Jan. 28, 1964 E. J. CLINTON 3,119,610

PACING DEVICE

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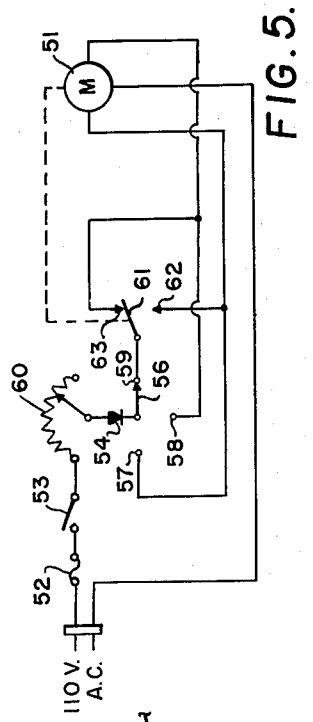


FIG. 5.

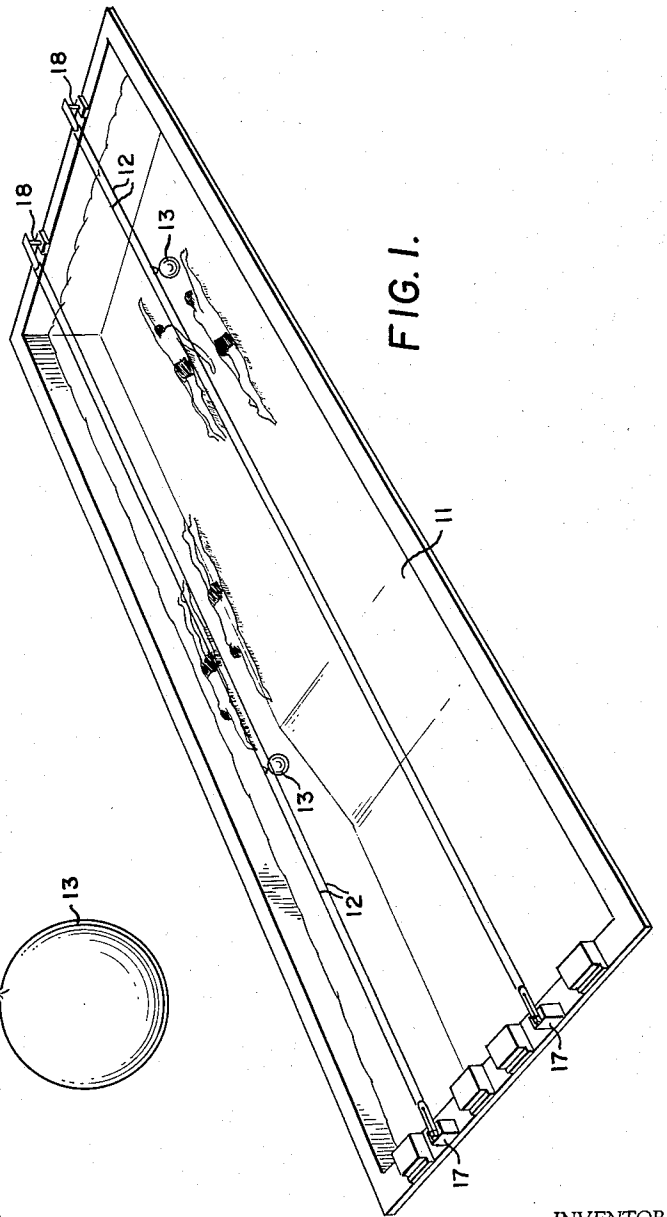


FIG. 1.

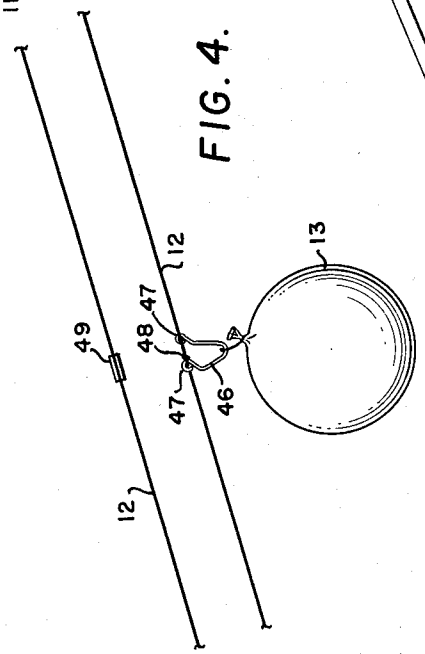


FIG. 4.

