

# The Wrist wrap as a protective and performance enhancing device in powerlifting

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## Introduction

Wrist wraps come in all sorts of designs, from simple slings to complex devices combining glove parts, thumb sleeves and grip aid elements. They are usually made of an elastic material that restricts backward and forward wrist bending without totally immobilizing the joint, plus any other desired effect such as aiding in grip, restricting thumb or whole hand movement. Most wrist support and wrap devices on the market are designed for treatment of hand, wrist and forearm injuries, or their prevention. More recently, wrist devices have been developed as sports equipment, either as protection against injury during training or competition, or, more controversially, as performance enhancing aids.

Most powerlifters use wrist wraps for lifting. Wrist wraps are standard equipment in the bench press and deadlift, but many lifters will not squat without it either. Wrist wraps are also popular among olympic lifters and other strength sports.

Let us have a look at the fascinating history of our modern wrist wraps before moving on to its protective and performance enhancing action.

## Some history

The first wrist protection and support device patented at the United States Patent Office was filed and granted in 1901 (table 1). The device is described by its inventor, Vitold Drosness, a Russian citizen living in New York, as an improvement over the traditional leather wristband used by workers. Drosness' invention introduced a double buckle system that supposedly provides a more uniform pressure around the wrist (figures 1 and 2). This innovation is claimed to provide better support and added strength to its users, allegedly workers. Therefore, wristbands, the precursors of modern wrist wraps, have been in use by manual workers for much longer than we thought in the form of traditional apparatuses not properly protected by intellectual rights.

Figures 1 and 2 show that the device's restrictive effect was limited compared to modern equipment and the rigid material (leather) did not allow for constriction modulation along movement.

This early wristband is the origin of the technological routes that resulted both in modern weightlifting wrist wraps and orthopedic devices, as table 1 demonstrates, but not before many other ramifications and innovative applications appeared.

Table 1  
Referenced by:

Patent Number	Title	Issue date
<a href="#">5324244</a>	Wrist assist device for weightlifting	Jun 28, 1994

[5599283](#)  
[5980476](#)

Orthopedic appliance retainer  
Non-compressive, distracting wrist brace

Feb 4, 1997  
Nov 9, 1999

Patent: WRISTBAND; Patent number: 680477; Filing date: Jun 14, 1901; Issue date: Aug 1901; Inventor: VITOLD DROSNESS

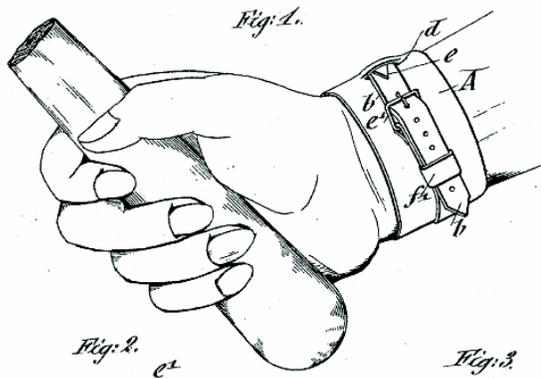


Figure 1: 1901 wristband invention in use. From Drosness 1901.

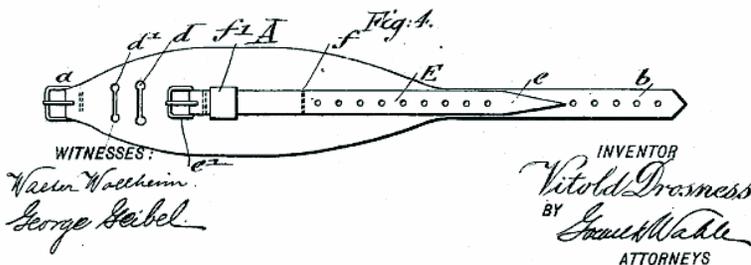


Figure 2: 1901 wristband invention in detail. From Drosness 1901.

The next step in the technological routes of sports and orthopedic wrist wraps is James Tyrrell's wrist support invention (table 2). This new device displays an anatomic sophistication: the material is still rigid, but it contains a small orifice to accommodate the pisiform bone (figure 3).

