patient at the time of my visit; a functional evaluation had therefore not been made.

c. *St. Thomas Hospital*

Basic research for exploring the feasibility of utilizing muscle action potentials as input signals for prosthesis activation was being conducted by Dr. Nightingale at St. Thomas Hospital, Physics Laboratory, in London. The goal of the project is to make use of remaining electrical activity in the biceps and quadriceps muscles of severely paralyzed polio patients to activate a very simple functional brace. The prosthesis should enable the patient to feed himself in a special shielded hospital room. In such circumstances the device should operate free of electrical interference and adjustment and maintenance problems would be attended to immediately by hospital technicians.

No attempt was anticipated to solve problems of electrical interference outside the shielded room or to miniaturize the equipment. The muscle action potentials will be used for activating an on-off control mechanism only. No plans have been made for designing a graded control system before a well functioning on-off control has been developed and more is learned about the practical problems involved.

All projects for development of artificial arms controlled by muscle potentials were abandoned more than two years ago because of unsurmountable expenses and other difficulties.

EMG records of even severely paralyzed muscles showed action potentials of at least 30 rv above noise level indicating the basic feasibility of the polio brace project. Dr. Nightingale stated that progress was slow because of limited funds for acquisition of necessary data analysis equipment.

d. *General Conclusions*

Present research activities in Britain apparently are directed more toward the rehabilitation of polio patients than toward the arm-amputee problem. However, as there are certain similarities among the associated problems, many findings should be applicable to artificial arm developments as well.

No functional externally powered artificial limbs have so far been developed in Great Britain.

2. GERMANY

a. *University of Heidelberg*

The Orthopadische Klinik of the University of Heidelberg is the only West German center engaged in research and development of externally powered artificial arms. To the best information available at that time, Mr. Haffner, the inventor of the CO_2 powered German prosthesis, is presently working for the East German government in Thuringia. He and a large staff of technicians assertedly are engaged in extensive modifications and further developments of this prosthesis.

Regrettably, external circumstances made impossible a visit to the East German prosthetic center.

A visit of several days in Heidelberg provided a good overall view of the present state of the pneumatically powered arm—its advantages and disadvantages. The project is under the direction of Professor Lindemann and Dr. E. Marquardt, both orthopedic surgeons. A new engineer recently joined them to take over the position previously held by Mr. Haffner.

All fitting, fabrication, and repair work of the arm is currently done in the shops of the clinic. However, Dr. Marquardt feels that the prosthesis has reached a state of development where it should be turned over to a commercial firm for final engineering modifications and mass production. As planned, only research leading to functionally important modifications will be continued by the clinic.

The prosthesis has been designed as a heavy duty working arm without regard to factors of cosmesis. Sylphon bellows are preferred to pistons because of greater safety to the patient in case of explosion.

Whenever possible, Dr. Marquardt prefers the use of separate locations for single control valves to a single location for a multiple valve controlling several functions. Use of the multiple valve is indicated only for the severely handicapped where there is no alternative. Although learning to operate the sequential control has not presented a large problem, it requires an undue amount of conscious effort and attention.

Existing pectoral tunnels have been found to provide excellent body control sites for shoulder disarticulations and forequarter surgeries. Dr. Marquardt doubts that miniaturization of cineplasty tunnels could provide satisfactory control sites because of hygienic and dermatological reasons.

The hissing sound of the valves provides an important auxiliary feedback channel to the amputee and should not be eliminated before other types of satisfactory feedback devices have been developed. Research is currently being conducted on such devices.

Although all amputees learn the basic prosthesis functions fairly fast and attain a criterion level of proficiency in the clinic, it has been found that practice is often neglected in the home environment. Amputees capable of functional independence have been found to revert to old patterns of dependancy on their return home.

An important feature of the arm is the complete standardization of components permitting interchangable mechanical or pneumatic powered assemblies. In case of pneumatic system failure, a mechanical part can be applied in its place. High reliability, ease of maintenance, and good rehabilitation value are indicated by the full endorsement of the prosthesis by the agencies of the West German government in charge of veterans' care and by the compulsory medical insurance agency (Allgemcine Ortskrankenkasse).

Urgent need is seen for the development of a pneumatic hook because of its functional superiority to an artificial hand. An excellent pneumatic prosthesis has been developed for transmetacarpal amputees. The valve is operated by the dorsum of the hand and permits very sensitive finger control.

Dr. Marquardt made it possible for me to observe several amputees of various ages doing work at the clinic and in their homes. These observations clearly demonstrated the advantages of externally powered prostheses for both severely handicapped children and adult amputees.

Adoption of the suction socket fitting technique developed at the University of Munster was found to be very satisfactory. According to Dr. Marquardt, elimination of all harness straps provides maximum comfort to the wearer and facilitates donning of the prosthesis. My own observations of amputees engaged in fairly heavy labor at a machine shop indicated a good fit without slippage. All amputees interviewed expressed satisfaction and considered it a great improvement over their previous harness-type prostheses.

The use of transparent "Plexidur" for socket and brace fabrication is said to have considerable advantages for strength, weight, flexibility, and ease of molding over the resins used ordinarily. A side trip to the producer of "Plexidur," Rohm and Haas, Kunststoff-Chemische Fabrik in Darmstadt,

provided samples and brochures with detailed technical information about this material. The material is also available in the U. S.

A complete pneumatic prosthesis was purchased for the Biotechnology Laboratory for engineering and functional analysis.

b. *University of Munster*

When visiting the Orthopadische Universitats-Klinik (Hufferstiftung) in Munster, both Professor Hepp and Dr. Kuhn had left for vacation. But fortunately Dr. Manz, an orthopedic surgeon and assistant to Dr. Kuhn, was available and kindly showed the research facilities and provided an up-to-date report of their experimental work. The present facilities are limited in space, but a large new laboratory and rehabilitation building is under construction.

Little interest in external power exists at this center. Their viewpoint is that auxiliary power is not necessary and that the disadvantages of costs, repairs and associated problems will outweigh any possible advantages. Development activities were primarily of the trial-and-error, gadgeteering type.

A notable achievement is the development of a three-prong voluntary opening hook which shows the following advantages: 1) easy adjustability of spring force to specific needs, 2) facilitation for grasping and holding cylindrical and spherical objects, 3) surface friction of the hook covering approximating that of normal skin, and 4) easy replacement of hook covering. The hook has a stationary thumb and two movable fingers which spread apart during opening. The functional qualities seem to be superior to those of ordinary hooks. However, the cosmetic appearance is very poor.

The suction socket for upper extremities was developed at the Munster center. The technical details of fabrication of the suction sockets are adequately described in the literature and will be omitted here. The goal of the development was to devise a socket that would give a tight and secure fit without use of supporting harness.

Dr. Manz was able to demonstrate several BE and AE amputees with problem stumps. All of them were able to lift a 40 kg weight without slippage of the socket. Donning of the prosthesis was possible for all unilateral amputees without assistance. Removal, however, is difficult if not impossible without aid. Amputees reported that they do not feel pain or discomfort even after eight hours of manual work. Sweat production seems to be reduced significantly in the tight fitting socket.

Pain as a consequence of neuromas and bony spurs reportedly is decreased appreciably. The reason given for the beneficial effect is the constant pressure in contrast to the variable pressure distribution during movements with conventional sockets. In a few cases, allergies have been observed, but these were attributable to individual reactions to the socket material and independent of the type of socket.

A further noteworthy development was the AE socket shape where a "bank" or "shelf" in the axilla and a 1:1 height-width ratio of the opening provides a best fit.

Dr. Kuhn is opposed to corrective surgery for stump shaping which would facilitate the fitting procedures enormously. Instead, very elaborate and special methods have been developed for obtaining the mold.

c. *General Conclusions*

In comparison to Great Britain, a good amount of progressive prosthetic development is being conducted in West Germany. The search for new and better materials, radical departure from conventional upper extremity fitting techniques, and a group of researchers dedicated to the ap-

plication of external power are indices of a tendency toward more sophisticated developments.

3. FRANCE

a. *St. Cloud Hospital*

Mlle, S. Fouche, Director of the "Lique pour l'adaption du diminue physique au travail," made arrangements for a visit and conference with Dr. Lescoeur and his staff at the Centre de Reeducation Fonctionelle at St. Cloud. The conference was attended also by a representative of the French Ministry of Health. St. Cloud is one of the government centers for prosthesis fitting and fabrication, and for physical and occupational therapy.

There is little or no interest in external power projects in this center. Reasons given for this attitude were as follows: 1) Only a very limited population would benefit by it; 2) Development and production costs would be high; 3) Maintenance would be difficult; and 4) Complex mechanisms to be used by laymen would be inherently unreliable.

The group was extremely reluctant to talk about the electric hand manufactured in Paris. On response to my questioning, they indicated that they had acquired one but had never fitted it to an amputee. To an outsider it appeared that there were other motives than technical considerations underlying the rejection of the electric hand.

Cineplasty tunnels were referred to as "unnecessary mutilation," and the operation is not performed at the Hospital.

Their prosthetic armamentarium consists of German and Austrian mechanical devices which are preferred to American developments because of their greater reliability, lower cost, and readily available spare parts.

There is a French counterpart of the APRL hand, but German hooks are generally prescribed for terminal devices.

b. *F. Guillot Institute*

Development and fabrication of electric hands is conducted by Mr. W. Kegel in the F. Guillot Institute Chirurgie Orthopedie, a limb fitting shop in Paris. Mr. W. Kegel is the only member of the German team that began this development shortly after World War II in Vaduz, Liechtenstein, who remains active in this concern. The German patent on this hand is held by him, the French patent by Mr. Guillot. The Vaduz project was terminated because of lack of funds, and no further prosthetic development is conducted in Liechtenstein.

The electric hand undergoes continuous minor modifications, and the latest model (Mark V) was purchased for engineering and functional analysis in the Biotechnology Laboratory. A detailed description of the mechanism will be published as a laboratory technical report when the analysis has been completed. No descriptive material was available in France.

The hand has a good cosmetic appearance and is extremely light in weight. The complete mechanism weighs less than 100 gms, and Mr. Kegel was experimenting at that time with a new motor which was about half the size of the present one and which would reduce the weight by another 50%.

If one can judge by the sales volume, the hand seems to be popular; and again when extrapolating from the repair orders, it also seems to be fairly durable.

Function is controlled by means of muscle force exerted against an air-filled plastic bladder. Any muscle bulge is suitable, and the pressure in the bulb transducer can be regulated to permit operation in the optimum range of sensitivity. Grasp force is approximately 2 kg. Only one BE amputee wearing the hand could be observed. He showed good dexterity with it and stated his satisfaction with the device.

A mechanical light-weight nine-position elbow lock was also developed by Mr. Kegel. The appearance of this mechanism is rather crude. However, it is apparently very sturdy and reliable during operation.

Mr. Kegel does not see any need for additional external power as long as the amputee has some stump left. However, for very short AE and shoulder disarticulation amputations, he stated that he preferred the German pneumatic arm.

c. *General Conclusions*

No scientifically planned prosthetic research and development is going on in France. The official attitude seems to be to scan the international market for reliable devices of low cost rather than to support local development. Private initiative seems to be very low, and no new developments seem to be contemplated.

4. SPAIN

a. *La Casa Prim*

Dr. Cantor, the Attache for Cultural Affairs at the U. S. Embassy, had no knowledge of any developmental work of prosthetics in Spain. He kindly made arrangements for a conference with members of the Direccion General de Sanidad de Espana in Madrid. Here I received confirmation of Dr. Cantor's impression that no prosthetic developments are going on or are contemplated for the future.

Senora Clementina Juderias, Patronata des Invalidos, then arranged visits to an orthopedic and rehabilitation hospital and to a limb shop, the Establicimientos Ortopedicos Prim. Nothing of prosthetic interest was observed in the hospital.

The limb shop, owned and operated primarily for his own patients by Dr. Prim, an orthopedic surgeon, is somewhat limited. As Dr. Prim was on vacation, his private clinic was closed and activities in the limb shop were at low ebb. Apparently it is the only limb shop in Madrid, if not in Spain, and all terminal devices and other components are imported to supply it.

b. *General Conclusions*

The relatively small number of arm amputees and the general poverty of the country seem to inhibit any official initiative for a prosthetic program.

The Third International Conference on Medical Electronics in London, England

Abstract of paper by:

BRIGADIER N. A. M. SWETTENHAM, A.M.I. Mech. E.:

"Problems of Powered Limb Prostheses"

The problems to be faced in trying to apply external power sources to the operation of artificial limbs and aids for paralyzed patients are human and mechanical. With every patient there is a limit to the addition of appliances and, in general, no such added aid is acceptable unless it provides a worth-while function. The problem is different for paralyzed patients and amputees, the latter usually having residual muscle power adequate to provide movement and operation of a prosthesis.

It would seem that the most promising investigations are those dealing with aids for the upper extremity: not only has a satisfactory mechanism to be designed, but also the method of its control. Some work has been done on mechanisms, but none at present available is entirely satisfactory. Compressed gas is the first choice for investigation as a medium of powering the devices. The problem of the bulk and weight of power storage is more acute for ambulant patients than for those who are chair-borne. Existing pneumatic

motors developed in other countries suffer from inadequate power and/or "bounce," a promising new design is being investigated in this country in which two double-acting opposed pistons are used to operate the mechanisms and it is hoped that this may well provide the answer to providing adequate power without bounce.

There is a limit to the number of controls a patient can operate instinctively, and there is evidence that three such controls should not be exceeded for the average person; this means simplification of movements. With the amputee it is normal practice to train the patient to operate the prosthesis with muscles different from those normally used for the movement. With the paralyzed patient a similar problem will exist in that some active muscle will have to be used to operate the valve of the mechanism. In the first place the operating mechanism will probably take the form of either a direct pull on a valve or the use of a small air bladder which can be compressed between a muscle and some fixed member.

As a long-term project, work is being done to explore the possibility of using neuromuscular potentials. Even a clinically paralyzed muscle often exhibits some electrical response. If this could be harnessed in some way and used to operate the mechanism, the patient might not be faced with the need for gaining an acquired skill to operate the aid or prosthesis. But many difficulties have to be overcome before this idea can become a practical proposition. These difficulties exist at all stages. The type of electrode which can be worn for long periods has still to be ascertained. A method has to be worked out for interpreting the signals so as to obtain a modulated control and not merely on-off switching. Some means has to be found for cancelling out or eliminating unwanted noise and interfering signals. Possibly the requirement least likely to present difficulty is that the apparatus must be reduced to minimum bulk and weight. Finally, it must be completely reliable if it is to be acceptable.

