HELPFUL NEW DEVICES; NOTES FROM THE P. W. HANICKE FACILITY

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Number 1

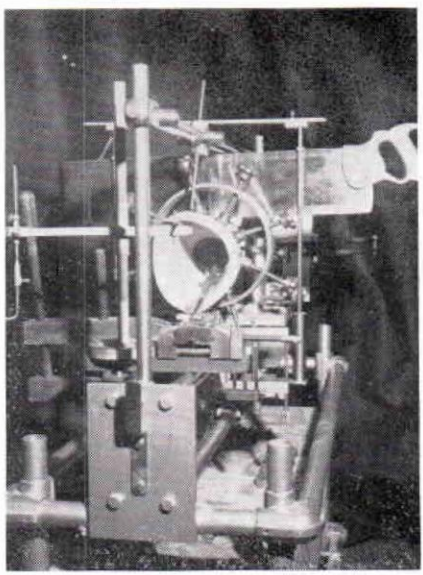
This mechanism shows a powerful, accurate and easily adjustable stretching device for severe contractions of the knee. It consists of bilateral drop ring locks mounted on swivel plates. These swivel plates are provided with circular slots about 2″ from the center of the knee bolt, following the radius of same. The slots are provided with milled grooves and hardened washers which have triangular ridges. These ridges engage into the grooves of the swivel plates and are held tight by Allen socket screws. This feature allows for very fine or gradual adjustment and fixation of position.

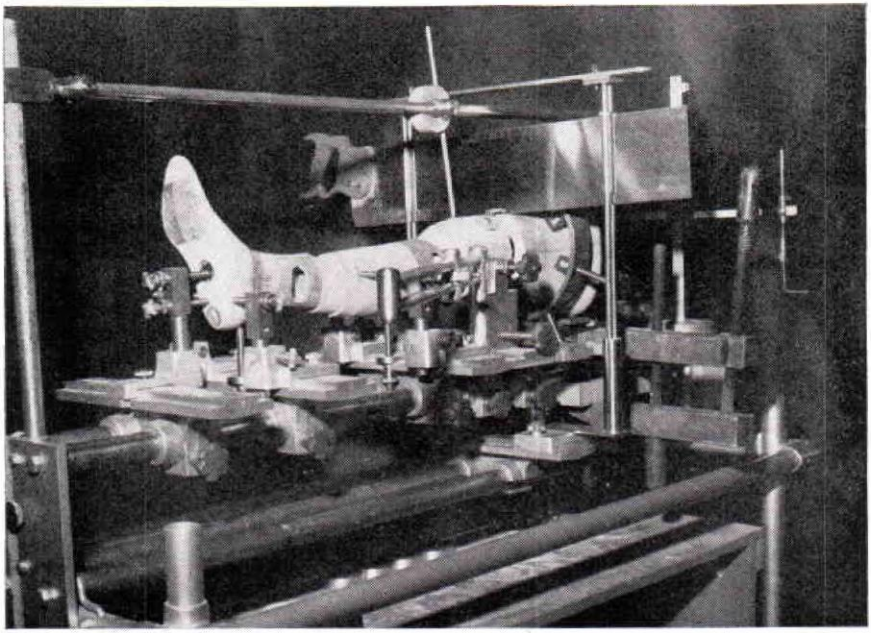
The force required to stretch or straighten a knee is derived by turn buckles or strong elastic pull straps. These are hooked into detachable anterior bows, which insert into metal loops attached to the thigh and garter band. This entire unit is part of a long leg brace attached to the shoe, with adjustable upper bars for control of weight bearing area as tuberosity of ischium. The cuffs at garter and thigh are held close to knee to prevent loss of efficiency or counter pressure. A well molded knee cap with a large opening for patella is also used with great advantage.

A broad, wide, soft padded posterior strap over the tendon achilles above counter of shoe provides definite counter pressure at the distal end of this leverage mechanism and protects the anatomical ankle joint from posterior subluxation at the astragalus.

Number 2

Looking at this photograph, you may question its identity and reason for existence. This introduction sounds about as good as any more elaborate means of trying to explain the illustration in one word. While necessity is supposed to be the mother of invention, it seems as if she has outdone herself just a little. There may also be a good many camps of criticizers who might just glance at this and brush it aside with a shrug of the shoulders which means "crazy." But, looking into this mechanism a