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PACING DEVICE

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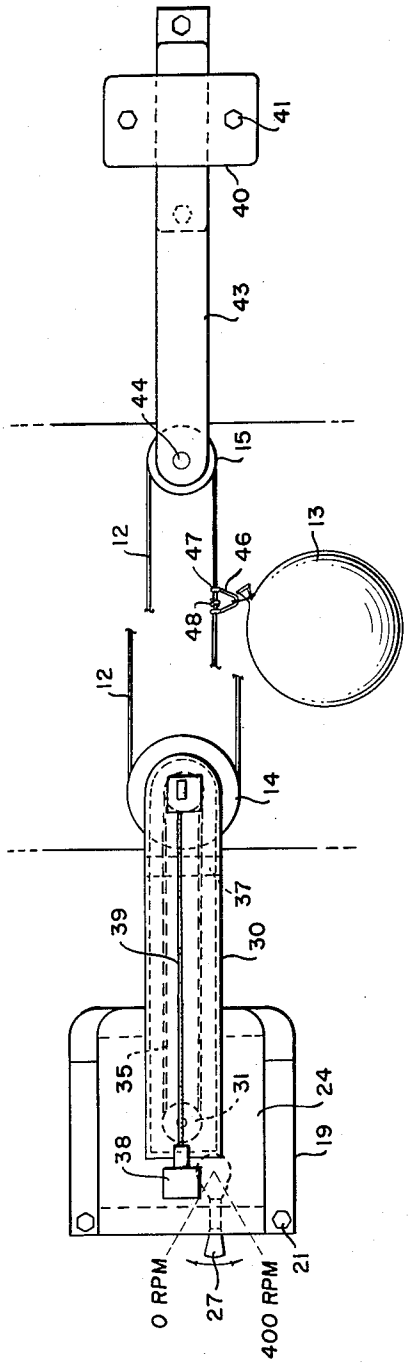


FIG. 3.

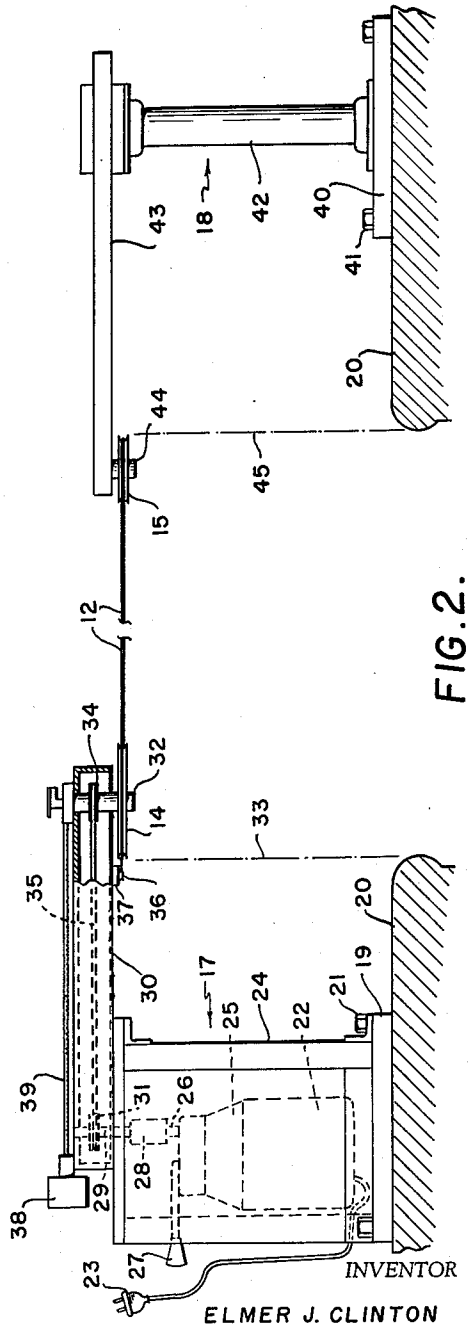


FIG. 2.

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PACING DEVICE

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6 Claims. (Cl. 272—4)

This invention relates to a pacing device and more particularly to a device for providing a controlled reference speed for pacing athletic and racing events.

In many athletic events such as swimming, track and field, and other sports, athletes strive for speed and endurance in racing over a determined course, either by swimming, running, walking, sprinting, or the like. Constant practice is necessary in order to build and maintain physical endurance and to improve performance. Coaches and athletes have long recognized the need for the athlete to develop the ability to pace himself in order to conserve energy and to maximize performance.