Table 2

Referenced by:

Patent Number	Title	Issue date
<a href="#">5324244</a>	Wrist assist device for weightlifting	Jun 28, 1994
<a href="#">6120472</a>	Forearm splint system for treatment and prevention of carpal tunnel syndrome and other cumulative trauma disorders	Sep 19, 2000
<a href="#">6807680</a>	Adjustable band to be worn by a person or animal	Oct 26, 2004

Patent: WRIST-SUPPORTER; Patent number: 923217; Filing date: Jun 16, 1908; Issue date: Jun 1909; Inventor: JAMES TYRRELL

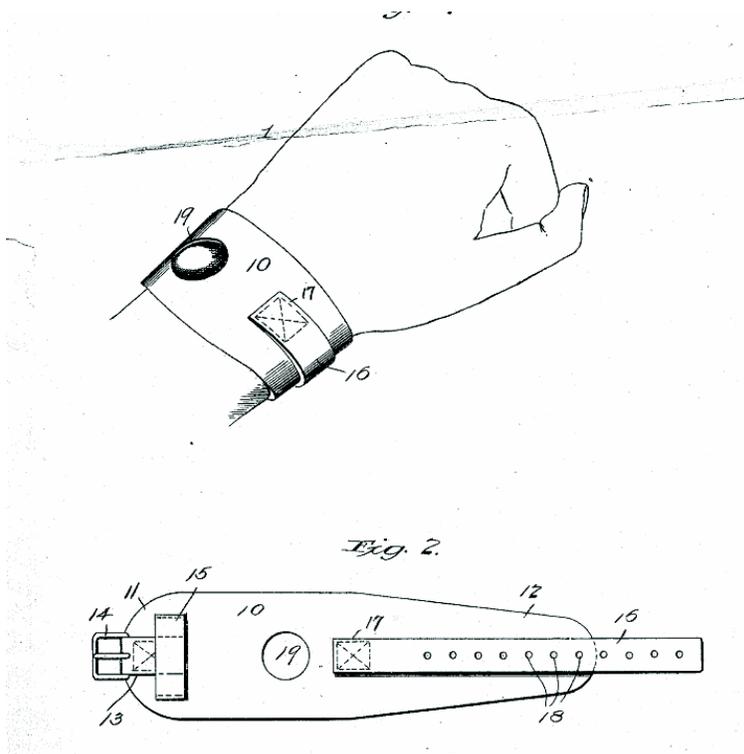


Figure 3: Patent: WRIST-SUPPORTER; Patent number: 923217; Filing date: Jun 16, 1908; Issue date: Jun 1909; Inventor: JAMES TYRRELL

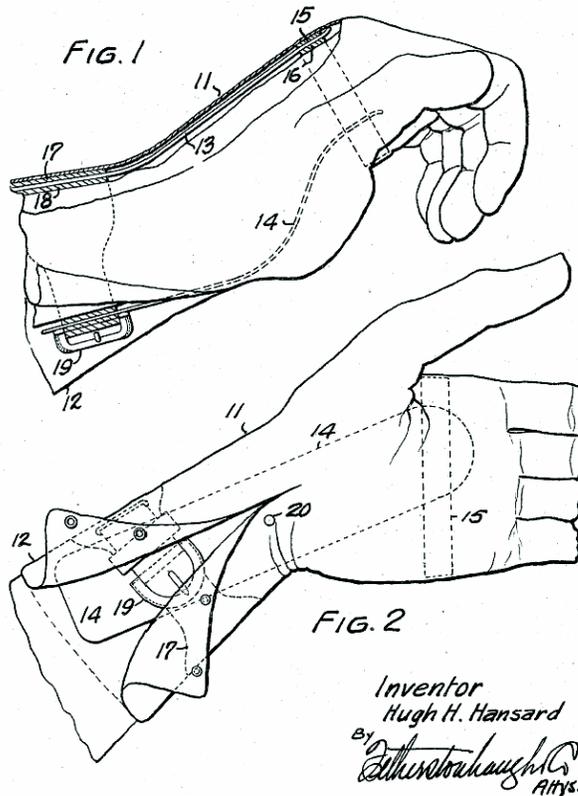
In 1923 we have the first wrist support invention namely introduced for athletic use (table 3). Hansard's invention is an early "sports glove" with inside rigid elements to prevent backward and forward bending of the wrist, as shown in figure 4. It was developed for the use in golf, billiards "and other games".