In Memoriam

The Association has learned with deep regret of the death of Franklin Homer Page, Jr., President of Du Pa Co., Inc., Arcadia, California, who was killed November 15, 1961 as he was walking home from a Little League meeting. He was well-known for his contributions to lower limb prostheses. At the time of his death Dr. Page was in the process of writing a book on the subject.

Dr. Franklin Page was a native of Des Moines, Iowa. He was a graduate of San Diego State College where he received a bachelors degree in chemical engineering. He received Ph.D. degrees in both chemical and electrical engineering from the California Institute of Technology in Pasadena. He was a minor league director of the Coast Little League in Arcadia, Scoutmaster of Troop 125, B.S.A., a Life Member of the P.T.A. and an Elder in the First Presbyterian Church of Arcadia. Survivors include his wife, Mrs. Ruth L. Page, two children, Pamela and John Page, his mother, Mrs. Frank Page of San Diego, and three brothers.

Prosthetic Habilitation of Infant Quadruple Amputee

JOSEPH SMERKO, C.P.**
Chicago, Illinois
and
By CLAUDE N. LAMBERT, M.D.*
University of Illinois College of Medicine

This child was first seen at the University of Illinois Amputee Clinic on August 8, 1957, when she was four months old. She was the third child in the family. The mother is Rh Negative and the father Rh Positive. She was a full term spontaneous delivery and at birth it was noted that she had bilateral hip disarticulation amputations together with a mid-humeral amputation on the right and a very high above elbow amputation on the left. (Fig. 1) By classification, she would be a bilateral upper humeral hemimelia and a bilateral lower complete amelia. Her heart and lungs and general systemic review was entirely normal except for the above described abnormalities. It was felt at this time that she was too young for prosthetic substitution.

At ten months of age, the child had been sucking on the finger bud of the right arm and using this as a pacifier as well as using the stump for gross functions. It was therefore decided to begin fitting the upper extremities with prosthetic replacements. This consisted of bilateral preflexed

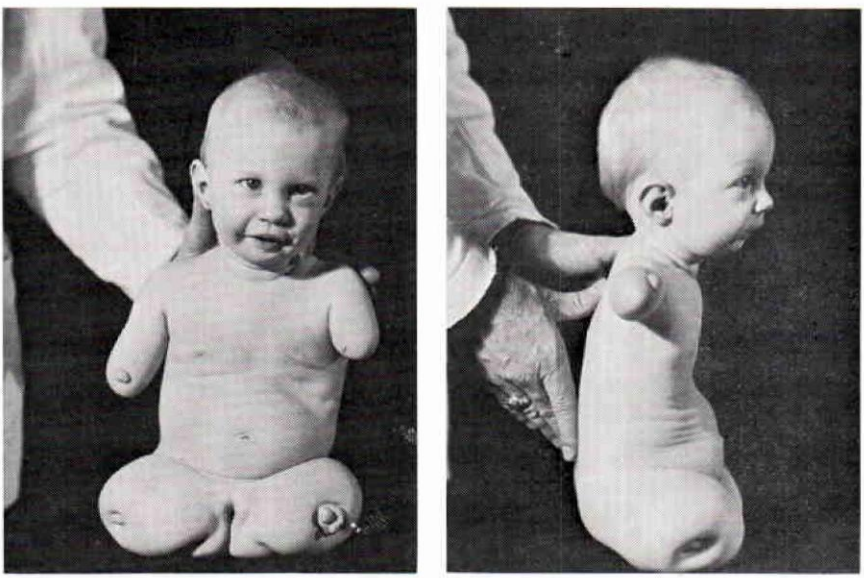


Figure 1

* Dr. Lambert is Professor of Orthopedic Surgery, University of Illinois College of Medicine; Attending Orthopedic Surgeon, Research and Education Hospitals, University of Illinois; Attending Orthopedic Surgeon at the Presbyterian-St. Luke's Hospital; Lecturer in Orthopedic Surgery, Northwestern University.

** Joseph Smerko, C.P.—Lake View Limb, Brace & Surgical Supplies Co., Chicago, Ill.

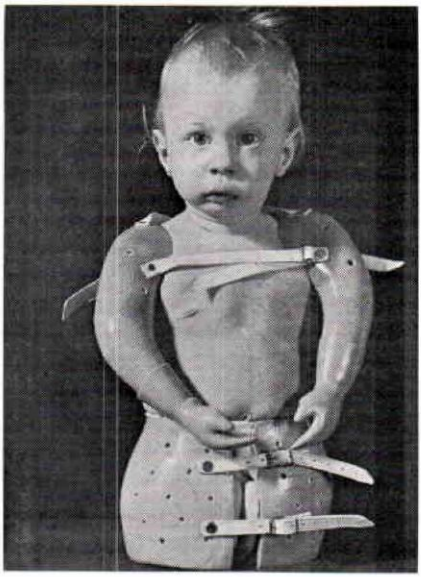


Figure 2

Figure 3

double-wall semi-rigid arms to which were attached plastic mittens.

After a short time some of the things she could do was wave a flag, bang on a xylophone with sticks, rattle rattles and pat her mittens like hands for a Pat-a-Cake game.

At the age of sixteen months, a model was made for a plastic pelvic support, (Fig. 2) inasmuch as she was unable to balance herself on the rounded buttocks and particularly since the addition of her upper extremity prostheses required her to sit in an upright position to attain optimal function. A plastic pelvic support with a flat bottom was constructed of a semi-rigid polyester resin, split in two halves and hinged in the posterior section for ease in applying, and a simple buckle and strap were used in the anterior section for attachment. After a fitting she was able to assume an upright position.

By the age of nineteen months, she was using the right upper extremity prosthesis very well and insisted upon having it on at all times. The mother mentioned that the finger bud on the right stump used as a pacifier, was creating a minor psychological problem when the arms were on. The left one was tight and had to be enlarged to allow her more use.

At this time it was felt that the plastic mitten on the right could be replaced with a 10 AW Hook and single control cable. She learned to open and close the hook immediately. However, her only objection was that she could not bring various objects to her mouth and she could not move about from place to place. To solve the latter problem, her father constructed a roller-type walker (Fig. 3) in which she could swing her body resting her axillas on the upper bars and move about in an upright postion. Up to this time, her only means of moving about was rolling.

By the time the child was twenty-nine months of age, she had outgrown both upper extremity prostheses so that neither one fitted at all. The mother stated that the child asked to have the prostheses on because she had found she could do so many things with them that she could not do without them. A new upper extremity prosthesis was ordered to continue

with a 10 AW Hook on the right and a 10 X Hook on the left giving her bilateral control.

A short time after the delivery of the new arms, a 10 X Hook was tried on the right long arm stump and it was found to be of greater benefit than on the left. Now the child was able to pick up smaller objects such as puzzle pieces and she could scribble and color with pencils which she was unable to do with the plastisol covered hook on the right arm. We then used the 10 AW on the left short stump side. She was now also able to maintain her own sitting balance without the use of her plastic bucket support.

In October of 1960, a left 10 X was ordered for the short arm. It seemed now that the child accepted her arms and enjoyed working with them to the fullest as long as she was occupied with many interesting and varied projects. The length of time she wore them depended upon this and her dependency of being moved about. It was suggested that a therapist could help in varying the interests and techniques in using her arms. This proved to be very beneficial.

By January, 1961, this patient was using her upper extremity prostheses one hour or more a day and using both with equal facility. However, her prostheses were again becoming small and it was decided at this time to have a standard above elbow on the right with an outside elbow lock, and to continue with the left prosthesis for the present but to lengthen it with spacers at the wrist, thus maintaining her overall length. In February, 1961, she was using her new right prosthesis fairly well and learned to use her new elbow immediately. It seemed as though another new world unfolded

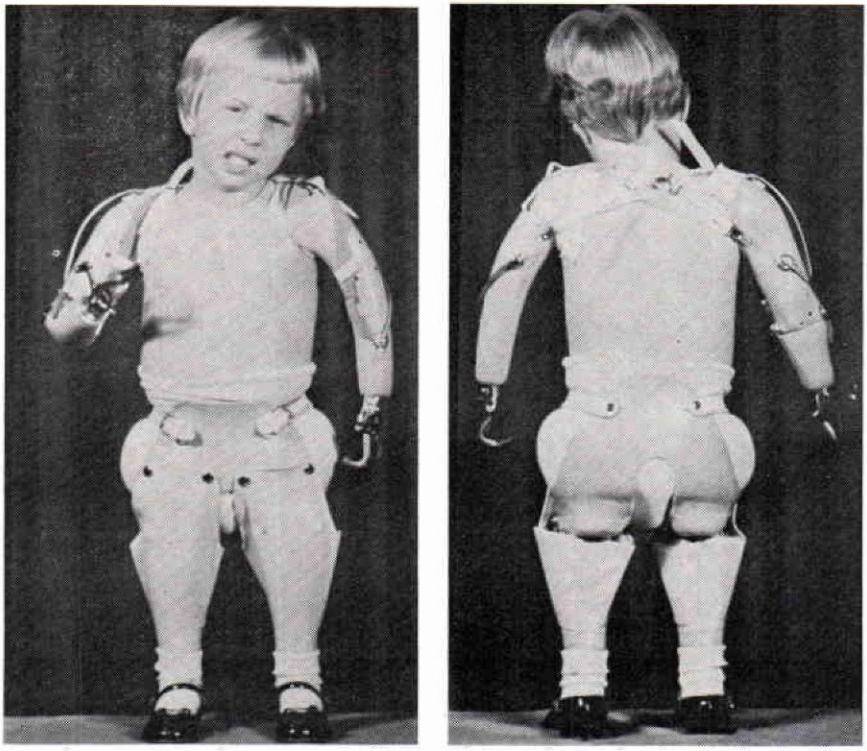


Figure 4

for her as she could now bend her elbow and bring objects to her mouth, and that more relearning had to be done.

At this time it was felt she was old enough, being practically four years of age, for us to begin the fabrication of lower extremity prostheses. Fundamentally these would be a Canadian hip disarticulation type with about a nine-inch leg piece, without knee joints, connected to bilateral SACH feet. This would be a preliminary stage so that when she became accustomed to this increased height, she could then be raised an additional nine inches and have knee joints added.

The socket was constructed with large teardrops on the lateral sides with adjustable straps fitted over the iliac crests. It was felt that this type of construction would accommodate growth much better than a split socket and also give more stability in walking.

In May, 1961, she received her bilateral Canadian hip disarticulation prostheses and from the very beginning did extremely well. (Fig 4) There was a question as to whether or not she should have one hip joint temporarily locked for stability but she did so well it was felt she could be trained without the locked hip joint.

On July 13, 1961, she was walking with her bilateral Canadian hip disarticulation prostheses with a pseudo four-point gait and maintaining her balance quite well with short crutches. One consideration was that she should be supplied with lighter weight crutches and secondly, that she soon have a new prosthesis on the left upper extremity which would have an actively operated elbow lock. On this side, due to the shortness of her humerus, she could have a conventional inside locking child size elbow.

At the time of this writing, the parents have informed us that the child is driving a battery-operated Go-Cart using her legs for regulating the speed and her right arm to drive. (Fig. 5) She is also moving about to all parts of her home without any assistance.

Advances In Artificial Limbs

A. BENNETT WILSON, JR., *Staff Engineer*
Committee on Prosthetics Research and Development

Editor's Note: Reprinted by permission of the author and the editors from the *News Report* of the National Academy of Sciences-National Research Council, Vol. XI, No. 5, September-October, 1961.

For this reprinting, the author has prepared a postscript, which appears at the end of the article.

Because of accidents, warfare, disease, and congenital abnormalities, the human population since the earliest recorded history has included a substantial proportion of amputees and cripples representing every conceivable level of disability—many unable to help themselves. Perhaps because these people represented an economic drain upon the balance of the population, the history of the treatment afforded them by society and by otherwise responsible government has, until very modern times, been largely a long and more or less disgraceful example of man's inhumanity to man.

But we live now in an enlightened age. The social reforms of the 19th and 20th centuries brought with them an expanding public consciousness of many responsibilities not theretofore recognized. Among these has been a growing public acceptance of responsibility for providing appropriate assistance for the less fortunate in the community of men. In this favorable intellectual climate, there has been an increasing tendency to apply public funds in support of modern scientific research and development aimed at the solution of some of the problems of disease and disability. This changing picture, which is now to be seen in almost every field of public welfare and in institutions both public and private, comes, in the area of amputations and artificial limbs, at the end of a long series of sporadic and largely unsystematic empirical attempts at the development of suitable limb substitutes.

Because periodic warfare tended to produce periodic contingents of new amputees, and doubtless also because of the emotional recoil that besets people after every major conflict, war has always generated an increased interest in the problems of amputees and has been followed by a flurry of impetuously conceived inventions relating to artificial limbs. History records, for example, a distinct rise in interest and achievement on the continent of Europe after the Napoleonic Wars, again in the United States after the American Civil War, and still again after World War I, notably in Germany, Belgium, and England. But in every instance these efforts have subsided to the previous peacetime level soon after hostilities had ceased and the wounded had been absorbed into civilian life, their residual problems largely forgotten.

For almost a quarter of a century after World War I, systematic efforts toward genuine improvement in artificial limbs, particularly in the upper extremity, lay almost dormant. It was World War II that was responsible for still another revival of interest in the problem of amputee rehabilitation,

even though by that time, in our highly mechanized society, disease and accidents—in the home, on the farm, in the factory, on the highway—were accounting for many, many more amputees than were produced in the military campaigns.

In any event, servicemen who had suffered amputations during World War II displayed keen disappointment with the artificial limbs provided them upon their return to the United States. Since they were now all familiar with extremely intricate mechanical, electrical, and hydraulic mechanisms, it was incomprehensible to them that a country so adept at turning out efficient weapons of destruction had seemed to have failed so miserably in providing substitutes for limbs lost in battle. Fortunately, in those days there were both the will and the wherewithal to establish a systematic investigation of the whole field of limb prosthetics.

When the problem came to the attention of The Surgeon General of the Army, he turned to the National Academy of Sciences with a request for assistance. An investigation by the Academy early in 1945 revealed that no sustained scientific approach had ever been made to the development of artificial limbs; that virtually all devices in use had been developed without the benefit of adequate design criteria, usually by amputees to fill partially their particular needs and who then made these devices available to others; and that the industry supplying limbs, serving a comparatively small and relatively impecunious segment of the population, was not prosperous enough to support a systematic research and development program of any consequence. In view of these findings, the Academy, using funds supplied first by the Office of Scientific Research and Development, then by the U. S. Army and the Veterans Administration, organized and operated by subcontracts with universities and industrial firms a research and development program in the field of prosthetics which has since come to be known as the Artificial Limb Program. This organizational structure prevailed until July 1, 1947, at which time the program was reorganized so that the Academy became the coordinating agency for projects sponsored by the Veterans Administration, the U. S. Army, and the U. S. Navy.