In order to develop pacing ability an athlete such as a swimmer races against time to learn his specific limits of endurance and capability. The disadvantage with this practice is that the swimmer has no way of accurately knowing how fast he is swimming at any particular moment or what his time will be until the race is completed. Also in practice the athlete may have little incentive to swim at his best in the absence of competition. Thus it is difficult for the athlete to develop the ability to pace himself in practice sessions.

It is an object of this invention to provide a pacing device for training athletes.

Another object of this invention is to provide a device for pacing an athlete over a predetermined course at a controlled reference speed.

Yet another object of this invention is to provide a device for pacing an athlete in racing over a determined course at variable speeds which may be increased as the athlete improves his performance.

A further object of this invention is to provide a pacing device in which a reference object, clearly visible to an athlete, is advanced along a determined course at a known speed whereby the athlete is aware of the exact speed at which he is performing at all times.

Another object of this invention is to provide a pacing device for training athletes including means for simulating turns and other movements of an athlete.

These and many other objects are achieved by my invention which in general may include an endless cord supported on pulleys and extending around a determined course. A reference object such as a balloon is secured to the endless cord. Variable speed drive means secured to one of the pulleys advance the endless cord and the target secured thereto around the determined course at a controlled reference speed. Control means are provided to adjust the speed of the drive means so that the balloon speed may be varied. Further control means are provided for momentarily stopping the drive means at determined intervals whereby the balloon pauses at various points along the determined course simulating turns or other movements during which the athlete varies his normal racing speed.

A better understanding of my invention may be had from the following detailed description when taken in view of the accompanying drawings wherein:

FIGURE 1 is a perspective view of a preferred embodiment of my invention as employed as a swim pacing device;

FIGURE 2 is a side view of my invention illustrating how an endless cord and a balloon secured to the cord is advanced along the length of a swimming pool on pulleys and variable speed drive means for regulating the speed of the balloon.

FIGURE 3 is a plan view of my invention as shown in FIGURE 2 illustrating the variable speed means in further detail;

FIGURE 4 illustrates how the balloon is secured to the endless cord;

FIGURE 5 is an electrical schematic illustrating an alternative electrical speed control means for varying the speed of the pacing balloon of my invention.

Although I have described my invention as a pacer for swimming events and illustrated a preferred embodiment of my invention in the drawings as a swim pacing device, it is to be understood that my invention may be used to pace all types of athletic events, such as foot racing or any event where a contestant is concerned with traversing a determined course.

Referring now to FIGURE 1, a preferred embodiment of my invention is shown being employed to pace swimmers in a pool **11**. Endless cords **12** having a clearly visible reference object such as a balloon **13** secured thereto are advanced along the length of the pool **11** at a controlled speed so as to provide the swimmers with a speed reference. As shown in FIGURES 2 and 3 each cord **12** extends around and between a drive pulley **14** and an idler pulley **15** supported at either end of the pool **11** on a control pedestal **17** and an idler post **18** respectively.

The control pedestal **17** comprises a base **19** secured to the deck **20** of the pool **11** by means of anchor bolts **21** for permanent installations. The control pedestal **17** may be tied down by means of rope or other suitable means so that it may be more easily removed when not in use. A constant speed electric motor **22** connected to a suitable source of power by means of cable **23** is mounted in a closed boxlike frame **24**. The output shaft of the constant speed motor **22** (not shown) is connected to a variable speed reducer **25** having a vertical output shaft **26**. A mechanical speed control arm **27** is provided for varying the speed of the output shaft **26** over a determined range. The mechanical speed control arm **27** extends from the speed reducer **25** through a slot in the back of the box-like frame **24**. In a preferred embodiment the output shaft of the constant speed motor is 1500 r.p.m. and the variable speed reducer **25** is arranged to provide a uniformly variable speed between 0–400 r.p.m. at the output shaft **26** by adjusting the mechanical speed control arm **27**.

The output shaft **26** is connected by means of a coupling **28** to a drive shaft **29** extending through the top of the box-like frame **24** and rotatively supported in a hollow pedestal arm **30** secured to the frame. A pulley **31** is secured to the shaft **29**. The pedestal arm **30** extends over the edge of the pool **11** and the drive pulley **14** is mounted on a vertically disposed shaft **32** extending through the pedestal arm **30**. The shaft **32** is mounted in suitable bearings and positioned so that the periphery of the drive pulley **14** passes directly over the edge of the pool **11** as shown by the vertical dotted line **33**.

