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(54) **LAP COUNTER SYSTEM FOR MULTIPLE RUNNERS**

(75) Inventors: **James Walter Kondrat**, Crystal Lake, IL (US); **Chad Lewis Miars**, Peoria, IL (US)

Correspondence Address:
MICHAEL J. FEMAL, ESQ.
812 N. BELMONT AVE
ARLINGTON HEIGHTS, IL 60004-5606 (US)

(73) Assignee: **TRAKSTARR FITNESS SYSTEMS, INC.**

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(57) **ABSTRACT**

A lap counter system for multiple runners automatically counts and times one or more runner(s) during a workout session exercise at either an indoor or outdoor running track suitable for use at a health club, school, business, government or other organization promoting physical activity to enhance the health of their members. The system includes standalone, computer controlled, end user friendly components that displays fitness statistics during the use of the running track for each runner without impeding the athletic activity with a cumbersome wearable device. The system preferably includes a display visible to the runner at one or more points around the track such as a scoreboard with the aforementioned statistics displayed providing the runner with a virtual coach.

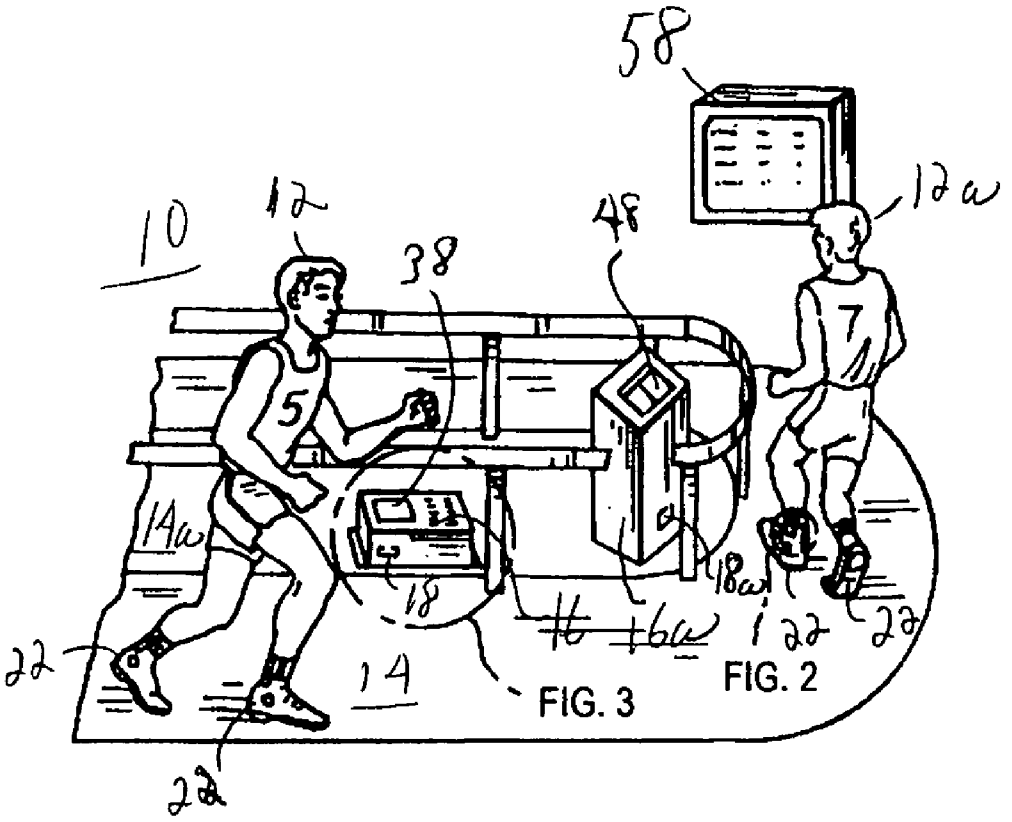


FIG. 3 FIG. 2

FIG. 1

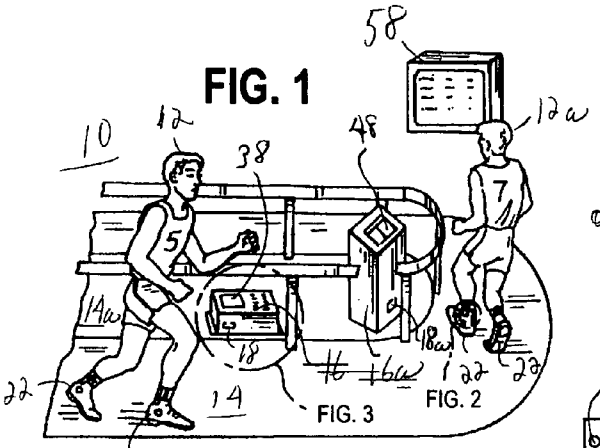


FIG. 2

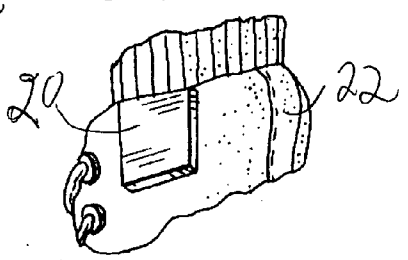


FIG. 3

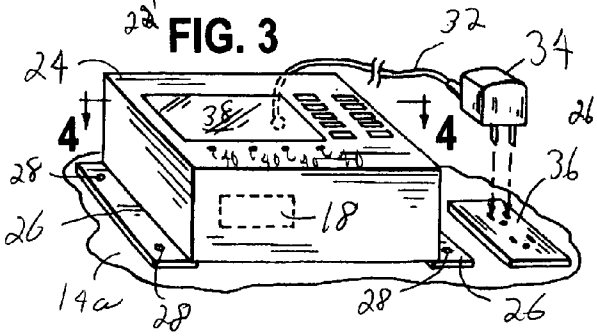


FIG. 4

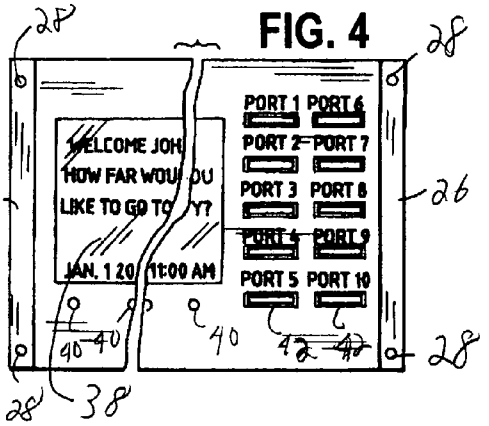


FIG. 5

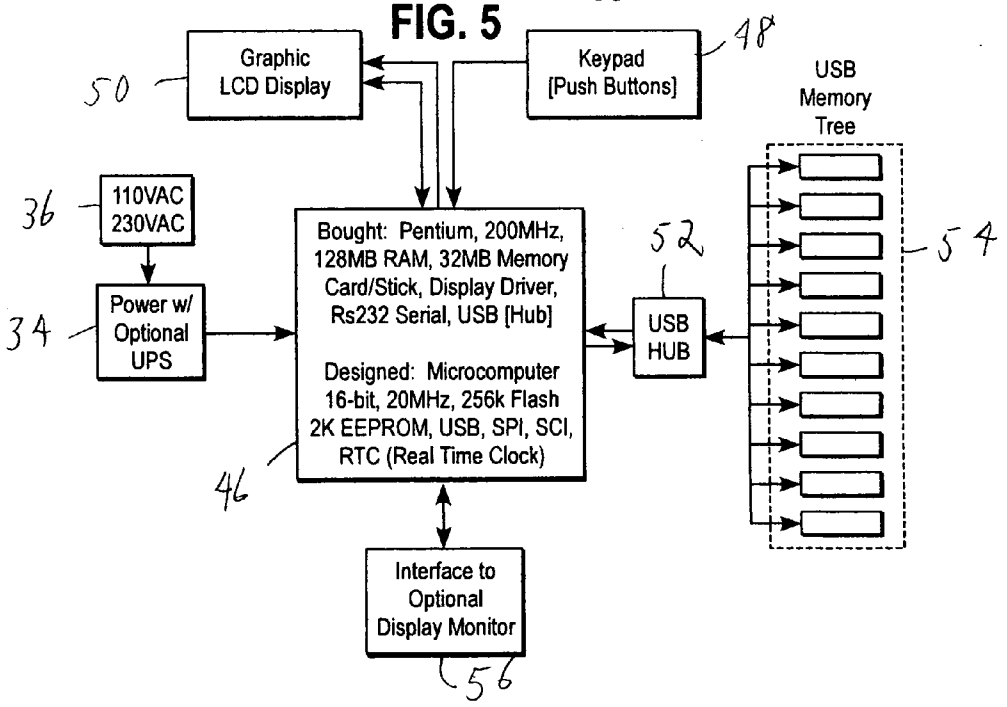


FIG. 6

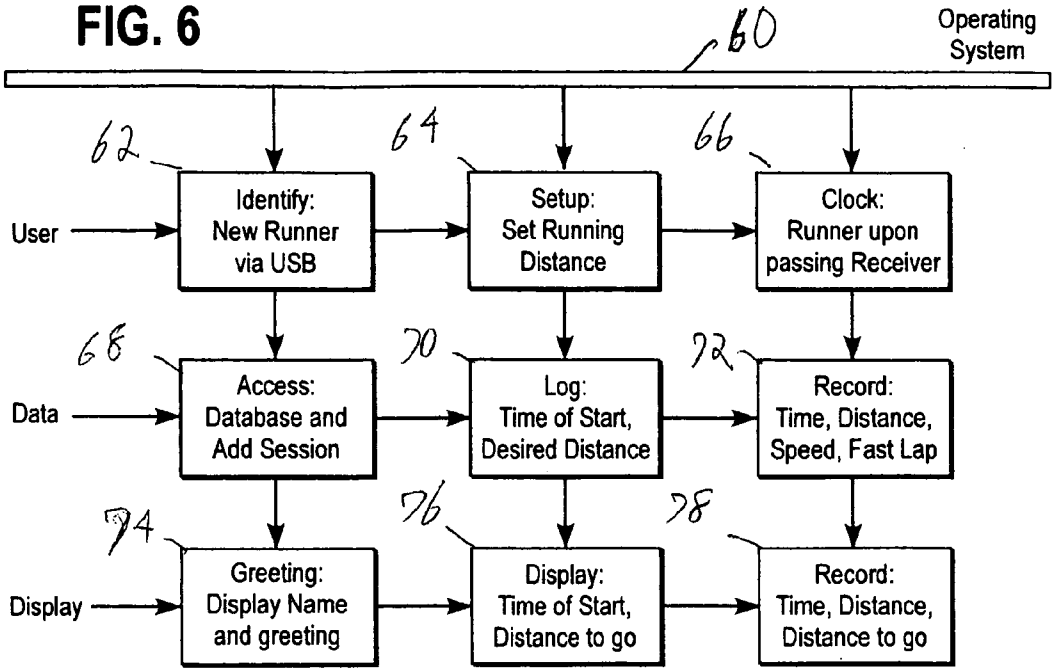
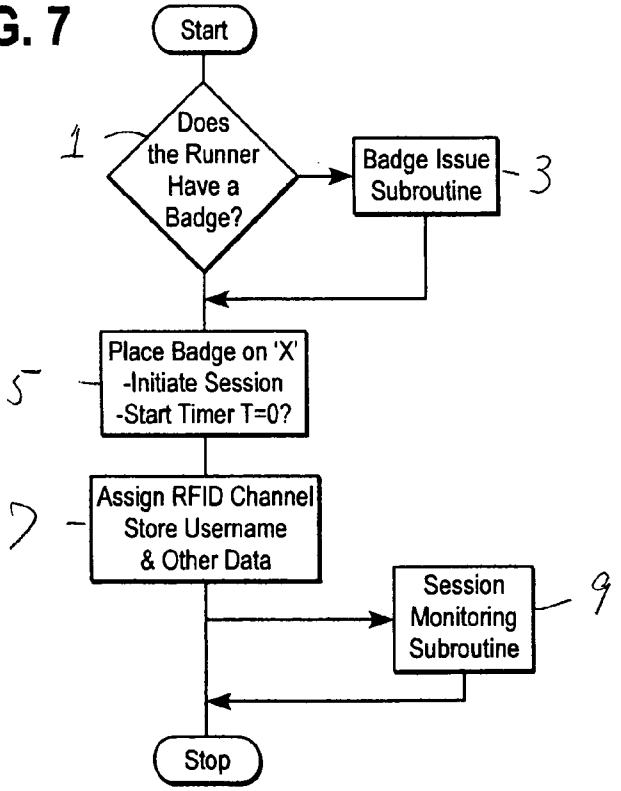