In mid-1948, the 80th U.S. Congress, recognizing the need for continuity in a program of this kind, initiated and passed Public Law 729,[1] which authorized the expenditure of $1,000,000 annually for prosthetics research. The Veterans Administration was designated as the appropriate agency for the administration of the funds thus made available, and the Administrator of Veterans' Affairs was directed to make the results of such a program available to all, veteran and civilian alike.

Until 1955, the majority of the work was supported by the Veterans Administration through contracts with universities, industrial laboratories, and the National Academy of Sciences under the provisions of Public Law 729 (80th Congress), while the Army and Navy cooperated by maintaining laboratories within their own organizations. Although Public Law 729 authorizes the Administrator of Veterans' Affairs to make results of research available to civilians, use of funds is for the most part restricted to research and development for adult cases. The Office of Vocational Rehabilitation, in addition to supporting the education program originally started with Veterans Administration funds, supports a number of research projects in prosthetics and orthotics under the provision of Public Law 565 (83rd Congress); the Children's Bureau has made available, through grants to

[1] Public Law 729, 80th Congress, was superseded June 17, 1957, by Public Law 85-56, 85th Congress, with essentially similar provisions.

several states, funds for research in the prosthetic problems of children, and the National Institutes of Health has awarded grants to cover part of the necessary medical research.

At the beginning of the Artificial Limb Program, it was the general feeling that the solution to the problem lay in developing new devices, and rapid advances were made by applying new materials and methods. It soon became apparent, however, that much more needed to be known about the functions provided by normal limbs before realistic design criteria could be developed. As progress was made, it later was shown that medical and surgical research, some of it of an extremely basic nature, was just as necessary as device development. Thus the program became one of interdisciplinary research.

As new concepts, introduced through the efforts of the Artificial Limb Program, were proven to be valuable in the rehabilitation of amputees, the need for essentially the same type of program in orthopedic bracing, or orthotics, became apparent. Because much of the fundamental data found necessary for progress in prosthetics was applicable to a program in orthotics, it was only natural that orthotics be added to the program of artificial-limb research. This was done beginning, in a limited way, about 1957.

At the present time in the United States there are 33 separate groups engaged in some phase of research and development related to artificial limbs or orthopedic braces, or both. Some are responsible for studies of a very fundamental nature, such as the biomechanics of human locomotion, in order to develop design criteria. Others are engaged in the design and development of devices. Still others are responsible for the development of methods of fitting limbs and braces. An evaluation laboratory has been established for testing each new item or idea as it progresses from one phase to the next.

In an effort to maintain a well-balanced program, the various activities of the research and development units engaged in both prosthetics and orthotics are correlated and coordinated by the Committee on Prosthetics Research and Development (CPRD), Division of Engineering and Industrial Research, under the chairmanship of Howard D. Eberhart, Professor of Civil Engineering, University of California, and supported by funds from the Veterans Administration, the Office of Vocational Rehabilitation, and the National Institutes of Health. CPRD also publishes the journal *Artificial Limbs* in order to ensure a broad dissemination of the results of research.

To bring results of the research program to the medical profession and its ancillary services, the Committee on Prosthetics Education and Information (CPEI) was organized in 1957. Originally established within the framework of the Division of Engineering and Industrial Research, CPEI now operates as a unit in the Division of Medical Sciences. C. Leslie Mitchell, Surgeon-in-Charge, Division of Orthopaedic Surgery, Henry Ford Hospital, and long associated with the Artificial Limb Research Program, is the present chairman. A close liaison between the two committees is maintained.

As a result of work done during the past 16 years, virtually every aspect of limb prosthetics has undergone dramatic changes. Because of new devices and methods of fitting, it has been possible to eliminate the old concept of "ideal" sites for amputation, thus preserving in many patients more function than was the case in the past. The "synergistic" action produced by physicians, engineers, prosthetists, and psychologists has been

carried forward into the general practice of prosthetics by the formation of clinic teams for management of amputees. Improved devices permit more function, and newer fitting and alignment methods based on biomechanical data have resulted in improvement in both comfort and function. At the same time, in many instances use of the new devices and techniques has permitted economies, not only by reducing fabrication time but also by reducing the time required for the rehabilitation process. Short-term courses are offered at three universities to physicians, therapists, prosthetists, and rehabilitation counselors so that results of research can be disseminated to the field rapidly.

The time required for results of fundamental research to reach widespread use in the form of practical devices is much longer than is realized generally. Often more than 20 years elapse between fundamental discovery and practical application. By carefully coordinating the work required in the various phases between fundamental research and application, and with the cooperation of several universities in offering short-term courses as new concepts are developed, the Artificial Limb Program has been able to reduce this time to between 5 and 7 years. Thus there has been evolved a method whereby the results of research rehabilitation can be translated into general use quickly and effectively.

Unlike the interests developed as a result of previous wars, that stemming from World War II has been kept very much alive largely because through the cooperation of several Federal agencies, universities, the medical profession, the prosthetics profession, and others, the organized, interdisciplinary, scientific approach has given useful results which have reached the amputee in a relatively short time. Although progress to date has been most gratifying, some areas of the problem have hardly been entered and whole new avenues need to be opened.

POSTSCRIPT TO "ADVANCES IN ARTIFICIAL LIMBS"

Without the cooperation and assistance of the American Orthotics and Prosthetics Association the progress made by the Artificial Limb Program would have been impossible. From the beginning members of the Association have been included in the membership of the various committees, panels, and conferences set up by the National Academy of Sciences to guide and coordinate the work of the research groups. The role played by the Association (then OALMA) in conducting the Suction Socket Schools during the period 1948-51 was a major factor in the success of that venture, which not only established a pattern for the present day Prosthetics Education Courses at the University of California at Los Angeles, New York University, and Northwestern University, but also demonstrated so well the advantages that are to be had by close cooperation between physician and prosthetist. Members of the Association have continued to assist in the Prosthetics Education Courses by serving as instructors in the established courses and participating in pilot courses.

Many facilities have devoted a good deal of time to assisting in evaluation of experimental devices in the various field studies conducted from time to time on a nationwide basis by New York University and the Veterans Administration, and in evaluations on a local basis by some of the individual research groups.

In 1958 the Association established the Committee on Advances in Prosthetics under the chairmanship of Carlton Fillauer to follow closely the research program in order to assist in the introduction for general use of the results of research and development. The Association has recently completed, with financial assistance from the Office of Vocational Rehabilitation, a Survey to determine the State of Services Available to Amputees and Orthopedically Disabled Persons which reflects the general pattern of prosthetics as practiced across the United States. A similar study will be made in reference to orthotics. Both studies should prove very helpful to the Research Program and AOPA by pointing out those areas in which further study and action should be emphasized.

BOOK REVIEWS

GEHSCHULE FUER BEINAMPUTIERTE: EIN HANDBUCH FUER BEINAMPUTIERTE, FACHAERZTE FUER ORTHOPAEDIE, ORTHOPAEDIE-MECHANIKER, KRANKENGYMNASTINNEN UND UEBUNGSLEITER IM VERSEHRTENSPORT (*Gait School for Leg Amputees: A Handbook for Leg Amputees, Orthopedic Specialists, Orthopedic Mechanicians, Physical Therapists, and Directors of Sport for the Disabled*). *By Herbert Kersten.*

Stuttgart, Georg Thieme Verlag, 1961. Price: DM 16.50.

Reviewed by HENRY E. LOON, M.D.
University of California Medical Center
San Francisco, Calif.

The long-standing controversy of who should be in charge of gait training of amputees—the artificial-limb fitter or the physical therapist—may become resolved, at least in part, through use of this systematic presentation of the subject. As well as its coverage of gait training, as such, for amputees with all levels of amputation, this monograph deals with preprosthetic care and preparation of the patient, activities of daily life, sports, a variety of stump problems, and stump hygiene.

With the increasing number of geriatric amputees, the problems of prosthetic rehabilitation are becoming more involved than limb fitters are usually equipped to handle. They need the help and cooperation of the physical therapist; for adequate rehabilitation of the amputee, team efforts are required. Professor Witt, in the introduction to this book, states that there will be differences of opinion regarding certain questions presented in it. These differences will persist until detailed knowledge of the biomechanics of normal human gait becomes available. In the meantime, this attempt to analyze the deficiencies of common rehabilitative procedures helps fill what has been until now a gap in concepts of amputee care and training.

When the latest advances in surgical techniques and fitting procedures become widely applied, there will no doubt be modifications in gait training. However, such modifications will be easier for the rehabilitation worker who is familiar with the principles outlined in this monograph.

World Rehabilitation Fund Announces South American Bracing Courses

President Howard A. Rusk, M.D., of the World Rehabilitation Fund, has announced that two four-month courses to train bracemakers in Brazil will follow a similar course begun in Lima, Peru, in July. This first course was sponsored by the World Rehabilitation Fund in cooperation with a number of other agencies, and is training personnel for the newly activated brace shops at the Central Military Hospital and the Hermanos Hospitalarios San Juan de Dios.

The two successive courses in Brazil will be held in Sao Paulo starting in January, 1962, in the facilities of the newly completed Children's Rehabilitation Center of the Associacao de Assistencia a Crinanca Defeituosa (Association for the Aid of Crippled Children). The latter, the "Easter Seal Agency of Brazil" is an affiliate of the International Society for Rehabilitation.

The two courses in Brazil are part of a project being partially financed by "counterpart" funds by the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare. The project includes manufacture for the first time in Brazil of prefabricated components for braces. (Manufacture of prefabricated brace components in Peru is scheduled to begin in 1962 under the sponsorship of the Patronato Peruano de Rehabilitacion y Educacion Especial—Peruvian Committee for Rehabilitation and Special Education.)

Technical director of the courses will be Mr. Juan Monros, a Spaniard, who has recently completed four years of training in prosthetics and orthotics at the Institute of Physical Medicine and Rehabilitation, New York University Medical Center; Institute for the Crippled and Disabled; New York Regional Office, Veterans Administration; and Prosthetics School, New York University Medical Center. Mr. Monros, a professional soccer player, received his training under a fellowship from the World Rehabilitation Fund.

Instructional staff for the courses in Brazil will also include a bracemaker, Mr. Manuel Tavares de Sousa, and a prosthetist, Mr. Casmiro Carlos, from Portugal. Both Mr. de Sousa and Mr. Carlos recently completed two and one-half years of training in the United States at the Division of Vocational Rehabilitation. Commonwealth of Puerto Rico; Newington Crippled Children's Hospital, Newington, Conn.; Rancho los Amigos, Downey, Calif.; Veterans Administration Regional Office, New York City: U.S. Naval Hospital, Oakland, Calif., and the Institute of Physical Medicine and Rehabilitation, New York University Medical Center.

Enroute to Peru, Mr. Monros will spend ten days in Haiti instructing the orthotics staff of St. Vincent's School for the Handicapped, Port-au-Prince, in the use of new power machinery recently supplied the school by C.A.R.E. He will also make short consultation and instructional visits to brace shops in Guatemala, El Salvador, Nicaragua, Cost Rica and Panama working with physicians and other personnel who have had training at the Institute of Physical Medicine and Rehabilitation, New York Unversity Medical Center, under fellowships from the World Rehabilitation Fund.

A New Twist For A Twister— The Torsion Splint

by JACK R. PAVA, C.O.

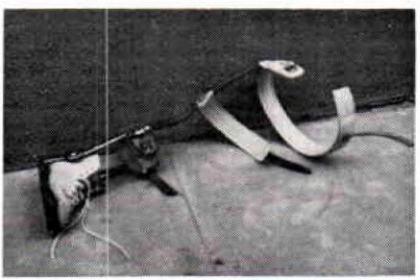
J. R. Pava Orthopedic Laboratory

Santa Barbara, Calif.

For the baby just starting to walk or too small for the conventional Torsion Brace, I recently tried what I thought to be a novel idea.

A double bar short leg brace was prescribed for a child 15 months old, to stabilize and control the ankle. However, the child walked with his foot toed inward, so the Doctor suggested adding a "twister." From my past experience, the cable type twister tends to either twist around itself or coil when a thin gauge is used. If a heavier gauge cable is used, it then becomes rather cumbersome for the length required and does not lend itself freely to anatomical movement of the knee and hip joints. To overcome this, a hip joint is generally used and in the case of a small child, where the distance from the top of the brace to the knee is so short, a knee joint also would probably have to be used.

After consulting with the prescribing Orthopaedic surgeon, I decided to try using a chain, of the type used on an "electric shopper car," as it lends itself to all movement, without concern of alignment, yet does not twist when anchored.



The chain was then encased in rubber tubing after lubricating it with soap suds so the tubing would slide on easily.

A leather cuff was attached just above the knee to hold the chain laterally. A metal pelvic band, which must be long enough to almost encircle the pelvis for good anchorage and unilateral control, was attached to the upper end.

Next, a one-quarter inch rod was brazed onto the distal end of the chain, which in turn was inserted into a split sleeve grip and attached with screws to the upper lateral bar of the brace. I found the split sleeve grip was better than the set screw method for stabilization and angle adjustment.

This all worked very satisfactorily and has the merit of being lightweight and not bulky and readily lending itself to the active movements of the child's leg.

Report On Lower Extremity Bracing Course Pilot Class, September 18-29, 1961

By W. F. HARMON
Atlanta, Georgia

Early in the summer of 1958 I had the opportunity, along with a dozen or so other Orthotists from all over the country, to be a member of a discussion panel on Lower Extremity Bracing at the Institute of Physical Medicine and Rehabilitation, sponsored by the New York University Post-graduate Medical School.

At that time, New York University was contemplating the establishment of a four year degree course in Orthotics and Prosthetics, and although there had been considerable activity in the field of Prosthetics, very little had been done in the field of Orthotics by any of the institutions of higher learning. The earliest effort in broadening the scope of Orthotists were the Symposiums held by the Mellon Institute starting in 1948.

Next followed the course in Functional Arm Bracing conducted by our friends from U.C.L.A. I was fortunate to be able to attend all of these gatherings, the success of which can be attested to by all Orthotists who were present.

As an outgrowth of the 1958 session, Dr. Sidney Fishman and his staff at New York University arranged for a series of courses on Lower Extremity Bracing, and a pilot course was concluded the latter part of September of this year.

