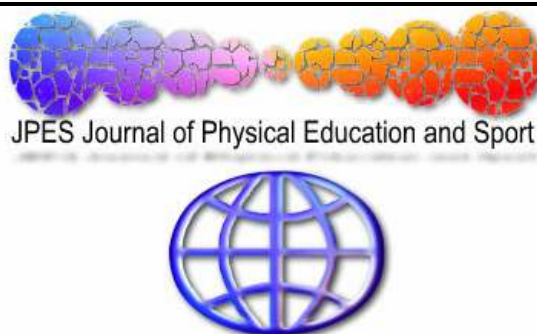




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ORIGINAL RESEARCH

PACING DEVICE FOR SWIMMING. MECHANICAL CONSTRUCTION OF CONSTANT SPEED.

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*Faculty of Physical Education and Sport Science, University of Athens***Key words:** swimming, pace, mechanical construction**Abstract**

The pace in swimming is very important because it allows swimmers to allocate their forces accordingly, and therefore a distance to travel as quickly as possible. The training pace at different swimming speeds and combinations thereof, is an important part of training before the competitions.

The definition and maintenance of the stable and swimmer specific speed is difficult to achieve and requires considerable effort and experience. To determine the desired rate of accuracy by the researchers and their coaches used till now, various audio and visual media.

However, some of these institutions did not very accurately measure the rate and not all styles of swimming, while other aspects affect the proper swimming. In this construction, a key objective is to solve the problems occurring in the previous constructions, the modern technological development of them and the adaption of the specificities of different swimming styles.

This device consists of an electro 3 / 8 of the horse, a flange, a single inverter from 3 / 8 to 1/2 of the horse, pulleys with taper Bush, flange axle, pulleys, platforms and a 52 meters cable. The assembly and operation is as follows: At the edge of the pool next to the platform is placed the base of pulleys, the electro set is connected to the inverter and the axle flange.

Precisely opposite is positioned the other base. Along the pool «moves» the cable that connects the two bases, located 150 cm above the water. A fixed point on the cable is marked with paint in order to be visible to the swimmer during backstroke swimming while for other styles we adapt a lamination at the cable vertically in the pool, above the surface a sheet of 15 cm which is painted with strong color that is visible from the athlete and will precede him. Setting the speed with inverter it starts from one end of the tank leading to the other, doing a circular motion.

The swimmer is required to follow the marked point of the cable in the backstroke or lamination in other styles. Practical applications of the use of speed regulator: 1) Determination of constant speed (rate) of the athlete, without movement problems 2) Growth rate of change in perception of the athlete. 3) Verification of proper technique 4) Training in the change of pace, planning and competition tactics.

Introduction

The aim of training is the periodic functional body charge of creating long-term operational adjustments so the swimmer to achieve the highest performance (Nikolopoulos, 2000).

The training of swimming has evolved over the years, initially aiming to improve the technical characteristics of different swimming styles and later to improve training methods focusing on energy characteristics and in particular mechanical and physiological functions of the human body.

One of the major factors for achieving high performance is the increasing power of the athlete. Presumption of these is research of Sharp et al. at 1982 on which was found significant relationships of power in swimming velocity. A protocol was implemented for the strength of hands in default speeds.

This is also the view of Birrer and Levine in 1987 under which the power of hands is major in maximizing the efficiency. Previous research on the power in swimming, made reference that the isotonic training enhances the performance of trainees (Chui, 1950) in contrast with new ones that showed significant improvement of strength by isokinetic exercises (Pipes & Wilmore, 1975 & Mitsumasa & Hiroaki, 1982).

However strength training these days apart from the various sets of training that followed, it is with the use of supports within and outside water. Thus used in swimming pool paddles (Payton, 1995), rubber attraction proposed by the researcher Kalitsis and his colleagues in 2004, tethered swimming (Hoper, 1983) and training with clothes (Choi et al., 1994 & 2000). Outside water weights are used (Platanou 1994) and swimming bench (Mitsumasa & Hiroaki, 1982). The strength is directly related to the speed which depends on the frequency and length of stroke (Craig & Pendergast, 1979).