Table 3:  
Referenced by

Patent Number	Title	Issue date
<a href="#">3990709</a>	Golfer's elbow stiffener	Nov 9, 1976
<a href="#">4103897</a>	Golfer's stance correcting device	Aug 1, 1978
<a href="#">4138108</a>	Athletic hand/wrist positioner	Feb 6, 1979
<a href="#">4198709</a>	Bowling glove	Apr 22, 1980
<a href="#">4384571</a>	Adjustable digital/metacarpal splint	May 24, 1983
<a href="#">4502688</a>	Wrist and hand support device	Mar 5, 1985
<a href="#">4575089</a>	Golf pronation device	Mar 11, 1986
<a href="#">RE32566</a>	Bowler's glove and wrist support	Dec 29, 1987
<a href="#">4873968</a>	Adjustable hand splint	Oct 17, 1989
<a href="#">4899763</a>	Therapeutic appliance for the wrist	Feb 13, 1990
<a href="#">D331042</a>	Wrist brace for use with computer keyboards	Nov 17, 1992
<a href="#">5180169</a>	Golf swing aid	Jan 19, 1993
<a href="#">5193771</a>	Typist's wrist support	Mar 16, 1993
<a href="#">5339465</a>	Palm guard for sports	Aug 23, 1994
<a href="#">5350345</a>	Exercise apparatus for the upper arm	Sep 27, 1994

<a href="#">5476439</a>	Remedial hand wear article	Dec 19, 1995
<a href="#">5499820</a>	Golf swing training device and method	Mar 19, 1996
<a href="#">D374314</a>	Hand and wrist support for bowlers	Oct 1, 1996
<a href="#">5593353</a>	Putting stroke training apparatus	Jan 14, 1997
<a href="#">5634854</a>	Golf swing training device and method	Jun 3, 1997
<a href="#">5685809</a>	Hand appliance for quadriplegic kinestherapy	Nov 11, 1997
<a href="#">5725490</a>	Elastic wrist brace with support and longitudinally extending fastener	Mar 10, 1998
<a href="#">5823980</a>	Collapsible tactile support for body joints	Oct 20, 1998
<a href="#">5846168</a>	Hand appliance for quadriplegic kinestherapy	Dec 8, 1998
<a href="#">5898936</a>	Protective wrist guard assembly	May 4, 1999
<a href="#">6001049</a>	Light weight exercise apparatus	Dec 14, 1999
<a href="#">6010473</a>	Remedial hand wear article for preventing hyperextension with full distal knuckle flexure	Jan 4, 2000
<a href="#">6213921</a>	Light weight exercise apparatus	Apr 10, 2001
<a href="#">6716185</a>	Wrist angle brace	Apr 6, 2004

Patent: WRIST SUPPORT; Patent number: 1469315; Filing date: Aug 25, 1921; Issue date: Oct 1923; Inventor: H. H. HANSARD



As can be seen in table 3, from this point several different innovation routes follow, both in sports - distinct sports, involving different wrist and hand movements - and orthopedic therapeutic applications. Later applications such as the Athletic hand/wrist positioner (Robinson 1979) and the Combined workout glove and wrist wrap (Walunga 1990) are the culmination of the sports branch of this route. Walunga's invention (table 4) is the first

patented device namely mentioning weightlifting in its claims. Table 4 shows that from this point on different weightlifting devices related to the wrist wrap were invented and patented, suggesting that there was a mature market for this kind of equipment around the 1990s.