The roster of 14 students for the pilot course included most of the men who had attended the original meeting in 1958.

Two full weeks, Monday through Friday, were devoted to the following phases:

1. Objectives of Bracing
2. General Anatomy
3. Surface Anatomy
4. Basic Mechanics
5. Normal Human Locomotion
6. Motor Disabilities
7. Pathomechanics of the Knee and Ankle
8. Metals in Orthotics
9. Orthotic Components, including Shoes
10. Measurements, Tracings and Layouts of Short & Long Leg Braces
11. Fabrication of Short & Long Leg Braces including the Ischal Ring
12. Medical Management

Assisting Dr. Fishman with the administration and conduct of the course were 9 New York University staff members, including doctors, therapists and engineers. In addition to this group, 5 Orthotists played important roles in the preparation and conduct of the course.

One of the most interesting phases that we participated in was the critique that followed at the conclusion of each day.

The Orthotist students were given the opportunity to offer comments, make suggestions and lend constructive criticism on each subject offered. These discussion periods, running for an hour or more daily, provided the staff with additional material, ideas, and recommendations for changes that would provide a more comprehensive course for the Orthotist to follow. Thus far three additional courses are scheduled to follow within the next six months, the first of which began on November 6th.

All the Orthotists in attendance are most gratified, as will be all other Orthotists who will attend subsequent courses, for the work that has been done and will be done to further the benefits for the handicapped and provide additional training for those who serve.

Our sincere thanks to Dr. Fishman and his associates who have contributed so much to this endeavor.

Prosthetists And Orthotists Courses For 1962

Date 1962	Course No.	Title	University
Jan. 2-12	749B	Lower Extremity Orthotics	NYU
Jan. 8-19	650	Fitting and Fabrication of Special Prostheses	NWU
Jan. 15-26	7416A	Upper Extremity Prosthetics—Fitting and Harnessing	NYU
Feb. 5-23	661	Upper Extremity Prosthetics	NWU
Feb. 5-16	7414C	Below-Knee Prosthetics	NYU
Feb. 12-23	X-485	Functional Long Leg Bracing	UCLA
Feb. 26-Mar. 23	746B	Upper Extremity Prosthetics	NYU
Mar. 5-30	X-463	Above-Knee Prosthetics	UCLA
Mar. 19-Apr. 6	601	Above-Knee Prosthetics	NWU
Apr. 2-13	749C	Lower Extremity Orthotics	NYU
Apr. 9-27	X-480	Below-Knee Prosthetics	UCLA
Apr. 16-27	611	Below-Knee Prosthetics	NWU
Apr. 23-May 4	7414D	Below-Knee Prosthetics	NYU
May 7-25	X-468	Upper Extremities Prosthetics	UCLA
May 14-25	7416B	Upper Extremity Prosthetics—Fitting and Harnessing	NYU
June 4-22	743C	Above-Knee Prosthetics	NYU
June 11-29	X-476	Functional Bracing of the Upper Extremity	UCLA

New York University Lower Extremity Orthotics Course

From September 18th through September 29th, 1961, fourteen of the leading orthotists in the country attended a pilot course in Lower Extremity Orthotics at New York University. Many of those attending had also participated in the preliminary planning for this new endeavour during the NYU-OALMA Orthotic Seminar held in August, 1958 at New York University.

Contents of Course

For two weeks this select group attended classes covering a wide range of subject matter pertaining to principles and practices in lower extremity orthotics. The major subject areas covered during the course serve to illustrate the scope of the endeavor. The subjects and the instructors who taught them were:

Subjects	*Instructors*
Scientific Background	
Anatomy	Joan Erback, Charles Fryer
Mechanics	Fred Berg
Normal Human Locomotion	Charles Fryer
Pathomechanics	Charles Fryer
Motor Disabilities	Joan Erback
Orthotic Principles and Procedures	
Metals in Orthotics	Elliot Dembner
Brace Components	Norman Berger
Shoe Modifications	Isadore Zamosky
Measurement, Tracing, Layout and Assembly of Short Leg Brace, Long Leg Brace, Weight Bearing Brace	Carlton Fillauer, Stephen Hall, and Bert Titus
Clinical Procedures	
Medical Management	Nadene Coyne, Victor Ribera
Training	Joan Erback
Checkout	Warren Springer

The scientific subjects were presented as prerequisite to a full understanding of the orthotic principles and techniques which were to be demonstrated later in the laboratory and shop sessions. The *anatomy* lectures, for example, emphasized discussions of muscles and bones in relation to the function of the lower extremities with illustrations selected to provide fuller understanding of the brace wearer and his braces.

Similarly, instruction in *basic mechanics* prepared the way first, for the study of *normal human locomotion* and second, for study of the effects of disability on balance and ambulation, which was to be discussed in *pathomechanics*. To help the orthotist attain a further understanding of the physician's prescription objectives, an important part of the course was devoted to a review of *motor disabilities* and *principles of medical management*. The material in these lectures was selected to familiarize the students

not only with terminology, but also with the causes, descriptions and treatments of the most important diseases encountered in orthotic practice.

Laying the groundwork for laboratory sessions, fundamental principles involving the uses of *metals in orthotics* were presented to enable the orthotist to make a more precise selection of bracing materials and to improve his understanding of good and bad practices in the working of various metals. In addition to this, a study of the *component parts* used in braces and lectures on *shoe modifications* were included. In the laboratory periods every effort was made to directly wed the theoretical knowledge presented in the classroom to the practical work of *measurement*, *tracing*, *layout*, and *assembly of braces*. The facilities of a completely equipped shop and twenty patient demonstrators were made available to the participants. In these sessions several braces were made by each individual and subjected to checkout and critiques by the faculty. Work sheets and textual material for home study and review were available as needed.

ATTENDING PILOT COURSE IN ORTHOTICS AT NEW YORK UNIVERSITY: (Top row l to r): Charles R. Goldstine (New York); Karl W. Buschenfeldt (Stoughton, Mass.); Erich Hanicke (Kansas City, Mo.); Clyde E. Peach (Indianapolis, Ind.); William J. McIlmurray (New York); Josef Rosenberger (Newington, Conn.); Herman C. Hittenberger (San Francisco, Cal.); (Middle Row l to r): Alfons Glaubitz (Elizabethtown, Pa.); Siegfried Jesswein (Chicago, Ill.); John J. Glancy (Boston, Mass.); W. Frank Harmon (Atlanta, Georgia); Milburn J. Benjamin (Los Angeles Cal.); Charles W. Rosenquist (Columbus, Ohio); Roy Snelson, Los Angeles, Cal.); Ralph Storrs (President of AOPA); FACULTY (seated bottom row l to r): Warren Springer; Joan Erback; Charles Fryer; Nadene Coyne; Sidney Fishman; Norman Berger; Carlton Fillauer; and Bert Titus.

To Meet a Need

The long period of preparation for this pioneer program was undertaken to meet the increasing demand for systematic education and training in the field of orthotics. It is common knowledge that in comparison to other professions the educational facilities available to people wishing to enter the orthotic field have been very limited. This has also held true for experienced orthotists desiring further study. Only limited instructional opportunities have been available primarily through apprenticeship training.

Today, in order to practice most professions, stipulated educational requirements must be met. It would be redundant to elaborate on the relative absence of such formal requirements and standards in the field of orthotics. Furthermore, many orthotists have themselves long been asking that orthotic research and educational facilities be expanded. Particularly with the successful introduction of courses in prosthetics, there were increased requests for comparable work in the field of orthotics.

In the last few years long strides have been taken to fill both the need for college level training and the need for up-grading courses for those in the field. In 1956, New York University's Prosthetics and Orthotics Education Program was created under the direction of Dr. Sidney Fishman with Associate Director, Norman Berger and Assistant Director, Warren Springer as key assistants. Two important outgrowths of this program of significance to orthotists are the first four year college level course offering a Bachelor of Science degree in Prosthetics and Orthotics, which was initiated in September, 1960 for beginners in the field, and this year's inaugural course in lower extremity orthotics setting the stage for regular courses for experienced orthotists in active practice.

Preparations Begin

Based on the information gained at the 1958 NYU-OALMA Orthotic Seminar and previous knowledge in the field, intensive efforts were begun to develop a course of study for orthotists. It was a little over three years later that the pilot course was presented; a relatively short time for preparation of a pioneer program of this sort when one recalls the wide range of necessary material. For one thing the contributions of a large variety of specialists were required. The preparations eventually involved the planning, research, writing or teaching services of orthopedic surgeons, physiatrists, engineers, therapists, anatomists and kinesiologists, educators, writers, artists and skilled office workers.

Once the subject matter had been selected other problems had to be solved. There existed a notable lack of textual and visual material applicable to a course in lower extremity orthotics. Specialists on the University staff, many of whom would be teaching the material, prepared subject texts, which were edited by a technical writer, gone over again by the authors, illustrated by staff and free-lance artists, and finally typed and prepared for publication by the office staff. A large assortment of graphs and charts for presentation in the classrooms were prepared, and films and equipment were obtained.

Amidst the academic preparation another and very important line of activity was in full swing. The value of patient demonstrators in the clinical aspects of the course had been proven in the prosthetics courses. This required the launching of a recruitment drive to find brace wearers for participation in the program. Mr. Gramza, of the staff, contacted the New York State Division of Vocational Rehabilitation, Bellevue Hospital, the Institute for the Crippled and Disabled, the Institute of Physical Medicine and Rehabilitation, and many other public and private institutions for leads to patients. These brace wearers were subsequently interviewed, examined and chosen on the basis of their handicap (as variety was desired) and on their willingness and ability to cooperate. Over twenty patient participants were involved in the pilot course. Some came from far away New Jersey, Connecticut and Long Island and took time off from business and jobs to help in the new program. Included were an artist, an author and several businessmen, all making an important contribution.

Reactions to Pilot Course

The final test of all these preparations was in the reactions to the course itself. The fourteen student-consultants were asked to critically evaluate the course so that suggestions could be utilized in preparing for future classes. The universally enthusiastic reception by the group brought forth typical comments such as these:

"The course is a step forward to establish a better profession in the future."

". . . it will also be an excellent course for the applicant for certification."

"I think the material offered is excellent and should assist in orthotists becoming professionals."

". . . facilitates communication with the medical field."

". . .essential for any orthotist regardless of previous experience."

Some very helpful suggestions resulted in revisions of instructional material. A number of participants commented, for example, that there was too much material for the students to absorb in the two short weeks of the course. As a result instruction in weight bearing braces had to be deleted from the current courses. It is likely that the course will have to be extended to three weeks next year in order to give adequate instruction in the varied subjects of interest to the student. Many new ideas came out of the class experience, but there was concurrence in the enthusiastically positive response to the program!

The success of the pilot course was due to the cooperation of those who attended the course itself, the 1958 seminar, and the unstinting efforts of the University staff and faculty. Special mention should go to the orthotist members of the faculty—Messrs. Carlton Fillauer, Stephen Hall and Bert Titus who for over a year took considerable time away from their own facilities to help prepare material and who carried a substantial part of the teaching load. Also to Dr. Edward Peizer (of the University's College of Engineering) and his staff, whose orthotic research activities contributed significantly to the course content.

Future Plans

With one regular course already completed, two additional courses in lower extremity orthotics will be offered during the remainder of the present academic year. The dates of these are:

749 B—January 2-12, 1962

749 C—April 2-13, 1962

There are still several vacancies available for those wishing to attend either of these sessions. Further information can be had by addressing:

Director, Prosthetics and Orthotics, New York University Post-Graduate Medical School, 342 East 26th Street, New York 19, New York.

Plans for the future include the inauguration of corresponding courses in lower extremity orthotics designed for physicians and surgeons and for therapists, and the unification of the instructional materials into a single textbook. It can be optimistically predicted that this forward step is only the beginning of a new effort in prosthetic and orthotic research and education, through which the combined efforts of many determined people will bring this profession into full and equal status beside the other professions dedicated to the healing and betterment of mankind.

Committee On Prosthetics Education and Information

National Academy of Sciences—National Research Council

ANNUAL MEETING

Woodrow Wilson Rehabilitation Center

Fishersville, Virginia

November 3, 1961

By HAROLD W. GLATTLY, M.D.

Executive Secretary

The series of informational articles concerning the activities and projects of the Committee on Prosthetics Education and Information will be interrupted in this issue of the *Journal* in order that a report can be made of the recent annual meeting of the Committee. The group met on November 3rd at the Woodrow Wilson Rehabilitation Center near Fishersville, Virginia. Dr. Roy M. Hoover, a member of CPEI, is the medical director of this unique institution that has played a major role in the field of rehabilitation for many years. In addition to the members of the Committee, the following guests were in attendance:

Dr. Jack D. Armold, Director of Prosthetics Education, Northwestern University.

Mr. Floyd H. Armstrong, Director of the Division of Rehabilitation, Department of Education, Commonwealth of Virginia.

Mr. Edward Bonk, Rehabilitation Institute of Chicago, Northwestern University.

Dr. R. Keith Cannan, Chairman of the Division of Medical Sciences, National Academy of Sciences.

Dr. Domingo Cerra, State Medical Administrator, Bureau of Vocational Rehabilitation, State of Ohio.

Dr. William J. Erdman, II, Director of Physical Medicine and Rehabilitation, University of Pennsylvania.

Dr. Sidney Fishman, Director of Prosthetics Education, New York University.

Dr. John A. Fritchey, II, State Medical Administrator, Bureau of Vocational Rehabilitation, Commonwealth of Pennsylvania.

Mrs. Margaret Hodges, Civil Defense Division, Office of Vocational Rehabilitation.

Mr. Floyd Kefford, Bureau of Vocational Rehabilitation, Commonwealth of Pennsylvania.

Mrs. Florence S. Linduff, Chief of Physical Therapy, Veterans Administration.

Mr. LeRoy W. Nattress, Jr., Executive Director, American Board for Certification in Orthotics and Prosthetics.

Dr. J. Warren Perry, Assistant Chief of the Training Division, Office of Vocational Rehabilitation.

Dr. Eugene E. Record, Massachusets General Hospital.

Mr. Lester A. Smith, Executive Director, American Orthotics and Prosthetics Association.

Dr. Robert E. Stewart, Director, Prosthetic and Sensory Aids Service, Veterans Administration.

Mr. A. Bennett Wilson, Jr., Committee on Prosthetics Research and Development, National Academy of Sciences.

Dr. Robert D. Wright, Director of Health and Medical Activities, Office of Vocational Rehabilitation.