60
Operating System
62
64
66
User
Identify: New Runner via USB
Setup: Set Running Distance
Clock: Runner upon passing Receiver
68
70
72
Data
Access: Database and Add Session
Log: Time of Start, Desired Distance
Record: Time, Distance, Speed, Fast Lap
74
76
78
Display
Greeting: Display Name and greeting
Display: Time of Start, Distance to go
Record: Time, Distance, Distance to go

FIG. 7


Start
1
Does the Runner Have a Badge?
Badge Issue Subroutine
3
Place Badge on 'X'
-Initiate Session
-Start Timer T=0?
5
Assign RFID Channel
Store Username
& Other Data
7
Session Monitoring Subroutine
9
Stop

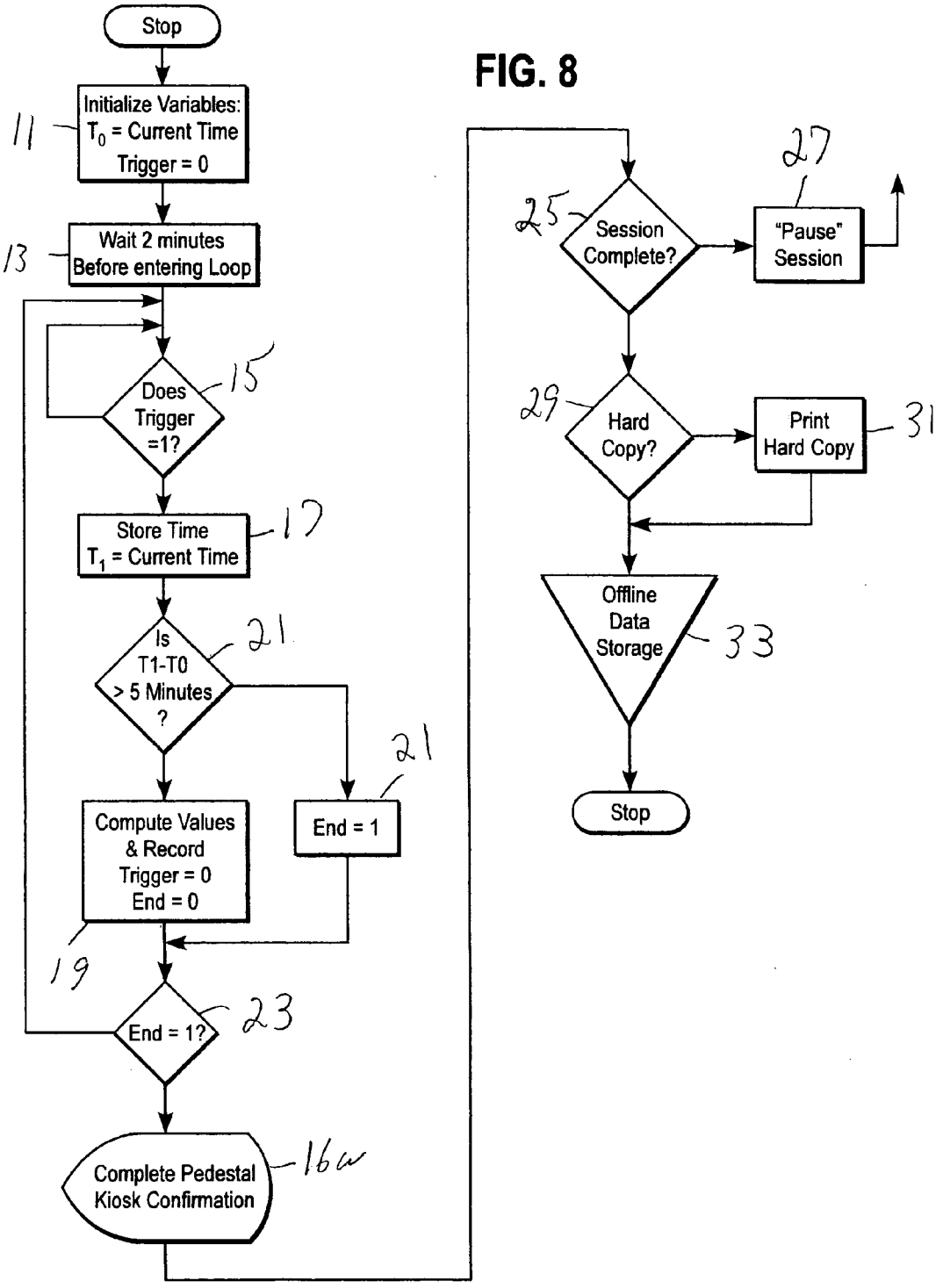

Stop
Initialize Variables:
T_0 = Current Time
Trigger = 0
11
Wait 2 minutes
Before entering Loop
13
Does
Trigger
=1?
15
Store Time
T_1 = Current Time
17
Is
T1-T0
> 5 Minutes
?
21
Compute Values
& Record
Trigger = 0
End = 0
19
End = 1
21
End = 1?
23
Complete Pedestal
Kiosk Confirmation
16a
Session
Complete?
25
"Pause"
Session
27
Hard
Copy?
29
Print
Hard Copy
31
Offline
Data
Storage
33
Stop

FIG. 8

LAP COUNTER SYSTEM FOR MULTIPLE RUNNERS

BACKGROUND OF THE INVENTION

[0001] This invention relates to a system for counting and timing a runner on a track and, more particularly, to a system for counting and timing the laps of one or more runners on the same track without a system component impeding each individual runner or the logging of the runner's individual exercise workout session.

[0002] There are a number of devices for counting and timing the laps of a runner. On personal lap counters, these devices generally fall into two different technology categories: a GPS driven device or an inertia detection device. There are significant problems and limitations with both technology categories and the respective devices used therein. First, each device shares the disadvantage of a significant investment of time to learn the operation and of money by the runner to purchase a component of these systems.

[0003] Next, commercially available GPS devices are quite expensive and generally take the shape of a wristwatch or a band attached around an arm of the runner. GPS devices although accurate in calculation of speed and location are somewhat delicate instruments that require significant time to calibrate before they can provide reliable data to the runner. Such devices are limited to only outdoors track where there are no overhead obstructions to impede the reception of satellite signals that often require at least three satellite captures of the signal for a proper triangulation of the runner on the ground. Moreover, to log meaningful data similar to the present invention, the GPS devices of these technologies would require additional memory on board which consumes battery power to later download the logged data to a personal computer (PC) for printing out the statistics on a particular exercise workout session. In addition, the runner utilizing a GPS system needs to be careful handling the GPS devices and so ruggedness, temperature and moisture often plays a role in the overall effectiveness of the GPS device in outdoor track settings.