Table 4  
Referenced by

<b>Patent Number</b>	<b>Title</b>	<b>Issue date</b>
<a href="#">4958384</a>	Safety glove	Sep 25, 1990
<a href="#">5004231</a>	Exercise glove	Apr 2, 1991
<a href="#">5033119</a>	Glove for enhancing athletic performance	Jul 23, 1991
<a href="#">5182814</a>	Weight supporting glove	Feb 2, 1993
<a href="#">D335368</a>	Support glove	May 4, 1993
<a href="#">5298001</a>	Gymnastics safety grip apparatus	Mar 29, 1994
<a href="#">5370606</a>	Hand and wrist support	Dec 6, 1994
<a href="#">D356203</a>	Ski glove	Mar 14, 1995
<a href="#">D360059</a>	Wrist guard	Jul 4, 1995
<a href="#">5435007</a>	Wrist guard	Jul 25, 1995
<a href="#">5435273</a>	Animal leash	Jul 25, 1995
<a href="#">5453064</a>	Exercise glove incorporating rods which offer resistance to movement of fingers, hands, or wrists	Sep 26, 1995
<a href="#">D362927</a>	Athletic glove	Oct 3, 1995
<a href="#">5456650</a>	Ergonomic exercising and bracing device	Oct 10, 1995
<a href="#">5498234</a>	Hand and arm support	Mar 12, 1996
<a href="#">D368351</a>	Glove	Apr 2, 1996
<a href="#">D369453</a>	Combined glove and deterrent spray	May 7, 1996
<a href="#">5517694</a>	Weightlifting glove	May 21, 1996
<a href="#">5555561</a>	Cuff seal for anti-contamination protective garments	Sep 17, 1996
<a href="#">5557806</a>	Weight-lifting glove having a securing strap and sleeve	Sep 24, 1996
<a href="#">5592694</a>	Wrap type hand glove	Jan 14, 1997
<a href="#">D380874</a>	Aerobic glove	Jul 8, 1997
<a href="#">D381128</a>	Weight lifting glove	Jul 15, 1997
<a href="#">5682611</a>	Thumbguard	Nov 4, 1997
<a href="#">5778449</a>	Wrist guard	Jul 14, 1998
<a href="#">5781928</a>	Multi-purpose hand protector	Jul 21, 1998
<a href="#">5813050</a>	Wrist guard	Sep 29, 1998
<a href="#">D410956</a>	Convertible glove-mitts	Jun 15, 1999
<a href="#">6317938</a>	Safety accessories for an elastic/hook combination fastener	Nov 20, 2001
<a href="#">6505350</a>	Glove with removable fastener material	Jan 14, 2003
<a href="#">7041032</a>	Wrist band workout display	May 9, 2006

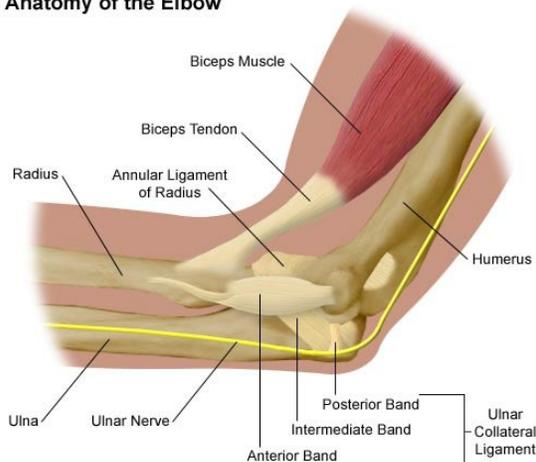
Patent: Combined workout glove and wrist wrap; Patent number: 4905321; Filing date: Apr 7, 1988; Issue date: Mar 6, 1990; Inventor: Allen R. Walunga; Assignee: Allen R. Walunga; Primary Examiner: Jeanette E. Chapman

## Wrist wraps and powerlifting injuries

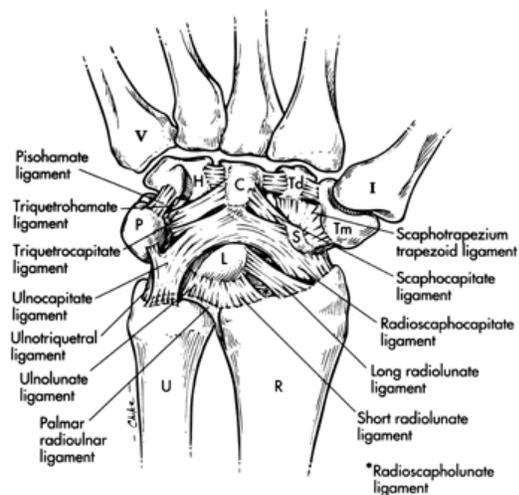
Wrist wraps were developed as protective devices for strenuous work involving arms and hands and today are still employed for this purpose. In sports in general, wrist wraps protect the athlete from elbow and wrist injuries by restricting forced or voluntary backward and sideways wrist movement.