The Committee-as-a-whole meets annually with representatives of the supporting agencies and the directors of the three prosthetics schools to critically review the group's entire program of prosthetics and orthotics educational activities. The agenda, therefore, consists primarily of a series of reports by the chairmen of the working subcommittees. For the purpose of this article, the following items that were a part of the proceedings of the meeting have been selected for inclusion by reason of their general interest character.

1. *Progress Report on Education Programs in the American Orthotics and Prosthetics Association* — *Mr. L. W. Nattress, Jr.*

Mr. Nattress, who is both the Secretary of the Education Committee of AOPA and the Executive Director of the American Board for Certification of Orthotists and Prosthetists, initiated his remarks by briefly orienting the group with respect to the functions of the two organizations. The former is interested in the education and training of the practicing members of the Association and the latter has as its objective the establishment of professional standards within the industry. Among the Education Committee's programs, Mr. Nattress emphasized the success of the seminars that were presented at the regional meetings last spring. The three prosthetics schools and the VA Prosthetics Center in New York were primarily responsible for the conduct of these short courses. He then introduced Mr. Lester Smith, the Executive Director of AOPA, who reported upon the October national assembly of the Association in Miami. This convention was the largest in the history of the organization. Mr. Smith believed that the three-day course on fluid-controlled knee mechanisms, sponsored by the VA, made a material contribution to the success of this meeting. He stated that AOPA would continue to work closely with the Committee and cited the amputee census as an example of the mutual cooperation that exists between CPEI and the Association.

2. *New York University Pilot Course on Lower-Extremity Bracing* — *Mr. W. Frank Harmon*

Mr. Harmon, the orthotist member of CPEI, reported on the pilot lower-extremity brace course that was recently given by NYU and was attended by a group of the outstanding orthotists in this country. There was general agreement that the course was well organized and would meet an existing educational need for the members of this discipline. Following each session, a critique was held at which the attendants offered suggestions to the NYU staff for improving the instruction. Of special interest was the fact that anatomy proved to be one of the most popular items of the course curriculum.

In the discussion, Dr. Fishman stated that he believed too much material was covered in the two-week period and that some "pruning" would improve the course.

3. *Prosthetics Education, New York University* — *Dr. Sidney Fishman*

Dr. Fishman, after reviewing the activities of the prosthetics school at his institution, commented upon the changing character of the student bodies. In the courses for physicians, there is an increasingly higher percentage of orthopedic and physical medicine residents. The prosthetists students, as

compared with those of former years, are younger and less prepared to accept the present rate of instruction. Dr. Fishman is of the opinion that it may be necessary to lengthen the courses for these individuals.

4. *Prosthetics Education, University of California* *Dr. Charles O. Bechtol*

Dr. Bechtol expressed the regret of the director at that institution, Dr. Miles H. Anderson, for his inability to attend the meeting. The program at UCLA continues to be very well attended. In the Los Angeles area, a high percentage of the residents in orthopedic and physical medicine programs are attending the courses. Dr. Bechtol commented on the many regional meetings of AOPA at which a variety of seminars in prosthetics and orthotics were presented by his school staff. The school is looking forward to a second course next summer for faculty members of schools of PT and OT.

5. *Prosthetics Education, Northwestern University* *Dr. Jack D. Armold*

Dr. Armold reported that applications for enrollment for the courses continue to exceed class capacities. Of special interest in this year's academic calendar is the second course on "Management of the Child Amputee," that will be presented in December. A new course, entitled "Principles of Spinal Orthotics," has been planned but not as yet scheduled.

6. *University Council on Orthotics and Prosthetics Education*
Dr. J. Warren Perry

Dr. Perry, the Executive Secretary of the Council, reported upon the activities of this commitee which was organized last spring. The Council is composed of the directors and medical supervisors of the three prosthetics schools. The objective of the group is to better coordinate the activities of the schools in the interest of meeting the national requirement for the training of physicians, therapists, prosthetists, orthotists and other categories of rehabilitation personnel in the fields of prosthetics and orthotics. The Council has held two meetings, the last one being in Miami in October. The organization is serving as a valuable instrument to insure good communication between the schools. An analysis is planned of the courses presently being given to insure uniformity in their content. The Council is available to other groups, including CPEI, on matters relating to prosthetics and orthotics.

7. *Subcommittee on Prosthetics in Medical Education*
Dr. Harold W. Glattly

This subcommittee has been quite active this past year in developing materials suitable for both the graduate and undergraduate levels of medical education. It is anticipated that a number of items will be completed and made available for distribution to medical schools and residency programs this coming year. These include:

a. Undergraduate lecture materials with illustrated slides.
b. A set of 100 clinical slides to be added to the VA set of devices and components.
c. An informational brochure suitable for distribution to residents, senior medical students and to practicing physicians as a handout at "grass-roots" meetings.

In a planning status are two short orientation-type films, one on upper and one on lower-extremity prosthetics. The grant program of OVR to schools for the teaching of rehabilitation subjects and the program, Medical Education for National Defense, are planned avenues for the distribution of these materials.

8. *Subcommittee on Prosthetics in Paramedical Education*
Miss Dorothy Baethke

Miss Baethke initiated her report by making reference to a survey of the directors of schools of physical therapy that was made by her group last year. It was found that there was a general desire on the part of the directors to strengthen their curricula in the fields of prosthetics and orthotics. The Subcommittee concluded that the best way to meet this need was to offer workshops in the care and management of individuals with these types of disabilities. For this purpose, an appeal for support was made to the Training Division of OVR. With the approval of that agency, a pilot course was arranged by a committee selected by the Council of Physical Therapy School Directors and the Committee on Education of the American Occupational Therapy Association, working with the director and staff of the UCLA prosthetics school. The initial two-week course was given last June and was attended by faculty members of ten schools of physical therapy and ten schools of occupational therapy. The course was very well received and the Advisory Committee and the UCLA staff are meeting again next February to consider the evaluations presented by the participants and the directors of the schools represented in the pilot course. Subsequent courses are planned that will make provision for the attendance of a faculty member of all other schools of PT and OT. This project will result in a distinct improvement of the prosthetics training of the students of these disciplines.

A current project of the Subcommittee is to make available to the PT and OT schools teaching materials and aids. They plan to review the slide library that is being developed by Dr. Allan's Subcommittee and to assemble a set that would be appropriate for the basic courses in prosthetics.

A preview of the film, "Gait Analysis," was then presented by Dr. Vultee. Although editing was not complete and the sound tract had not as yet been added, there was unanimous agreement that this would make a very valuable teaching device. Miss Baethke extended to the Northwestern staff the appreciation of her Subcommittee for the development of this audio-visual aid. She believes that this is just what the directors of PT schools wish to have.

9. *Civil Defense Aspects of Prosthetics* *Dr. Robert D. Wright*

Dr. Wright, the Director of Health and Medical Activities for the Office of Vocational Rehabilitation, initiated the discussion of this agenda item by briefly reviewing the Federal Government's program in Civil Defense over the past years. The entire subject has been in a chronically-confused status during the period. Recently the Office of Vocational Rehabilitation and the Public Health Service were given the responsibility by the Department of Health, Education, and Welfare of participating on the national level in disaster planning. Present programs include:

a. Mass training of the population in the principles of survival, including self-help for the more common medical and surgical emergencies. This program will be implemented through brochures, movies, and local training courses such as are commonly given by the Red Cross.

b. Stock piling of the Civil Defense 200-bed hospitals that are equipped with a 30-day level of supplies. Crutches are included in these supplies. There are now 2,000 of these units and many more will be added. There are also plans to increase the supply level.

c. Studies are now in progress concerning the stockpiling of certain critical medical and surgical supplies.

With respect to prosthetics, there are no good estimates available with respect to the percentage of the living casualties that will require amputations. There are, however, certain assumptions that can be used for planning purposes:

a. Amputations will, in general, be of the open variety, such as is now the accepted doctrine for battlefield casualties. Healing will therefore be slow and cases will not be ready for even a temporary prosthesis for a relatively long period of time. Crutches therefore appear to be the most useful item that can be stockpiled.

b. In a general nuclear attack upon the U.S., an appreciable number of the more important prosthetics and orthotics facilities would be destroyed.

c. There would appear to be a need to develop a number of very simple temporary lower-extremity devices that might even be fabricated by artisans other than prosthetists.

During the discussion of this subject, Dr. Park presented to the group a very simple device made of wood and leather for a BK amputee that can be put together in a matter of minutes. Mr. Wilson made reference to the work of Mr. McLaurin at Northwestern University in developing a pneumatic AK socket. This item when perfected could be stockpiled. Mr. Muilenburg believed that conventional prostheses would be subject to deterioration if stored for long periods of time. Dr. Compere recommended that the problem should be studied in the research centers.

The role that CPEI should play in this matter was next discussed. It was the sense of the group that the Committee should make agreed upon recommendations a part of their prosthetics and orthotics education program. It was hoped that the problem would be presented to the Committee on Prosthetics Research and Development for further study. Dr. Wright believed that CPEI could very well be helpful to OVR in developing plans related to the care of mass casualties of an orthopedic character.

10. *Prosthetics in Pennsylvania* — *Dr. J. William Erdman, II,* and *Dr. John A. Fritchey, II*

Dr. Erdman, the Chairman of the Advisory Committee on Prosthetics in Pennsylvania, briefly reviewed the program of this group. As a result of the organization of a number of new prosthetics clinics, the State Bureau of Vocational Rehabilitation is now able to implement the policy whereby all amputee beneficiaries of this agency are fitted and trained in one of these facilities. To properly staff these clinics, quite a number of physicians and therapists attended courses at the prosthetics schools. Last August, the Committee sponsored a three-hour prosthetics seminar at the annual meeting of the medical consultants and administrators of the State Bureau of Vocational Rehabilitation. This meeting has been the means of stimulating a great amount of interest in amputee care and management. Many of the attendants have requested authorization to attend a prosthetics school course.

Dr. Fritchey then outlined the new policies and operating procedures of the Bureau as they pertain to the amputee clinics. These include the provisions that:

a. The clinic personnel must have attended formal courses such as given by the prosthetics schools.

b. The Chief is responsible for assigning cases to prosthetics facilities. Although rotation among the participating prosthetists is normal, it

is recognized that certain facilities do not have personnel that have taken all of the prosthetics courses.

c. The State will contract only with "certified facilities."

d. A rehabilitation counselor is assigned to the chief of each clinic.

Dr. Fritchey stated that the Subcommittee has been of material assistance to his Bureau in both developing and implementing these new policies.

Dr. Fritchey introduced Dr. Domingo Cerra, the State Medical Administrator of the Bureau of Vocational Rehabilitaiton in the State of Ohio, who reviewed the prosthetics program in his state that is quite similar to that which is in being in Pennsylvania. He extended his appreciation to the Pennsylvania subcommittee and to the Washington office of CPEI for the assistance that they had been to his agency. He believes that an advisory committee in Ohio, such as the Pennsylvania group, would be a very valuable adjunct to his office.

In the discussion, Dr. Stewart emphasized the value to the VA of having prosthetics programs in the states such as are now present in Pennsylvania and Ohio. There should not, he stated, be one standard of services for the veteran and another standard for the non-veteran amputees.

11. *Amputee Census* *Dr. Harold W. Glattly*

The Secretary reported that, as a result of the cooperation of the directors, officers and staff of AOPA, 288 firms that are responsible for 98% of the prosthetics services in the U.S. have indicated a desire to participate in this project. Since the actual census was only initiated five weeks ago, no deductions or conclusions can as yet be made.

Frank Rhatigan Honored with Armamentarium Award

Frank M. Rhatigan, Secretary of the American Surgical Trade Association, was presented with the Armamentarium Award in a ceremony on September 12, by Robin International, publishers of the new *Medico Surgical Armamentarium* physicians' reference.

The bronze medallion, presented by Mr. W. Howard Chase on behalf of Robin International, was given in recognition of Mr. Rhatigan's contributions to the medical community. Mr. Chase pointed out that Mr. Rhatigan has played a unique role for many years in helping to bring new developments of scientific research to the ultimate users through the channels of manufacture and distribution.

"Mr. Rhatigan was selected for this honor," Chase said, "because he is the ideal representative of an industry dedicated to perfecting new instruments and techniques to benefit the physician and the hospital."

Titles Don't Make It So!

By LEROY WM. NATTRESS, JR., Secretary
Committee on Education, AOPA[1]

During the past months I have attended numerous meetings of national societies and associations which are working in one way or another with the physically disabled. Included in a list of these would be our own American Orthotics and Prosthetics Association, the National Rehabilitation Association, the Congress of Physical Medicine and Rehabilitation and the National Society for Crippled Children and Adults. In thinking back and comparing these meetings one would have to admit that the aims of each organization differ from the others and, as a result, their meetings differ.

The purposes of these organizations are only of passing interest in this article. Of much more interest is the fact that at each of these meetings at least one three-hour period was devoted to an educational seminar in prosthetics and orthotics. Seemingly, national meetings are not considered to be well balanced unless they include educational seminars on technical subjects. But what are the effects of such educational seminars?

About two years ago a doctor attended an educational seminar where he was introduced to the field of prosthetics. He was so impressed that when later confronted with a young woman who had traumatically lost her left arm at the shoulder he assured her that she would be fitted with a prosthetic appliance that not only would resemble her anatomical arm, but also would function in much the same way as her missing member had. To this day the young lady does not wear a prosthesis.

More recently a prosthetist attended an educational seminar in which many techniques currently under study by a research facility were introduced. The prosthetist, deciding that he had sufficient understanding of these techniques, attempted to incorporate these in his fabrication of appliances. When the techniques failed to yield the desired results the prosthetist condemned the research program in general, and the techniques in particular. Today, when they have become accepted practice, this prosthetist states that they are of no value to the amputee because of his premature experience with the techniques.

A rehabilitation counselor attended one of these seminars and decided that the prosthetists and orthotists in his area were incompetent to provide the services to his clients without extensive training. He, too, did not differentiate between current practices and research problems.

The questions raised in these three examples are not peculiar to our fields of prosthetics and orthotics. They are not answered by discontinuing

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[1] The Committee on Education of the American Orthotics and Prosthetics Association is a working committee. The current membership of the committee is:
Edward W. Snygg, C.P.O., San Francisco, California, *Chairman*
Charles O. Bechtol, M.D., Los Angeles, California
Alvin L. Muilenburg, C.P.O., Houston, Texas
Charles Rosenquist, C.O., Columbus, Ohio
Claude L. Lambert, M.D., Chicago, Illinois
Paul E. Leimkuehler, C.P., Cleveland, Ohio
While continuing its work on the Regional Seminar programs the Committee is now engaged in preparing materials on business management programs.

educational seminars. They are answered by pre-planning and organization of material. Each presentor of material must decide before his presentation on what points he wishes his audience to take home with them. His entire presentation must be built around these points which can only be made through his understanding of the subject matter and of his audience. An educational seminar is not educational just because it is labeled so in the program. Titles don't make it so!