[0004] On the other hand, the modern inertia detection devices are essentially more elaborate electronic versions of the classic pedometer with all of the normal problems encounter by the electronic GPS devices and yet having additional unique problems for the runner that makes inertia devices unfriendly to the end user. Inertia devices require a careful calibration to the runner's stride which may change several time over an exercise workout session and once set, all calculations are based on that stride whether it's an accurate approximation or not. If the runner changes stride during the workout, which is often the case because the runner either speeds up or slows down, there is little chance that the inertia device no matter how expensive the electronics can properly compensate for this change in the runner's stride. Therefore, the runner ends up with essentially erroneous data displayed and later logged out to a PC for printing the exercise workout session results.

[0005] And then there are even more expensive type of runner systems used in Marathon running, cycling and other similar type athletic events marketed by ChampionChip World of the Netherlands. Its principal use is to log the times of runners and the like as they cross the finish line in a race. Since this type of system utilizes expensive components to energize and capture a signal from a chip on board the runner that has a coil which must be energized by a magnetic field at the finish line, a powerful magnetic field must be created and then each individual runner's chip produces only a small signal that must be picked up by an accompanying antenna that is also located in a specialized mat at the finish line. There is no feedback displayed to the runner in this system and the chip in the system is often subject to severe shock during accidents and other traumas during the run that can damage it and render it useless at the finish line.

[0006] Accordingly, it is an object of the present invention to provide a lap counter system that automatically counts and times a runner's laps around an indoor or outdoor track that requires no investment in time or money by the individual runner to utilize.

[0007] It is a further object of the invention to provide a lap counter system that is inexpensive but yet provides an accurate device worn by a runner for automatically counting and timing each individual runner doing laps around a track that has no restrictions of indoor versus outdoor use.

[0008] It is a further object of the invention to provide a lap counter system for counting and timing a runner's laps around a track that results in accurate information about each individual lap completed despite changes in the runner's stride or form while running around the track.

[0009] It is a further object of the invention to provide a lap counter system for counting and timing a runner's laps around a track that produces workout statistics that are captured by a storage device for later printing results or tracking the progress over a multiple of exercise workout sessions over a predetermined time span.

[0010] It is still a further object of the invention to provide a method for a lap counter system for counting and timing a runner's laps around a track that can be added to an organization or club track facility statistics on each individual runner with relative ease while an essentially unlimited number of runners on the track are able to see a display of their progress during each runner exercise workout session.

[0011] It is still a further object of the invention to provide a system for counting and timing a runner on a track with a passive emitter or tag carried or attached to the runner person or clothing which is unobtrusive and has no appreciable effect upon the runner's performance on the track.

[0012] It is yet a further object of the invention to provide a system for counting and timing a runner's laps on a track with a durable and active emitter or tag having a greater sensing range than a passive emitter or tag.

SUMMARY OF THE INVENTION

[0013] In accordance with the present invention, the foregoing objects are met by providing a lap counter system for counting and timing a runner's laps around a track in which the runner affixes either a passive or active transponder tag, respectively, to the person or the clothing worn by the person and in which the runner passes by an antenna generally incorporated into a receiver located adjacent the track to pick up the signal emitted from the tag during each lap around the track. Each tag is encoded with unique informa-

tion related to a particular individual runner and this tag serves as a transponder with the runner's information concerning the counting and timing of the laps associated with each exercise workout session so that this lap information can be logged into a storage device in the system associated with each runner assigned tag. This logging function permits each runner's data for one or more exercise workout sessions to be stored for later comparison between various workout sessions to see the advancement in physical training for each runner. A signal from the runner's tag is generally picked up by an antenna of a predetermined configuration or array generally incorporated into a receiver located closely adjacent the running track.