A pulley **34** is secured to the shaft **32** and a nonslip drive belt **35** extends around the pulleys **31** and **34** to connect the shaft **32** to the drive shaft **29**. Thus the drive pulley **14** may be driven at varying speeds from 0–400 r.p.m. The peripheral speed of the drive pulley **14** and the linear speed of the endless cord **12** is determined by the diameter of the drive pulley which may also be varied.

A normally closed switch **36** connected in electrical circuit with the constant speed motor **22** is mounted adjacent the drive pulley **14** on a cross member **37** secured to the pedestal arm **30**. The switch **36** is of the time delay self-closing type so that when opened the motor **22** is momentarily deenergized stopping the drive

pulley 14. After a predetermined interval the switch 36 closes energizing the motor 22 to again rotate the drive pulley 14. A tachometer 38 provided with a dial calibrated in yards per second is mounted on the pedestal arm 30 and connected to the shaft 32 by means of a speed pick up cable 39. The tachometer 38 provides a direct reading on the balloon speed in yards per second.

The idler post 18 comprises a base 40 anchored to the deck of the pool 11 by means of bolts 41. Like the control pedestal 17 the idler post 18 may be tied down by ropes or cables for easy adjustment and removal. A vertical post 42 extends over the edge of the pool 11. The idler pulley 15 is secured to the vertical shaft 44 rotatively mounted in suitable bearings at the end of the idler arm 43. Shaft 44 is positioned so that the periphery of the idler pulley 15 passes directly over the edge of the pool 11 as shown by the dotted line 45.

Referring to FIGURE 4 the balloon 13 is tied to a wire clip 46 secured to the endless cord 12 which passes through eyes formed in the spaced ends 47 of the wire clip 46. A knot 48 formed in the endless cord 12 between spaced ends 47 of the wire clip 46 prevents the wire clip and thus the balloon from sliding relative to the endless cord 12. The wire clip 46 prevents the balloon 13 from twisting and wrapping about the endless cord 12 as it is moved and whipped around the drive and idler pulleys 14 and 15 respectively. In addition the wire clip 46 actuates the switch 36 to deenergize the motor 22 each time it passes around the drive pulley 14.

A second switch actuator 49 is secured to the endless cord 12 at a point equidistant from the balloon 13 so that the switch 36 is momentarily opened each time the balloon 13 reaches either the control pedestal 17 or idler post 18. This momentary deenergization of the motor 22 stops the drive pulley 14 and the balloon 13 each time the balloon reaches the end of the pool, simulating turns or other movements of the swimmer. This is an important feature as it prevents the target from running away from the swimmer during intervals when the swimmer travels at slower speed than his normal pace. Also, if desired, a number of switch actuators may be secured to the endless cord 12 at various distances to simulate a number of turns and other movements by the swimmer at various positions in the pool 11. As an alternative to this arrangement a timer circuit may be connected in circuit with the motor 22 to momentarily deenergize the motor 22 at determined intervals, such as when the target balloon 13 reaches either end of the pool 11 or when the swimmer changes strokes.

In operation the mechanical speed control arm 27 is adjusted to the 0 r.p.m. position and the motor 22 is turned on. For a swimming event involving a diving start the balloon 13 is positioned a few yards from the edge of the pool 11 to compensate for the swimmer's diving take off speed which is faster than his normal swimming speed. The swimmer starts upon command and the mechanical speed control arm 27 is simultaneously moved to the desired pacing speed. On surfacing after a diving start, the balloon is clearly visible to the swimmer and remains in his field of vision each time he raises his head. By keeping pace with the balloon the swimmer will traverse the swimming course or distance in the desired time.

As the balloon 13 reaches the idler pulley 15 the switch actuator 49 attached to the endless cord strikes and opens the normally closed switch 36, to deenergize the motor 22 and momentarily stop the drive pulley 14. This stops the balloon 13 at the idler post 18 as the swimmer reaches the edge of the pool 11 and starts his turn. The switch 36 then closes to start the motor 22 and the drive pulley 14. The balloon 13 travels around the idler pulley 15 and is advanced toward the control pedestal 17. Thus the momentary delay of the balloon 13 simulates the delay of the swimmer's turn at the end of the pool. When the balloon 13 reaches the drive pulley 14, the wire clip 46 opens the switch 36 to again deenergize the motor 22 and stop the drive pulley. The switch 36 remains open only long enough to simulate the extra time required by the swimmer's turn at which time it closes to advance the balloon 13 and continue the pace.