As a further extension of this thought we would differentiate between three types of programs which may be presented under the title of educational programs. These are information programs, training programs and finally educational programs. Instead of defining each of these we will compare them so that the distinctions between each may be most clear.

First, an educational program is presented in an organized way to increase the audience's background knowledge about the subject matter; an informational program is also presented to increase background knowledge but in a much less organized way and without depth; a training program is more immediate and gives knowledge of how to perform without the background of why this performance is necessary or how it fits in to the total task.

Second, a training program is presented to change the behavior of the audience, the way they do things; an educational program is also presented in an effort to change behavior, not through "brain washing" techniques, but through the comparison of techniques on the basis of advantages and disadvantages; an informational program may whet an audience's interest in a behavioral change but seldom contains sufficient material to bring about the change.

Third, an educational program must be planned and presented under controlled conditions which are conducive to learning; a training program must also be planned and presented under controlled conditions; an informational program, while sometimes planned, is seldom presented under conditions in which learning is assured.

The distinction between these three types of programs are clear. To title all of them as educational is misleading. We must decide on the correct title in advance, based on the material to be presented, the objectives of the presentation, and the audience to be reached. This is the task of the Committee on Education of American Orthotics and Prosthetics Association as it works to bring an educational program to the members of the Association.

In so doing the committee has recognized one further complication. It is that persons attending the *same* program may find that it increases their background knowledge, or that it introduces them to a new way of approaching an old problem, or that it is just interesting. Providing an educational experience does not guarantee learning. Titles don't make it so!

The committee will continue to strive to present high caliber, educational programs. It is up to the membership to obtain the most from each one in which they participate.

In closing, let me share with you a most meaningful cliché —

> "THE MAN WHO KNOWS HOW WILL ALWAYS HAVE A JOB, BUT HE WILL BE WORKING FOR THE MAN WHO KNOWS WHY!"

Certified: The Successful Candidates

The American Board for Certification in Orthotics and Prosthetics announces that the following men have received Certification as a result of successfully passing the recent Examinations of the Board. At these Examinations, held at the Rehabilitation Institute of Chicago, September 13-15, 1961, eighty-five Candidates for Certification sat for their Examinations in Prosthetics or Orthotics.

(The ten men listed as Certified Prosthetists and Orthotists had previously received Certification in one of these two fields, and this year successfully qualified for Certification in the second.)

CERTIFIED PROSTHETIST AND ORTHOTIST

Willis E. Ballard	Maywood, Ill.
Manuel Dobrenz	Canoga Park, Calif.
Wm. Dewey Friddle, Jr.	Greenville, So. Car.
Charles R. Greene, Jr.	Erie, Penna.
Wm. Heath Harvey	Columbus, Ga.
Robert E. McIntyre	Baton Rouge, La.
Herbert E. Niehuus	Scranton, Pa.
Erwin Nobbe	Washington, D. C.
Thomas Pirrello, Jr.	New York, N. Y.
Wm. D. Weisgerber	Milpitas, Calif.

CERTIFIED PROSTHETIST

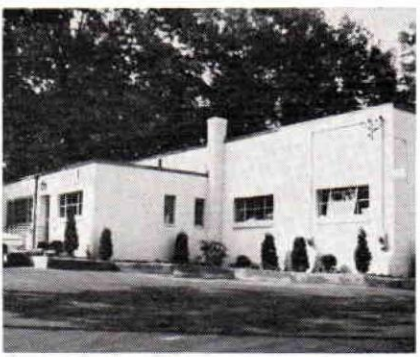
F. H. Bandy	East St. Louis, Ill.
Hershel Bevill	San Antonio, Tex.
Walter D. Boatright	Tulsa, Okla.
Hans Bobardt	Minneapolis, Minn.
Carl Boly	St. Louis, Mo.
William Brady	Kansas City, Mo.
Donald R. Decarteret	Lowell, Mass.
Eugene D. Filippis	Detroit, Mich.
Erich Fischer	New York, N. Y.
Samuel E. Hamontree	Springfield, Mo.
Walter A. Hart, Jr.	Richmond, Va.
Robert Hayes	Chelsea, Mass.
Charlie Kymes	San Antonio, Texas
L. D. Lane, Jr.	Goodlettsville, Tenn.
Alfred Maier	San Diego, Calif.
Kurt Marschall	Syracuse, N. Y.
Carl S. McCluggage	Johnson City, Tenn.
Wm. Muehlenthaler, Jr.	Des Moines, Iowa
Daniel E. Palmer	Kansas City, Mo.
Marcus E. Phelps	Atlanta, Ga.
James Polega	Grand Rapids, Mich.
Carl Sellers	Powell, Tenn.
James A. Swimm	Charleston, W. Va.
Albert Tindall	Syracuse, N. Y.
Howard J. Tyo	Syracuse, N. Y.
Walter H. Willis	Sacramento, Calif.

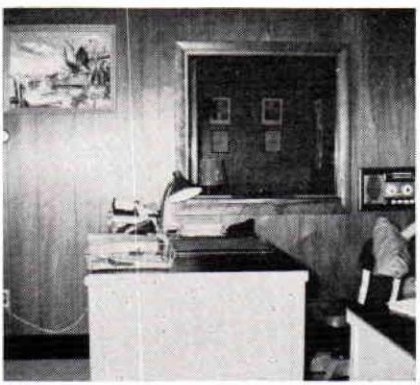
CERTIFIED ORTHOTIST

Harold Amtower	Saginaw, Mich.
Walter T. Benedict	Corpus Christi, Tex.
Thomas R. Bidwell	Madison, Wis.
James G. Carleton, Jr.	Orlando, Fla.
Leroy Cook	Nashville, Tenn.
Frank A. Cregger	Roanoke, Va.
Harold Enneberg	Portland, Ore.
Moses A. Feigenbaum	Cleveland, Ohio
Charles M. Jensen	Sioux Falls, S. D.
Loren D. Jouett	Chicago, Ill.
Raymond W. Marvin	Pittsburgh, Penna.
Marvin Prince	San Antonio, Tex.
Harold Prescott	San Antonio, Tex.
Percy H. Ray	Durham, N. C.
Leonard Ruscito	Metuchen, N. J.
David C. Schultz	Milwaukee, Wis.
John Skahan	Cincinnati, Ohio
William B. Smith	Kansas City, Mo.
Huey E. Thames	Lawton, Okla.
Joseph Tindall	Syracuse, N. Y.

Boston Artificial Limb Company

In New Quarters





This new Facility at 44 Middlesex Turnpike, Burlington, Mass., is the new home of the Boston Artificial Limb Company, Howard Mooney, Manager. The spacious and attractively landscaped building contains a 43' by 38' plant area, office and separate waiting room, and four fitting rooms furnished with combination lamps and tables, clothes racks and chairs. Parking space for sixteen cars is provided. A sketch of the floor plan and additional pictures of this attractive facility are being added to the Building Plan Loan Folder.

AOPA Survey Reports On Prosthetic Services

By BERTRAM D. LITT

Associate Survey Project Director

The American Orthotics and Prosthetics Association "Survey To Determine The State of Services Available To Amputees and Orthopedically Disabled Persons" visited 125 facilities during May and June of 1961. Owners, managers, and prosthetists at these facilities provided information on all phases of their prosthetic services, including the details describing: shop personnel; methods of patient referral; the areas which they serve; attendance of Prosthetics Education Program Courses; types of prosthetic components and procedures which they use, as well as the rationale underlying their selection of these items and methods; individual techniques which they have developed; improvements in components, research, and education which prosthetists would like to see in the future. This data was analyzed during the summer. *Report 1—Prosthetic Services—USA—1961* was completed in October, 1961, in time to be presented before the National Assembly of the American Orthotics and Prosthetics Association in Miami, Florida.

This Survey was originally conceived by Mr. Glenn E. Jackson, who was then Executive Director of the Association. Mr. Jackson and the members of the American Orthotics and Prosthetics Association Committee on Advances in Prosthetics—Carlton Fillauer, *Chairman;* M. P. Cestaro, Fred Eschen, Charles Hennessey, and Howard Thranhardt—drafted a proposal for a survey of services available to amputees and orthopedically disabled persons, which was accepted by the Office of Vocational Rehabilitation in June of 1959. The Committee on Advances in Prosthetics then appointed a special Survey Advisory Committee to guide the proposed study.

The members of this Survey Committee have worked closely with the survey staff since the inception of this study. These three Committee members, M. P. Cestaro, Chairman; the late Dr. George Young, and D. A. McKeever, have contributed tireless efforts toward the successful conduct of this Survey. They have been instrumental in shaping all phases of the study. In particular, they have been helpful in preparing questionnaires, selection of the tables for inclusion in the report, and have contributed immeasurably to the actual form which the prosthetics report has taken.

A. Bennett Wilson, Jr., one of the principal investigators for the Survey during the Pilot Study, has generously contributed his talents and advice to the survey staff since his return to the National Research Council, Academy of Sciences. Ralph Storrs, President of the Association in 1961, and Lester A. Smith, Executive Director, participated in the efforts of the Survey Advisory Committee during the past year and were also active in enlisting the cooperation of many facilities.

The 1961 Regional Directors of the American Orthotics and Prosthetics Association:

Joseph Martino, Region I
Mary S. Dorsch, Region II
Basil Peters, Region III
Bert Titus, Region IV
Durward R. Coon, Region V
Richard G. Bidwell, Region VI
Robert Gruman, Region VII
David C. McGraw, Region VIII
Harvey Lanham, Region IX
Herbert J. Hart, Region X
August W. Pruhsmeier, Region XI

also helped in enlisting the aid of individuals in their areas and provided the Survey with listings used in assembling the universe of facilities from which the smaple was drawn.

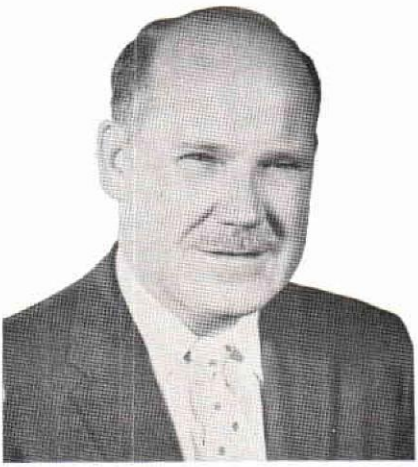
Both LeRoy Wm. Nattress, Jr., Project Director, and Bertram D. Litt, Associate Project Director, owe a special vote of thanks to the individuals who participated in this Survey as members of the staff. Certainly the contribuions of the eight men who took leave from their professional practices to serve as interviewers in the Survey, cannot be fully measured. These men were:

William M. Brady
Jack Gold
Claude J. Lambert
Ralph R. Snell
Eugene D. Filippis
Donald E. Hedges
Frank Malone, Jr.
James W. Stanford, III

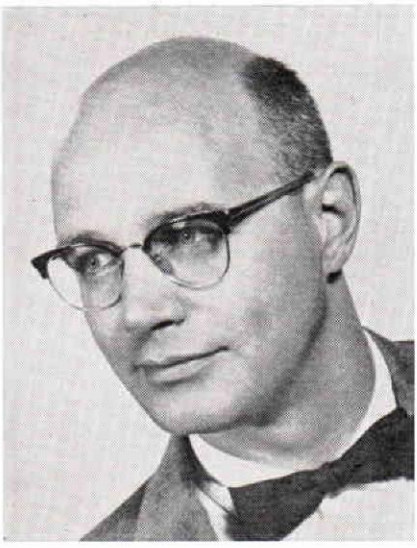
Miss Victoria Bowen, Secretary to the Survey, also functioned as technical assistant. In addition, Robert A. Wolf assisted in the preparation and analysis of the data, and Mrs. Judy T. Bevis aided the typing of the report.

U.S.S. KITTY HAWK (CVA-63) IN OPERATION HANDCLASP—Nine cases of prosthetic devices, weighing 1391 pounds, were delivered in October 1961 by the KITTY HAWK, the world's first guided-missile aircraft carrier. Shown here is the KITTY HAWK's Chaplain, CDR Ross H. Trower, USN, making the presentation to the Peruvian Army's Surgeon General and to representatives of Hospital San Juan de Dios, a crippled Children's center in Lima. The prostheses were the gift of the World Rehabilitation Association. Many AOPA members also have contributed to the special program of technical assistance to medical centers.

New Officers of the American Orthotics and Prosthetics Association



FRED QUISENBERRy, President—For details of Mr. Quisenberry's professional background and service to AOPA, see story on facing page, 287.



CARLTON E. FILLAUER, President-Elect—Mr. Fillauer, Vice President of Fillauer Surgical Supplies, Chattanooga,is the Association's new President-Elect. He will assume the Presidency following next year's Assembly in Arizona.

M. P. CESTARO, Secretary-Treasurer — Mr. Cestaro, who has served for ten years as Secretary-Treasurer of AOPA, was reelected to that position at the 1961 Assembly. He is president of J. E. Hanger, Inc., in Washington, D. C.

ROBERT C. GRUMAN, Vice President—Mr. Gruman, General Manager of the Winkley Company, Minneapolis, is the newly-elected Vice President of AOPA.

Fred Quisenberry Becomes AOPA President

Fred Quisenberry, President of the Alpha Orthopedic Appliance Company of Los Angeles, assumed the presidency of the American Orthotics and Prosthetics Association for 1961-62 following the October 19-25 annual National AOPA Assembly in Miami Beach. Mr. Quisenberry succeeds Ralph Storrs, Manager of the Pope Brace Division of Kankakee, Illinois.

Mr. Quisenberry began his orthopedic and prosthetic training with the George R. E. Milligan Company in Los Angeles in 1927 and with with this company until 1946, except for two years with the Lundberg Company in Seattle. In 1946 he became a partner in Alpha Orthopedic Appliance Company and is now president of the firm.

AOPA's new President is himself an amputee. He lost a limb in a railroad accident while still in his teens, and his mechanical aptitude combined with his interest in amputees led him into the field of prosthetics. He is a certified prosthetist and orthotist.