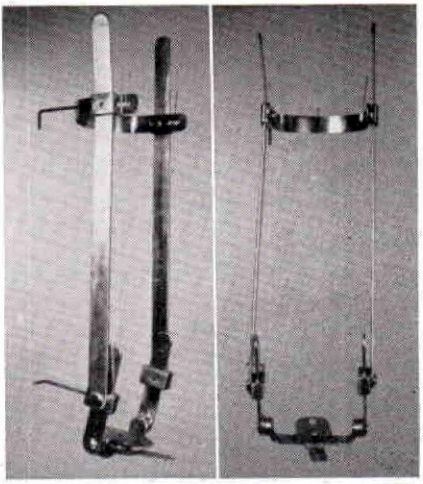
No. 2

bit closer, we find quite an assortment of fixtures, clamps, gages and special tools to be a part of a rather unique measuring and duplicating jig. Its main function is to assist in recording a set of assimilated parts in relationship to each other so that they may be classified and recorded as to degrees or linear proportions, etc. In ordinary machine work one has a certain advantage to measure everything one sees just as it is. With many multi-faced surfaces on an artificial leg or other types of congenital or other special appliances, it becomes rather difficult to get a good foothold or bearing surface and maintain same during the coming operation of dismantling, realigning or just replacing certain parts which have become obsolete during fitting procedures and also for the purpose of duplicating a test leg or fitting leg to a new ankle mechanism.

This jig is constructed from various components. The main base, a Trautman type duplicating jig, is used in conjunction with walking jigs. This has been machined and squared up to obtain level surfaces for gages, squares, squaring blocks, height gages, clamps, etc. A lower deck has been added to facilitate movement of saw carriage from end to end. Detachable lower center indicators can be fitted whenever needed. An upper or anterior center marking rail has been added which can be lowered and tilted to meet the occasion. A detachable rail with scribe or pencil has been added into recessed openings at either side of knee joint towers. This can be detached and used for medial or lateral below-knee as well as above-knee measurements. A footboard can be attached to record position of foot or shoe in relationship to previous recordings and permit accurate duplication. A ring vise which encircles the socket and holds it in proper position is a great help should this socket have to be turned, abducted, adducted or tilted into flexion or extension.

This apparatus is a blessing to anyone in our field who has had and will have the opportunity to create something rather unique for a pa-

tient. This so-called something, taken so lightly, yet demanding much knowledge, engineering, patience, experimentation, ingenuity and financial support as the construction of an artificial leg, or any other complicated appliance, if you expect it to function as well as is humanly possible, includes revamping of a patient's brain pattern to establish a new gait and habit of handling his prosthesis. This may require a few months to a year but when these Test or Model legs are ready to be duplicated into the permanent prosthesis this last operation would be quite hazardous without the proper protective devices to assure us a well executed appliance of master workmanship.



Adjustable Ankle Brace

Number 3

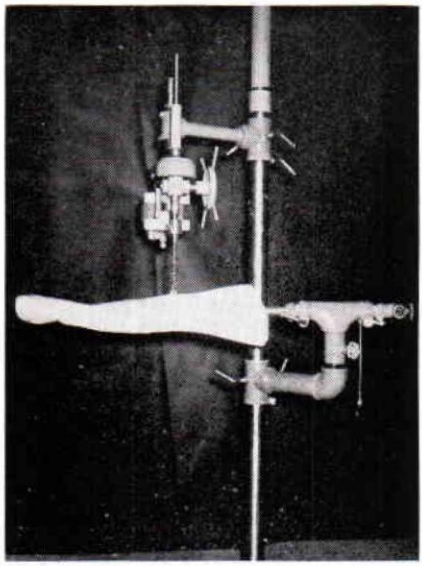
This photograph illustrates a very simple test brace. It is adaptable to most any shoe — mens or ladies'. It is screwed to the shank of the shoe with short wood screws or machine screws passing through the shank of the shoe. The plate to which this brace is attached can follow the conventional lines of the shank of the shoe. This brace is used to determine the functional position of the mechanical ankle joint in relation to the anatomical joint. Joint location can be duplicated by loosening all moving parts and then tightening one by one. It will indicate how low the joints should be. This will be a surprise to most investigators. It will show how far forward or backward the joint should be located (or placed). It will also show the rotation of the axis of the ankle joint in relation to the longitudinal axis of the foot, or so-called tibial torsion. It will show how far the joint can be erected or inverted in order to help correct a certain condition of clubfoot or flatfoot in conjunction with polio or fracture cases. The shank plate is provided with serrated discs at medial and lateral sides. The stirrup bars are anchored to the discs which engage with the ones mentioned above.

It is interesting to find that by turning the stirrup back and forward (parallel with the longitudinal axis of the foot or shoe) one can control the maneuverability of a pair of leg braces. Placing the mechanical ankle joint in position will either ground a patient or endeavor to make him walk with much greater ease. Placing the downward force of a body behind the anatomical ankle joint will have a tendency to raise the forefoot. Placing the same force ahead of the anatomical ankle joint will create a terrific downward pull with the result that this patient can hardly lift his foot or clear his toes. While this is nothing particularly new, this test brace will give us fairly accurate information as to what we may expect from this patient, and the effort or energy he has within himself to manage braces and walking. In low fractures of the tibia it is important to obtain as accurate duplication of ankle joint movement as possible to maintain proper immobilization of the site of the fracture.