In instances where the swimmer's objective exceeds his present ability, the coach places a marker at the point where the swimmer is no longer able to maintain the pace of the balloon. Repeated efforts can then be made by the swimmer to improve his endurance at that particular pace. The marker is moved toward the finish line as the performance increases and serves as a goal which the swimmer can strive to improve. Used in this manner the pacing device shows the specific limits of the swimmer's capability and also offers the swimmer an incentive basis for improvement.

Alternative Embodiment

An alternative arrangement for the mechanical speed control device described is shown in FIGURE 5. A reversible, variable speed electric motor 51 is connected to a suitable source of A.C. line voltage through a fuse 52 and a master switch 53. The line voltage is rectified by means of a rectifier 54 and applied to the motor through a three-position control switch 56 having an outbound position contact 57, a return position contact 58, and an automatic position contact 59. A variable resistor 60 is connected in circuit with the motor 51 to control the output speed of the motor. The output shaft of the motor 51 is connected to the pulley 31 to rotate drive pulley 14.

For manual operation the variable resistor 60 is adjusted to the desired balloon speed setting and the control switch 56 thrown to the outbound position contact 57. When the master switch 53 is closed the motor 51 is energized and the balloon 13 is advanced at the desired speed. As the balloon 13 reaches the idler post 15 the switch 56 is manually thrown to the return position contact 58. This reverses the motor 51 and returns the balloon to the control pedestal 17. This procedure is repeated for each lap of the pool until the swimmer has traversed the desired distance.

In starting, the variable resistor 60 may also be adjusted to the zero position and the master switch 53 closed. In this event the swimmer starts upon command and the variable resistor 60 is simultaneously adjusted to the desired speed setting.

For automatic operation, the starting procedure is repeated except that the control switch 56 is thrown to the automatic position contact 59. In this position a two-position time switch 61 controlled by the motor 51 is connected in circuit with the motor 51. A contact 62 of the switch 61 corresponds with the outbound position contact 57 while contact 63 of the switch 61 corresponds to the return position contact 59. The motor 51 is arranged to operate the time switch 61 at the proper intervals so that the switch 61 is automatically thrown to the contact 63 as the balloon 13 reaches the idler post 18. This reverses the motor 51 and returns the balloon to the control pedestal 17. As the balloon 13 reaches the drive pulley, the switch 61 is automatically thrown to the contact position 62 and the motor reversed to start a next lap.

Thus I provide an automatic, variable speed device for pacing swimmers. In order to simulate turns and other movements of the swimmer the time switch 61 may be arranged to introduce a slight delay each time the switch 61 is thrown from one position to the other.

Although I have described my invention in detail as a training device for pacing swimmers it is not intended to be limited thereto. My invention may be used as a pacing and training device for many types of sports and athletic events including track and field events, and other activities where it is desired to traverse a given distance at a determined speed. Also the invention may be used to pace racing events about circular and other types of race courses. Many alterations and modifications may

be made in accordance with the principles of my invention which is to be limited only by the scope of the appended claims.

What I claim is:

1. A pacing device for providing a controlled reference speed comprising: an endless carrier disposed around a race course; a reference object secured to said endless carrier; drive means operatively connected to said carrier for advancing said carrier and said reference object around said race course at a controlled reference speed and control means operatively connected to said drive means for automatically stopping said drive means and starting said drive means after a determined interval.

2. Apparatus as defined in claim 1 including a manual speed control arm operatively connected to said drive means.

3. Apparatus as defined in claim 1 including means for indicating the speed of said endless carrier along said determined course.

4. A device for pacing swimmers by providing a controlled reference speed comprising: an endless carrier; a reference object secured to said carrier; electrical motor means connected to said endless carrier for driving said endless carrier; manual means for varying the speed of said motor means whereby said reference object is advanced by said endless carrier at a controlled reference speed; switch means connected in electrical circuit with said electrical motor means; and switch actuator means secured to said carrier for actuating said switch means to periodically stop and start said motor means at determined intervals simulating turns and other movements of a swimmer.

5. A pacing device as defined in claim 1 wherein said drive means comprises a variable speed electric motor and including a variable transformer connected in electrical circuit with said motor for varying the output speed of said motor.

6. Apparatus as defined in claim 5 including a timer switch connected in electrical circuit with and controlled by said motor for periodically reversing said motor at determined intervals whereby said reference object is moved back and forth along said determined course on said endless carrier.

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