Mr. Quisenberry early attracted the favorable attention of his colleagues in the limb and brace industry. He has served as Regional Director for Southern California and Arizona; was Program Chairman for the 1959 National Assembly at Dallas; and was elected Vice-President of the Association at that meeting. The year following he served as Chairman of the Membership Committee. He was the first man to be chosen for the position of "President-Elect" of AOPA when that office was created at the 1960 National Assembly in New York City.

Mr. Quisenberry is a firm believer in the importance of basic business training for the manager of the prosthetic and orthotic facility. He plans to emphasize this subject at the Association's Regional Meetings and Educational Programs.

1961 NATIONAL ASSEMBLY

The 1961 AOPA Assembly met in Miami Beach, Florida, at the Eden Roc Hotel, October 19 through 25. The meeting broke records both as to the number of registrants (over 400) and the number of technical and educational exhibits (43). Outstanding physicians joined with orthotists and prosthetists in consultation and discussion. (See, above, Richard Bidwell, Program Chairman; George T. Aitken, M.D., Speaker; H. Blair Hanger, Chief Prosthetist at Northwestern University. Below, Lee Fawver, Kansas City; AOPA President Fred Quisenberry, Charles H. Frantz, M.D., Speaker; and Past President Ralph Storrs.) Certain of the technical papers presented will be published in comming issues of the JOURNAL.

Congratulations and Good Wishes Received At Assembly

A cable from Mr. Hellmut Habermann of Frankfurt, Germany, and a letter from Dr. J. Vernon Luck, M.D., President of the American Academy of Orthopaedic Surgeons, were received just prior to the opening of the 1961 Assembly. Both of these communications congratulated the American Orthotics and Prosthetics Association on its continuing aid to the disabled. Both the letter and the cable are quoted in full below:

Mr. Ralph Storrs, President
American Orthotics and Prosthetics Association
Dear Mr. Storrs:

Cordial greetings from the American Academy of Orthopaedic Surgeons.

With such an outstanding program, your meeting should be a memorable occasion. The foundation and superstructure of your organization are impressive. Your superstructure, solidly anchored in tested basic principles and high ethical standards, will need no "bracing" to protect it against the storms that occasionally test the structure and stature of all professional associations.

We of the American Academy of Orthopaedic Surgeons admire the achievements of the A.O.P.A. Please know, as in the past, it is ever our wish to cooperate with you, participate with you in your organization and programs, and be helpful in every possible way. Our organizations hold a common goal: to serve our patients by an ever higher standard of practice.

Yours most sincerely,

J. Vernon Luck, M.D.

President

To the Meeting of the American Orthopedics and Prosthetics Assn.

Eden Roc Hotel, Miami Beach (Fla.)

U.S.A. Executive Director Lester A. Smith

My Best Regards and wishes for a good and successful meeting 1961 in Miami Beach. I'm always thinking with gratitude of the unforgetable days, when I was at Waldorf Hotel in New York City for the meeting last year. I pursue with great interest the progress of the American Orthopedic Technique.

With my best *kolliaguel* greetings

Mrs. and Mrs. Habermann, Germany

The President of AOPA Reports on the Association's Committees

Committee appointments are one of the first and most important decisions to be handled by a new President. Each person named to a committee contributes much time to the Association's and to our common good, without any reimbursement. They deserve our full cooperation when they turn to us for help on committee assignments.

I have given a great deal of thought to the naming of committee members and chairmen since our Miami Beach Assembly, and am happy to announce the following appointments for the coming year:

PROGRAM COMMITTEE 1962: Herbert Hart, Chairman. This is one of our important assignments and Mr. Hart has had unusual experience. He was Program Chairman when we met in San Francisco in 1956 and he has just concluded a term as a member of the American Board for Certification. He will be sending a letter to all members inviting their suggestions for the next year's program.

EXHIBITS CHAIRMAN—William Scheck of Oak Park, Illinois. Mr. Scheck served on our Exhibits Committee this year. He deserves much credit for the excellent exhibit on building plans and remodeling which attracted so much atention at the Miami Beach Assembly. We will name a member from each Region to serve with him on the Exhibits Committee.

SPECIAL DEVICES COMMITTEE: Erich Hanicke, Chairman. I am asking Mr. Hanicke to serve again as Chairman of this Committee. The exhibit in Miami Beach was outstanding and if we can build on it for the years ahead we will have added to our National Assembly something of real value to every member. Frank Sheridan of Phoenix will be Vice-Chairman of this Committee and we will name other members so that each Region will be represented.

GOLF COMMITTEE—Richard Locke, Chairman. Here again we will want to build on the success of this year's Meeting—and handling a golf tournament is no easy matter. So we have asked Dick Locke to continue on this assignment.

AUDIO-VISUAL PROGRAM—Edward Jachowski of Phoenix Limb Shop. The provision of the necessary equipment for projecting of slides and motion pictures is one of the difficult assignments at any Convention. It is important to have a man who knows local sources of supply and for that reason I am happy that Mr. Jachowski has consented to take this assignment.

ASSEMBLY LOCAL ARRANGEMENTS: Clyde Aunger, our Past-President, knows Phoenix like the back of his hand and we are counting on him to assist on necessary local arrangements. Serving with him will be our other Arizona members.

VA LIAISON COMMITTEE—I have asked M. P. Cestaro to serve as Chairman of this Committee. Other members are our Vice-President Robert Gruman and Howard Thranhardt.

COMMITTEE ON ADVANCES IN PROSTHETICS—I have re-named all the members of this Committee, but have asked Howard Thranhardt to serve as Chairman in the year ahead. Since Carlton Fillauer, the previous Chairman, is now our President-Elect, this will free him to make plans for his upcoming term of office.

Other Committee appointments will be announced later in the year.

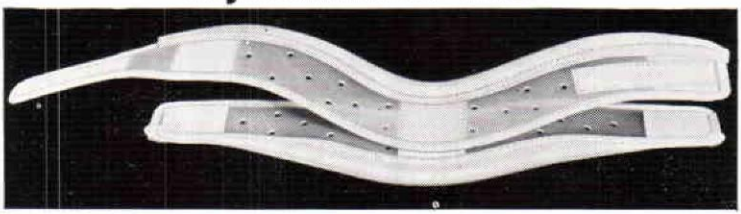
Sincerely,

FRED QUISENBERRY

AOPA TECHNICAL DEVICES AND FACILITY BUILDING EXHIBITS—The stage of the Cafe Pompeii was a center of attraction at the Assembly because of the display on Building and Remodeling the Facility, arranged by William Scheck, as well as the Technical Devices Exhibit arranged by Erich Hanicke.

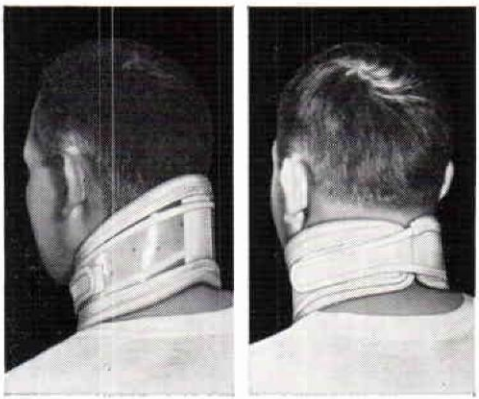
A NEW PRINCIPLE

"Velcro" interlocking parts permit almost universal adjustment of this



TRUFORM CERVICAL COLLAR

Regulation collar . . Queen Anne style . . right or left lateral extension . . . this new Truform model 975 can be assembled readily and accurately to meet any one of a number of needs. Resetting the two interlocking "Velcro" parts according to the individual patient's requirements achieves right or left lateral extension. This washable collar has no pressure point, but distributes pressure evenly around its circumference. Acquaint your physicians with the almost universal range of adjustment . . . stock Truform model 975 collar (patent pending) in only three sizes, with these circumference ranges: Small (13½" to 15½"), Medium (15½" to 17½"), Large (17½" to 19½").



Nylon-covered threads of real live rubber give excellent therapeutic support from these Men's Elastic Socks by Truform. The ribbed top securely holds them in place. Available in smart-looking blue, brown, black, white; three sizes with these calf circumferences: Small (10" to 13"), Medium (13" to 16"), Large (16" to 19").

Write for "Truform Red Book," the fully illustrated reference catalog of Surgical Supports and Hose. Ask about the Truform Fitting Schools.

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A Report From the President of the American Board for Certification

As we look toward the year ahead it becomes apparent that a movement such as the American Board for Certification in Orthotics and Prosthetics, Inc., can not continue to grow and be of influence without the hard work of many individuals. Recognizing this, The Executive Committee of the Board has made the following Committee appointments for the 1961 1962 year.

Committee on Educational Standards
Michael P. Cestaro, Washington, D. C., *Chairman*
Robert C. Gruman, Minneapolis, Minnesota
Basil Peters, Philadelphia, Pennsylvania
Thorkild J. Engen, Houston, Texas

Committee on Credentials
Alvin L. Muilenburg, Houston, Texas, *Chairman*
Charles W. Rosenquist, Columbus, Ohio
William E. Brownfield, Boise, Idaho
Paul E. Leimkuehler, Cleveland, Ohio

Committee on Examinations
Richard G. Bidwell, Milwaukee, Wisconsin, *Chairman*
Jack B. Faatz, Lakeland, Florida
Bert R. Titus, Durham, North Carolina
John J. Glancy, Boston, Massachusetts
George T. Aitken, M.D., Grand Rapids, Michigan

Committee on Facilities
George H. Lambert, Baton Rouge, Louisiana, *Chairman*
Herbert J. Hart, Oakland, California
Theodore W. Smith, Kansas City, Missouri
Durward R. Coon, Detroit, Michigan

Committee on Ethical Practices
Howard R. Thranhardt, Atlanta, Georgia, *Chairman*
Lucius Trautman, Minneapolis, Minnesota
George A. Scoville, Hartford, Connecticut
Cameron B. Hall, M.D., Beverly Hills, California

These Committees will be working for you during the year. But they cannot do their work alone. The certification program is your program. You will get out of it what you are willing to invest in it.

ROY M. HOOVER, M.D., *President*

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COMFORTABLE . . . Smooth thickness and resiliency to cushion the stump from shock.

SOFT . . . Every Knit-Rite Stump Sock is flawless, smooth, absorbent, downy soft.

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KNIT-RITES . . . since 1925 . . . amputee preferred! Sell fresh Knit-Rite Stump Socks for the ultimate in walking comfort.

KNIT-RITE offers stump socks in a special range of sizes for Patellar Tendon Bearing prostheses.

Materials other than wool . . 50/50 White Wool & Cotton, Silkoline (Mercerized Cotton) Cotton, Regular or Light Weight. 7

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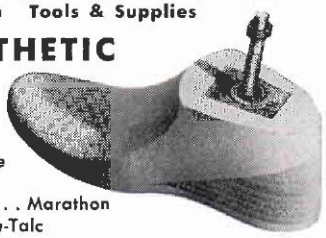
Leg Braces—Complete • Joints & Component Parts
Denis Browne Splints • Spring Wire Drop Foot Splints
Crutch Set-Ups—Aluminum **Tools & Supplies**

PROSTHETIC



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Plastic Lamination Supplies . . .
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To The Ladies:

FROM AOPA'S AUXILIARY

Mrs. Lorraine Scheck
President

Mrs. Elinor Bohnenkamp
Vice President

Mrs. Esther Pava
Secretary-Treasurer

Mrs. Pearl Leavy
Past President

First of all I want to thank you for electing me as your President for the coming year. I hope I will be able to have as well-planned a program at our next convention as our past president Pearl Leavy had in Miami.

I am only sorry that some of the ladies were not fortunate enough to attend that convention. The luncheon-fashion show—held at the Fontainebleau Hotel—was in itself worth the trip.

Fashions were shown by Jordan Marsh, which is quite an exclusive store in Miami. The fashions made quite an impression. A few of the ladies managed to get to the store a few days later and made purchases. There were quite a few calories floating around during the dessert. An ice cream log meringue with flaming brandied Bing Cherries. It was marvelous, ummm . . .

Our trip to the Villa Vizcaya, the Deering estate, was restful and enjoyable sitting in the float and listening to the guide tell about the various places of interest as we passed them by and also telling a joke or two. I managed to take a few movies while at the estate. I particularly liked the formal gardens. We did not get to go through them but I at least have it on film taken from a balcony.

The day of the Children's Clinic gave us a good and warm feeling to know that we helped in some way.

One of the highlights of the Assembly banquet was the surprise presentation of a birthday cake by the Ladies Auxiliary to Dr. Warren Perry, who was the guest speaker. He was a very surprised man, especially when he could not blow out a couple of candles. Two trick candles were among the usual birthday ones.

Well ladies, the above is just a skeleton of all the activities we had but I did want to share a few things with those who could not attend.

It is still too early to have anything definite for our next convention in Phoenix. I hope we have as large a turnout of ladies as we had in Miami.

I would be happy and appreciative to hear from anyone with ideas or suggestions in regard to activities for the ladies in Phoenix. Drop me a line, won't you?

With regards to all.

Sincerely
LORRAINE SCHECK

SUPPLIERS SECTION—INFORMATION ON SUPPLIERS LIMB AND BRACE FIELD

Advertising in the *Journal:* The *Journal* is published March, June, September and December. Advertising contracts for these issues are issued on an annual basis.

Advertising rates are full page $65.00 per issue—half pages $40.00 per issue.

Other details on advertising requirements and policies may be obtained from the editor, 919 18th St., N.W., Washington 6. C. D. or from any of the members of the AOPA Committee on Advertising and supplies:

Armand Roy, Burlington, Vermont
Charles Dankmeyer, Baltimore, Md.
John Hinnant, Charlotte, N. C.
Howard Reinherz, Kenosha, Wisc.
Lucius Trautman, Minneapolis, Minn.
Charles Kymes, San Antonio, Texas
Edward L. Jachowski, Phoenix, Ariz.
Harold Lloyd, Reno, Nevada
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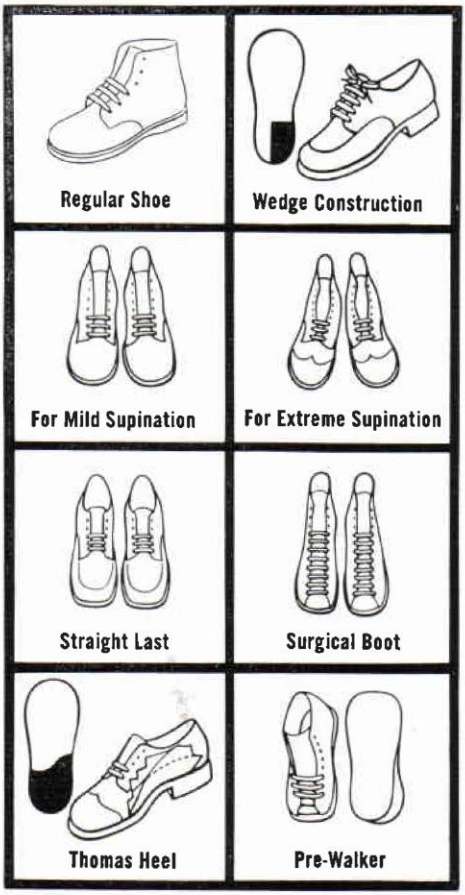
SUPPLIERS' INDEX—DECEMBER, 1961

The COMPLETE line helps you build new business



Today more leading orthotists and prothetists carry and feature Medic Junior Arch Preserver Shoes than ever before. The reason? Simple. It's the line doctors recommend and prescribe. And doctors prescribe Medic Junior Arch Preservers because they know that whatever the need, they can rely on Medic's complete line. From wedge construction shoes to the exclusive Medic-Splint, Medic has a shoe for every R$_x$ need.