As findings of the previous seems, the constant speed helps increase strength and at the same times the cultivation of neuromuscular synergy. Several are the methods of determining constant speed.

Methods & Procedures

The swimmers should be able to swim a distance in accordance with the time that has been requested by the coach in training or in competition, changing the rate (constant speed) of swimming. This often is not easy and requires great effort and experience.

Several investigations have been done to study effects on the rate of swimming. To determine the desired rate of accuracy by the researchers and their coaches used till now, various audio and visual media:

- 1) Walking alongside the researcher with the athlete
- 2) Acoustic instruments such as Aqua pacer which give the rhythm to swimmers emitting sounds
- 3) Small lights (pace lights) electronically adjustable, which were in the water along the pool gave the rate
- 4) Balloon which was moving along the pool tied with rope (Clinton, 1964). This was an evolution of previous construction by Abraham, 1937 and Levenstein, 1953.

The mechanical construction presented in this work is adapted for determining the constant speed in backstroke, breaststroke and butterfly style.

This device consists of an electro 3/8 of the horse, a flange, a single inverter from 3/8 to 1/2 of the horse, pulleys with taper Bush, flange axle, pulleys, platforms and a cable 52 meters F3. The assembly and operation is as follows: At the edge of the pool next to the platform is placed the base of pulleys, the electro set is connected to the inverter and the axle flange. Precisely opposite is positioned the other base.

Along the pool «moves» the cable that connects the two bases, located 150 cm above the water. A fixed point on the cable is marked with paint in order to be visible to the swimmer during backstroke swimming (fig. 1) while for other styles we adapt a lamination at the cable vertically in the pool above the surface of water and marked with waterproof paint.

Setting the speed with inverter it starts from one end of the tank leading to the other, doing a circular motion. The swimmer is required to follow the marked point of the cable in the backstroke or lamination in other styles.

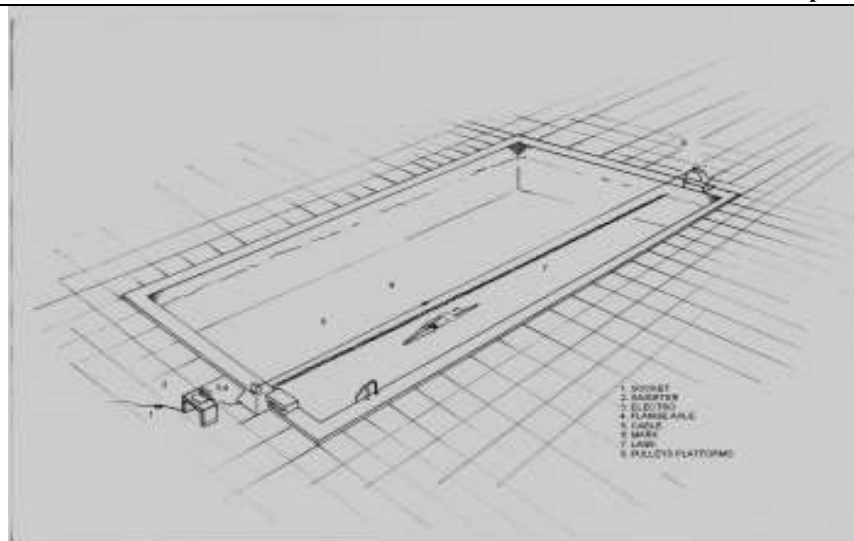


Figure 1. Mechanical construction of constant speed swimming in backstroke

Practical applications of the use of engineering design patterns: A) Training in breaststroke, butterfly and backstroke at the maximum speed of each athlete following the lamination (race conditions). B) Growth rate of change in perception of the athlete. C) Check training readiness of the athlete before the race and likely return forecast. D) Training in rate changes and planning race tactics. E) Determination of constant speed (rate) of the athlete, without movement problems F) Improve the pace of the athlete (visual stimulus) G) Verification of proper technique.

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