Upper body injuries are common in sports, involving the shoulder, the elbow and the wrists. Two classes of injury may be distinguished: overuse (chronic) injuries and acute injuries. Elbow overuse injuries include musculotendinous injuries, ulnar nerve injuries and ligamentous injuries. Osteochondrol lesions of the capitellum and posterior impingement injuries in the joint are frequently seen in athletes as well. Acute traumatic injuries to the elbow include tendon ruptures, elbow dislocations and intra-articular fractures. Forearm overuse injuries in athletes include fracture of the carpal scaphoid, fracture of the hook of the hamate, Kienbock's syndrome and pisoquetral syndromes. Ligamentous injuries include scapholunate, lunotriquetral and midcarpal instability injuries. Injuries to the distal radio-ulnar joint and triangular fibrocartilage are also quite common in athletes (Rettig 1998).

### Anatomy of the Elbow



(from Yale-New Haven Hospital Health Library, <http://www.ynhh-healthlibrary.org/content.asp?page=P07451> )



(from University of Pennsylvania Health Systems – Penn Orthopaedics - <http://www.uphs.upenn.edu/ortho/oj/1999/html/PICS/p27f2.gif> )

In a 2005 study carried out by the Institute of Sport and Recreation Research at New Zealand (Keogh et al 2005), 36% of all reported injuries in powerlifting involved the shoulder and 11% involved the elbow. Wrists were not included in the questionnaire closed question item where the respondent should indicate the part of the body affected by the injury. Many elbow injuries, though, are a later consequence of wrist overuse or trauma. Field and Savoie (1998) reported that lateral epicondylitis occurs among 50% of athletes that use overhead arm motions. In spite of being an elbow injury, the onset of lateral epicondylitis begins with the excessive use of the wrist extensor musculature. Most elbow injuries are chronic, overuse injuries (Safran 1995).

Restriction of wrist backward, forward and sideways flexion may contribute to prevent such wrist originated injuries. The wrist wrap effectively serves this purpose.

Bellow is a table of common elbow injuries for different sports, according to Frostick et al (1999). Weight training in general is associated to ulnar nerve disorders.

<i>Sport</i>	<i>Common injury</i>
Racquet sports	Lateral epicondylitis with backhand
Golf	Medial epicondylitis on downswing with trailing arm Lateral epicondylitis with leading arm
Basketball	Posterior compartment with follow through on jump shot
Water-skiing	Valgus extension overload of the posterior compartment with trick skiing
Bowling	Flexor-pronator soreness
Baseball	Valgus stress of pitching: medial traction, lateral compression, posterior abutment
Volleyball	Valgus stress at impact of striking
Football	Valgus stress with throwing a pass; hyperextension and dislocation and olecranon bursitis with direct trauma
Gymnastics	Radiocapitellar overload and posterior impingement with weight bearing on extended elbow
Weight training	Ulnar collateral ligament sprain, ulnar nerve irritation
Field events	
Shot-put	Posterior impingement with follow through
Javelin	Valgus-extension overload of throwing: medial traction, posterior abutment, lateral compression
Canoeing, kayaking	Distal bicipital tendinitis
Archery	Extensor muscle fatigue, lateral epicondylitis of bow arm
Rock climbing	Brachialis or distal bicipital tendinitis

From: Frostick, S.P., Mohammad, M. and Ritchie, D.A. 1999. "Sport injuries of the elbow". J. Sports Med. 33;301-311, p. 301.

In their review, Frostick et all (1999) present several versions for the onset of ulnar nerve injuries. Elbow flexion reduces cubital tunnel area and may therefore contribute to the entrapment syndrome if inflammation and repetitive stress is also present. Chronic elbow instability seems to be frequently associated to ulnar nerve injuries.

Both conditions are present at Bench Press training and competition. I have myself suffered from ulnar nerve entrapment syndrome and have only been symptom free after adopting the regular use of wrist wraps for the Bench Press.

Apparently, wrist wraps not only restrict wrist flexion, but also help to stabilize the elbow during flexion.

## **Wrist wraps as performance enhancing equipment**

Do wrist wraps actually aid in performance for weightlifting, particularly for powerlifting? There is no published research to support a definite answer to this. I will therefore rely on my own experience and that of other lifters I have questioned. In this manner, the answer is a positive YES!

The most frequent use of wrist wraps in powerlifting is in the Bench Press. Fellow benchers have reported to me what could be interpreted as a carry-over effect, since they have observed an increased maximal effort load with the wrist wrap as compared to the raw lift. The mechanism for the observed effect is not clear. Whether it is a result of the stabilizing action over the involved joints (wrist and elbow) or some other effect directly related to the movement, remains to be studied. Since the success of a maximum effort lift is critically dependent on technique precision, stability is possibly the main source of wrist wrap performance enhancing effect.