By carrying Medic's complete line, forward-looking orthotists and prothetists have taken on new business. And, of course, Medic's regular construction shoe — combining quality and fit with style — helps build volume sales. It's no wonder more and more orthotists and prothetists are also successful Medic Junior Arch Preserver retailers. To find out how you, too, can join the ranks of successful Medic Junior Arch Preserver retailers, send us your name and address and we'll give you complete information.

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New Helps for your
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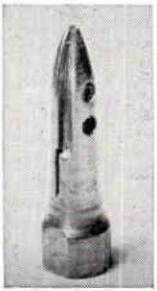
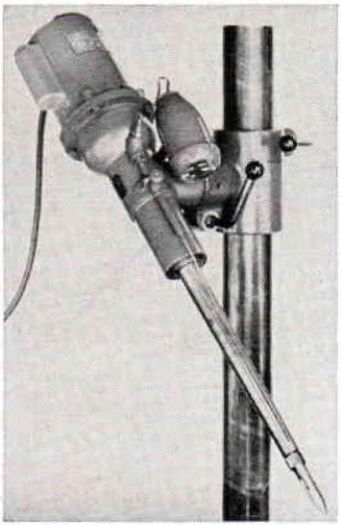


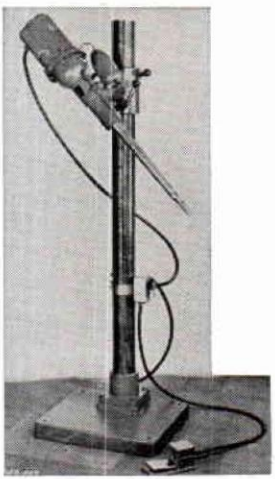
MIDGET CUTTER—No. 2100H

A new single blade cutter to help you pull small children's sockets—and to route out corners for all quadrilateral fittings. $25.00 including an extra blade.

Air Attachment for Trautman Carver No. 2100J



Another tool to help you get ultimate efficiency from your Trautman Carver. This is a blower attachment which gently blows sawdust and chips away from the cutting tool. This enables you to see at all times exactly where and how you're cutting. Comes complete with airhose fitting—can be plugged into any standard airline. Flow of air can be regulated. Attach in minutes with screwdriver only tool needed. Cost $10.50.



FOOT SWITCH (For the Trautman Carver 2100K)

We've had requests for a foot-operated switch, and this is the answer. It can be attached in a matter of minutes to any Trautman Carver. Designed so that if the operator wishes to use the hand switch instead of the foot pedal, all he has to do is remove the motor plug from the receptacle on the column of the Carver and then plug it directly into the power supply. Does not affect the Carver's normal operation. Cost $22.65.

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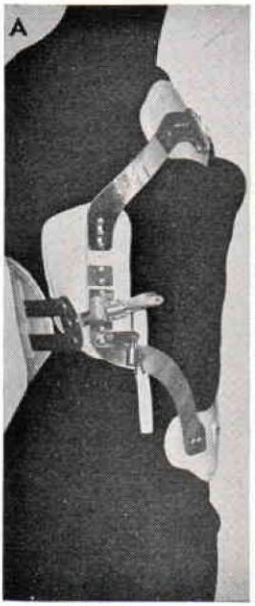

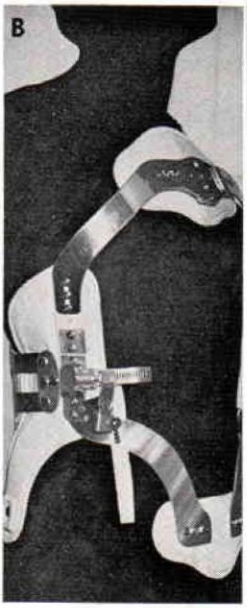

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CERVICAL COLLARS FOR EXTENSION-FLEXION OR STABILIZATION

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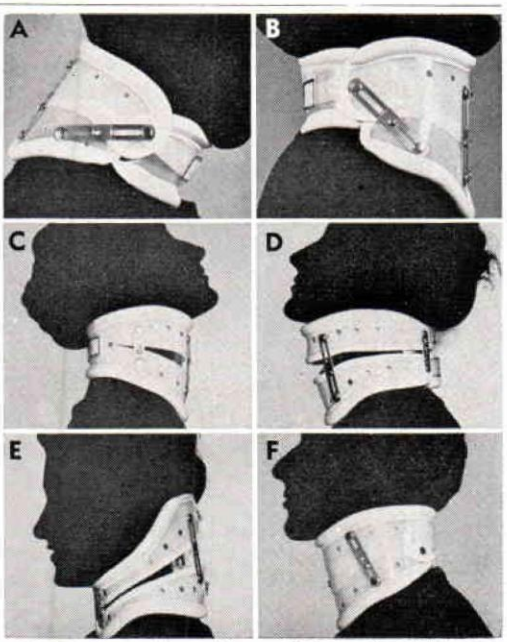
A & B THE EXTENSION-FLEXION COLLAR—A universal cervical collar, extremely versatile and adaptable for extension, flexion, or stabilization.

C—The MYO-VENT—A one-piece extension collar with ventilated adjustability.

D—The CER-VENT Extension Model. A one-piece collar with ventilated adjustability. Easy to put on, complete support.



E—The CER-VENT Flexion Model. A one-piece collar with ventilated adjustability. Easy to put on, complete support.

F—The MYO-CERVICAL. A one-piece extension collar with overlapping adjustment. Catalog and Order Blanks upon request.

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- **Sufficient support for the most aggravated cases.**
- **Support that only rubber can give.**
- **Attractively packaged, ideal for point-of-sale displays.**

Bell-Horn also manufactures the famous "TROPICAL WEIGHT" brand in both service and sheer weights—contour fashioned, two-way stretch to support even the severest cases of varicose veins.

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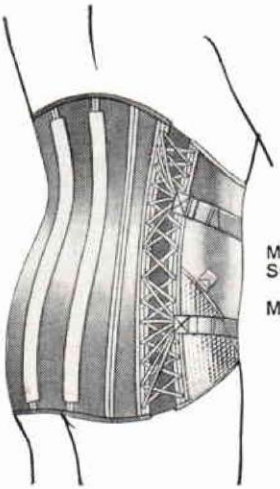

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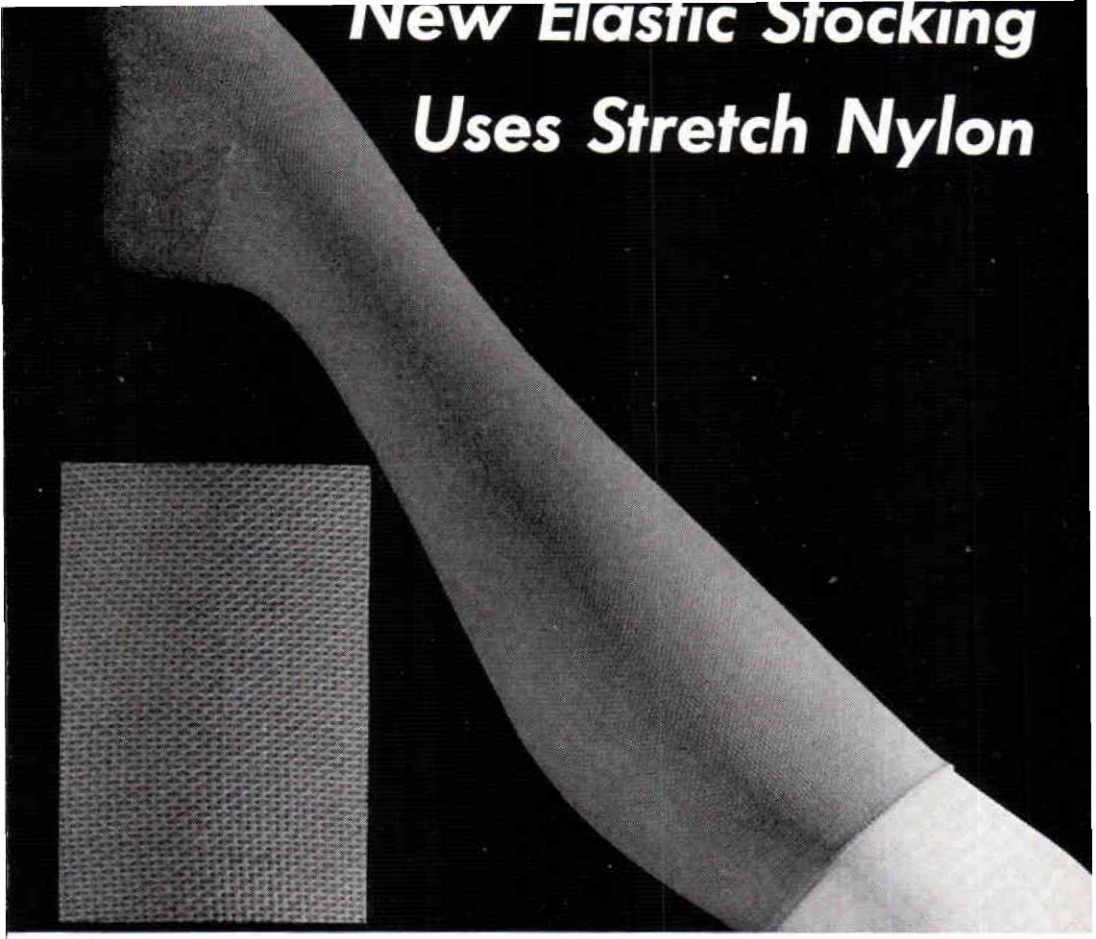

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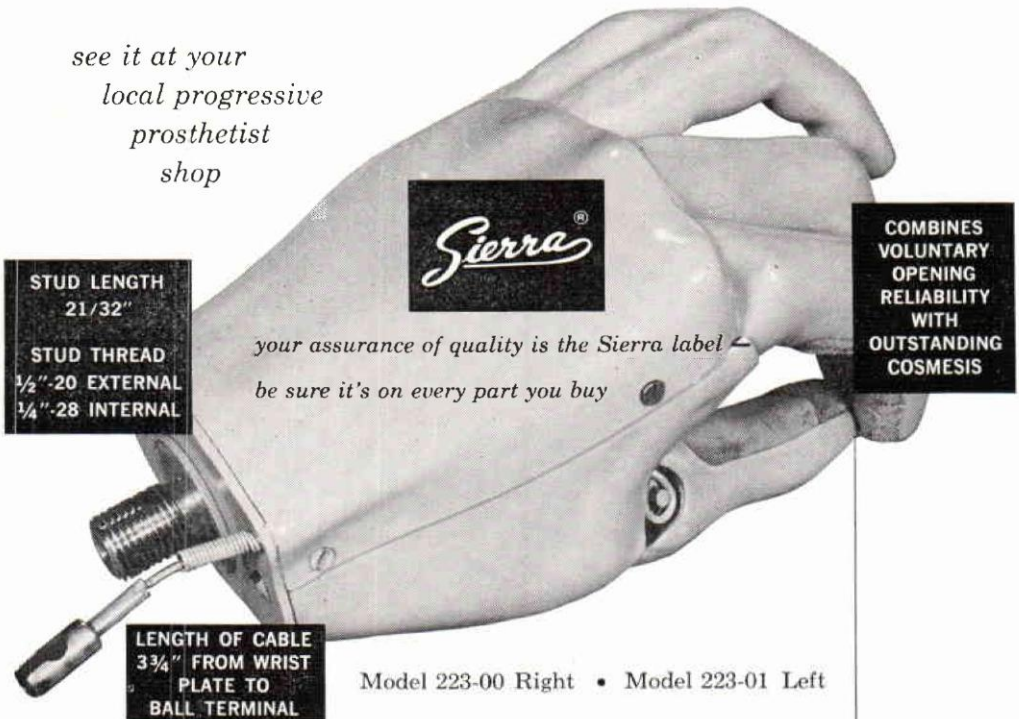

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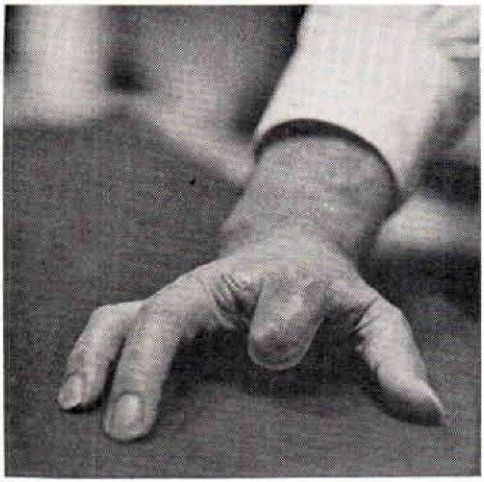

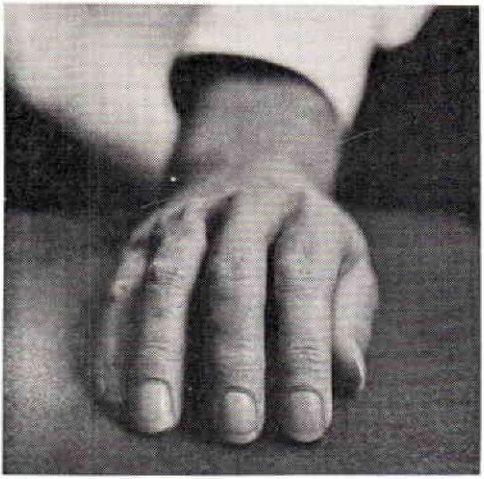

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