Anyone experiencing cases with heel and counter movement will welcome this device, as it will eliminate a good percentage of this troublesome occurrence, especially where there is need for built-in elevations with elevated stirrups. The ankle joint proper and its upright bar are mounted on a drop ring lock type of sleeve, adjustable by an Allen socket head screw. The metal garter band can be raised or lowered as well as deepened and flattened as the various conditions may require. It can also be tilted to follow the taper of the area of the calf muscles, which are found in reverse occasionally. While this particular test brace does not conform to the contours of a human leg, its skeleton design is primarily used to locate the position of the anatomical joint to the most advantageous position for the mechanical joint.

Number 4

This drill press is used primarily to bore holes through plaster of paris leg models. Most small drill presses have a downward excursion of about 4½", while this particular one has a 9" drop. This means that a drill can bore through most any diameter of knee without having to be reset. The upper or motor section is attached to a long bracket which in turn can be raised or lowered on a 4" steel tubing. A separate clamping ring gives us a rotary motion on the main steel tube area. The proper height has been established. This enables us to swing the drill itself with about a 15" radius or 30" from minimum to maximum horizontal excursion. At the end of this arm is another vertical adjustment feature. A solid rod is mounted in such a way that it can be raised or lowered to a very fine degree. Around this rod at the lower end is the attachment for the drill press itself, so that there are two rotary motions possible: the first motion to move the drill from one side to the other in an arc; the second to move the drill in and out or closer and farther away from the central steel tube. This allows very fine maneuverability of this upper section.



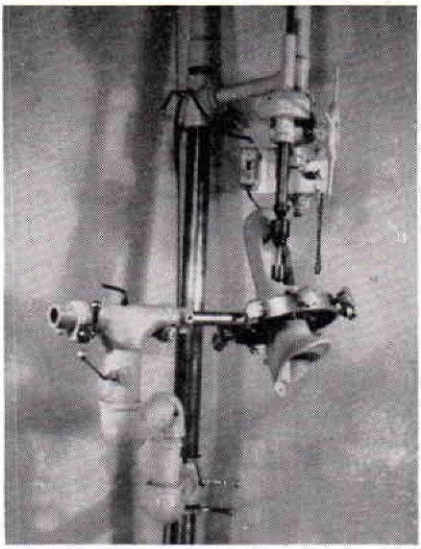
Drill Press

The lower section, called bed, on most drill presses, is constructed in the form of swivel brackets. The first one rotates on the main steel tubing and rests on a separate clamping ring. The head or main section of the lower assembly is set in a 4" tube and held in place by a shallow circular groove to maintain its position and obtain another rotary advantage and maneuverability. This bronze head is provided with machined ferule which can be rotated and clamped tight by flanges and drill press handles. The entire unit makes a very strong and dependable machine.

This press is used to maintain proper alignment of joints with respect to their basic position depending on center of gravity and position of abduction of entire leg during stance phase on appliance and prior to dynamic action of leg to foot and floor during weight bearing cycle.

This particular plaster of paris model was made from a patient with ununited fracture at lower 3rd of tibia with a 2″ shortening of lower leg. Since the patient was heavy and active, it was necessary to use heavy molded cuffs due to the excessive posterior curve of the lower leg and the marked cone-shaped outline of his thigh. A strong inside shoe with a celastic and fiberglas counter was used to hold the foot rigid. Special bars $1\frac{1}{8}$ x $\frac{1}{4}$ with tapered section in between joint areas were used to allow for ball bearing races, screw heads and locking screws.

In order to bend and fit the individual members, including the medial and lateral stirrup upright and obtain a proper parallelism or opposition of joints which had to be fitted at either side of the cast, it was decided to penetrate the cast in proper locations and insert a specially devised clamping mechanism which would enable the mechanic to lift the entire appliance off the cast without altering or dismantling the mechanism. Because the bars were of such heavy caliper, it would have been highly improbable to make such a brace and guarantee a good molded fit over leather cuffs and still keep all joint surfaces in proper relationship



to each other, without the aid of proper protective measures. In ordinary braces, small alterations in the shape of the bars or diameter of knee and ankle joint can be handled with bending irons. This, however, was impossible to use in this case as these bars had to be annealed and hardened and rechecked after this procedure.

The other picture shows this press performing another duty — to bore a rather large hole into an area of a leg — knee block, etc., the article is held tight in this special ring vise. In this manner it is possible to clamp this article in almost any position and hold it there until operations are completed. Drill position does not have to be changed in order to exchange borers or other auxiliary tools needed to accomplish this task. The ring vise protects the socket in this instance from being crushed; the entire setup protects the mechanic and his hands and guarantees safer and more accurate workmanship.