Powerlifters also use wrist wraps for squatting and deadlifting. In the squat, the wrist wrap is clearly a stabilizing device, used to prevent joint movements of the arm that might affect bar stability during the lift. In the deadlift, the wrist wrap is used chiefly as a device to strengthen the bar grip. Most lifters use this equipment and claim they feel a much tighter grip with the wrist wrap than without it.

## **Concluding remarks**

Since the early precursors of modern wrist wraps, support, injury prevention and “added strength” have been their purpose. Today, variants of the sports wrist wraps are also used for therapeutic reasons. There is no doubt that athletes find this device useful both for injury prevention and performance enhancement, although the exact mechanism for the observed increased performance may not be understood.

Wrist wraps come in different materials and lengths. Each material offers a unique combination of elasticity, support and comfort for the lifter. I have myself tested six different APT wrist wraps, some of which are no longer commercialized. I have recently used the Blue Mamba, the Blood Stripe, the Blue Power, the ZRV-Pro wrist wraps and settled for the Blue Mamba and the Blue Power. Both wrist wraps have a perfect combination of toughness, flexibility and support. The Blue Mamba feels slightly more comfortable, while the Blue Power feels more supportive. The ZRV-Pro was somewhat tougher than I thought optimal for my lifts. However, a heavy lifter (308 lbs) that tried it felt it was the right toughness and support for his needs. Should it be a function of bodyweight and lifted weight? I guess not: another lifter – male, 198 lbs, on a 440 lbs lifting range – tried the Blue Power and felt it was tougher than he liked, while the Blue Mamba felt right. As APTProWristStraps owner Alan Thomas pointed out to me once, the choice is very personal.

Besides the technical aspect, the relationship between lifter and equipment has a psychological and emotional component. A lifter’s equipment is the warrior’s sword, a weapon, no doubt, but also the symbol of his quest, his victory and his honor. Do not underestimate the ritual aspect of equipment choice and use. All the wrist wraps I listed above will grant a lifter the necessary support. The increased performance, though, depends

on that subtle psychological aspect as well. My advice is that you try as many models as you can and let the wrist wrap choose you!



Blue Mamba



Blood Stripe



Blue Power



ZRV-Pro

## References

- Drosness, V. 1901. Patent: WRISTBAND; Patent number: 680477. Filing date: Jun 14, 1901. Issue date: Aug 1901. Inventor: VITOLD DROSNESS
- Field LD, Savoie FH. 1998. "Common elbow injuries in sport". Sports Med. 1998 Sep;26(3):193-205.
- Frostick, S.P., Mohammad, M. and Ritchie, D.A. 1999. "Sport injuries of the elbow". J. Sports Med. 33;301-311
- Hansard, H.H. 1923. Patent: WRIST SUPPORT. Patent number: 1469315. Filing date: Aug 25, 1921. Issue date: Oct 1923; Inventor: H. H. HANSARD
- Keogh, J. Hume, P. and Pearson, S. 2005. "Retrospective injury survey of competitive Oceania powerlifters - A technical report for the Oceania Powerlifting Federation and their member federations". Institute of Sport and Recreation Research New Zealand, Division of Sport and Recreation, Auckland University of Technology.

Rettig A.C. 1998. Elbow, forearm and wrist injuries in the athlete. Sports Med. 1998 Feb; 25(2):115-30.

Robinson. C.H. 1975. Patent: Athletic hand/wrist positioner (<http://www.google.com/patents?vid=USPAT4138108>). Patent number: 4138108. Filing date: Aug 15, 1975. Issue date: Feb 6, 1979. Inventor: Charles H. Robinson.

Safran, M.R. 1995. Elbow injuries in athletes. A review. Clin Orthop Relat Res. Jan;(310):257-77.

Tyrrell, J. 1909. Patent: WRIST-SUPPORTER. Patent number: 923217. Filing date: Jun 16, 1908. Issue date: Jun 1909. Inventor: JAMES TYRRELL

Walunga, A.R. 1990. Patent: Combined workout glove and wrist wrap. Patent number: 4905321. Filing date: Apr 7, 1988. Issue date: Mar 6, 1990. Inventor: Allen R. Walunga. Assignee: Allen R. Walunga. Primary Examiner: Jeanette E. Chapman.

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