

The Rocker Soled Shoe

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For many years we have been using two types of soles with rockers. One is a fast roll and the other is a slow roll. In cases of stiff knee, hip or ankle where there is no chance of the knee buckling we use the former—when there is a more or less unstable knee with insufficient gluteus maximus and hamstrings we then use the latter or slow roll.

1) In the first instance as the opposite side passes thru the swing phase, the rocker rolls the affected side forward so that the pelvis is balanced smoothly in the advanced position without any hitch or lurch. When the slow roll is used, the leg and pelvis are held in the stance phase long enough for the opposite foot to be planted and accept the weight—then the rocker rolls the foot off the toe.

2) In the case of a polio with a flail leg, a pan arthrodesis of the foot will stabilize it and prevent the knee from buckling forward. The lateral stability of the hip can be improved by lateral fascial straps from the trochanter to the body—sometimes to the 10th rib, or otherwise to the rectus abdominis, or external oblique in front and the latissimus dorsi, or sacrospinalis muscles behind. Or in the case of good abdominals the external oblique may have its insertion shifted to the greater trochanter.

In this way a flail leg with reasonably good posterior capsular ligaments of the knee to allow enough backward pressure from the foot, may make it possible for the individual to be brace free or use a cane.

The major indications for the increased heel and sole thickness is to level the pelvis and thus reduce back strain, and as stated above roll the patient forward without pounding down on an affected hip from fracture; congenital hip; or Legg Perthes disease, etc., and to reduce fatigue by getting an improved cadence in the gait and equalizing the amount of time spent on each foot during the stance phase.

3) With hips in a stiffened or flexed position and corresponding shortening with a lurching limp and the extreme toe drop, there may be a too

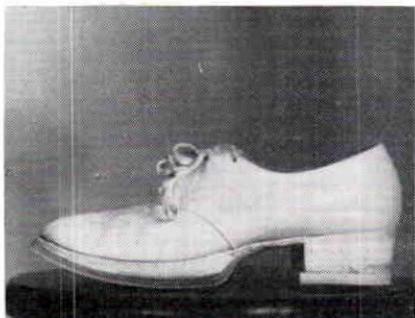


Figure 1. Smooth tapered roll to make it faster. Narrow the filling layer down to nothing at the front so that the two soles come together.

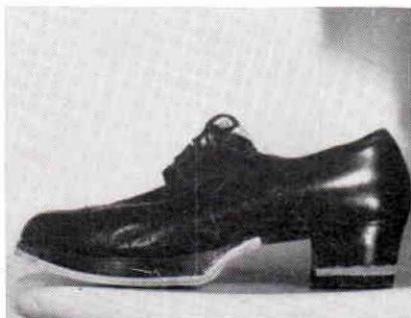


Figure 2. Slow roll. Note flatness out to the breaking point of the toes.

great forward thrust on the ankle joint which is quite ungainly. The smooth taper of a proper rocker greatly improves the gait.

4) When fractures occur in hip, knee or ankle leaving partial movement there is almost certain to develop a painful joint, because a little motion is worse than none at all and leads to an arthritis sooner or later.

Proper training in the use of a rocker sole is very essential. Especially is it hard to break the bad habit of the sudden forward shift of the weight of the affected side, onto the ball of the metatarsals with a quick upward lift in order to overcome the deficient reciprocity between the hip joints in rotation. This is a substitutionary movement and really is an effort to roll off the toe.

Some tend to swing the leg outward and twist the opposite foot in the stance phase. Some try to rotate the pelvis by rocking at the lumbo-sacral junction and thereby forcing the affected leg forward like some amputees do.

Many surgeons who do a lot of hip-joint work simply raise the heel and sole for a shortened leg without realizing that an appropriately shaped heel and sole combination will reduce the trauma of walking.

Another satisfactory detail is the boost in morale a patient receives when he learns how to alter an old bad pattern of movement and gait, and rolls along with a smoother cadence. A limp calls attention of every passerby to the person, whereas when the limp is reduced and the gait improved there isn't much occasion for close scrutiny.

Many women patients would rather have a high heel on a conventional shoe and take the grief, but when they are properly fitted and the correct heel and sole relationship is obtained, the smoothness of gait is so improved they may accept it. Usually we tell a woman to wear the correction 75% of the time and then for parties and evening wear to use their dress-up shoes.



Figure 3. Comparison of the two soles, showing the difference between the fast roll (white) and the slow roll (black).

In the case of a stiff hip the patient can swing forward on the bad side, because in the stance phase on the good side the pelvis rotates on the standing hip. But the reverse is difficult because there can be no rotation on the ankylosed hip. In consequence, they may rise on the toe, bend the knee and snap the foot forward—in which case as mentioned above, they are trying to roll over the ball of the foot while the good side is being advanced. When the ankle is stiff and the integrity of the thigh muscles is

good, a smooth-fast roll is indicated and will markedly improve the gait as well as reduce strain and arthritic changes.

The ankylosed knee, especially in full extension is the most difficult to shoe, as the movement in hip and ankle doesn't give smooth compensatory movement. In such cases there being no worry as to knee buckling, the forward roll of a smooth rocker can minimize stress on foot and hip, altho not entirely eliminating the limp. Getting the adjustment requires study, observation and patience.

Good follow-up work with a physical therapist helps in obtaining the best results—the first exercise is very important, namely, stepping forward on the heel of the affected side—rolling forward while step is made on the good side, and letting the rocker roll up to the toe but not lifting it. Then pressing down on the rocker with the ball of the foot step back to the starting point, pausing with toe up, but heel remaining fixed—thus roll back and forth many times to get the feel of the motion.

Next—trying to pause an equal time on each foot, take alternate steps with a completely smooth cadence or rhythm—preferably, at first walking with another person—keeping in step.

In construction the main point of importance for the smooth fast roll is to make the high point diagonal down and back of the head of the first metatarsal about $\frac{1}{2}$ to $\frac{3}{4}$ " then smoothly tapered to as little thickness at the toe as the sole will permit. For the slow roll keep the sole flattened out to the point where the rolloff is smooth after the stance phase on the opposite is about finished.

AUTHOR'S SUMMARY OF RESEARCH REPORT

The Evaluation of Restrained Bellows as Torque Elements in Prosthetics and Orthotics, by Robert T. Gage and John G. Gamble, Gamble and Gage, 84 Broad Street, Milford, Conn., 1960, 22 pp.

The purpose of this study is to determine the feasibility of using bellows as force elements in prosthetic and orthotic devices. We recognize that there are many types of power sources which may be used, such as electric, pneumatic, mechanical, and hydraulic, or any of these in combination.

The evaluation of bellows as components is merely a part of the overall system which we originally proposed, as an alternative to the McKibben Actuator. It is obvious that a gas or a liquid can only push, it cannot pull. It seemed logical there-

fore, that the most efficient utilization of a fluid (either gas or liquid) would be in a device which utilizes this push directly.

We felt that an orthotic device attached to a flail hand should be flexible in itself, and that harness rather than control should support and restrain. This implied either bellows or pistons as the force or torque elements to effect the desired displacements.

Consequently, this study has been undertaken to provide data with which to compare work elements within gas powered systems in orthotics. From this study we have concluded that corrugated bellows are feasible as force elements and in our opinion continued investigation as to physical configuration, materials and specific application is merited.