[0014] Preferably, a lap counter system for multiple runners automatically counts and times one or more runner(s) during an exercise workout session at either an indoor or outdoor running track suitable for use at a health club, school, business, government or other organization promoting physical activity to enhance the health of their members. The system includes a standalone emitter tag worn by a runner, an antenna or other array sensing a signal from the emitter tag during each lap, a computer receiving and processing the sensed signal from the antenna or array for presenting the runner lap information in any desired format, end user friendly components that display predetermined fitness statistics during the use of the running track for each runner without impeding the athletic activity with a cumbersome or fragile wearable device. Through an unique, coded passive or active transponder tag or device carried by or attached in some manner to the runner, the system calculates individual elapsed time, current lap number, time taken to run the last lap, total distance run, minutes per mile achieved per lap, and speed in mile per hour per lap or any other relevant data related to the exercise workout session. The system preferably includes a display visible to the runner at one or more points around the track such as a scoreboard or other type of monitor with the aforementioned running statistics displayed providing the runner with a virtual coach. On the completion of the exercise workout session, the runner may print out a hard copy (receipt) of the workout session statistics or data. The results of each runner exercise workout session is logged into the system computer and stored for future reference by the runner or others. Therefore, multiple runner workout sessions can be easily referenced at a later date and the data from each workout session is available to view training progress on each runner. The end result of utilizing this lap counter system for multiple runners of the present invention is getting all of the benefit of workout logging provided by a health club treadmill machine, but with an actual running on a track exercise workout session that is universally accepted and considered to be superior to that of the motor assisted treadmill or other health club workout machines or devices.

[0015] Preferably, a lap counter system for one or more runners comprises means for counting and timing a workout session of a runner using a programmed microprocessor in which the results are displayed to the runner using a monitor or scoreboard type of device strategically placed near or about an indoor or outdoor track. The monitor or scoreboard uses light emitting diodes or a graphic liquid crystal display or the like. The microprocessor is programmable to operate in predetermined modes to display relevant information with regard to the runner such as lap count completed, total distance completed, time of each lap, average of each lap time, average speed or individual speed of a particular lap, real or total time, pace (minutes/mile) or last lap time. Also, the microprocessor is adapted for programming by either the club or individual runners to change the output of data for review by each runner.

[0016] Other features and advantages of the invention, which are believed to be novel and nonobvious, will be apparent from the following specification taken in conjunction with the accompanying drawings in which there is shown a preferred embodiment of the invention. Reference is made to the claims for interpreting the full scope of the invention, which is not necessarily represented by any one embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] **FIG. 1** shows a pictorial illustration of a running track and multiple runners incorporating the basic components of a lap counter system in accordance with the present invention;

[0018] **FIG. 2** is a partial perspective view of an installed emitter tag installed on a running shoe as shown in **FIG. 1**;

[0019] **FIG. 3** is a perspective view of a box enclosure including a receiving antenna and computer for a lap counter system as shown in **FIG. 1**;

[0020] **FIG. 4** is a top plan view on the enclosure taken along cross section lines **4-4** of the lap counter system as shown in **FIG. 3**;

[0021] **FIG. 5** is a partial block diagram of the electronics in either the box enclosure or kiosk stand enclosure of the lap counter system as shown in **FIG. 1**;

[0022] **FIG. 6** is a partial block diagram of the informational flow recorded in electronics of the box and kiosk enclosures as shown in the lap counter in **FIG. 1**;

[0023] **FIG. 7** is a partial flowchart of the initiation of an exercise workout session by a runner accordance with the invention of the lap counter system shown in **FIG. 1**; and

[0024] **FIG. 8** is a partial flowchart of a preferred embodiment of an exercise workout session and completion thereof in accordance with the invention of the lap counter system as shown in **FIG. 1**.

DETAILED DESCRIPTION

[0025] Although this invention is susceptible to embodiments of many different forms, a preferred embodiment will be described and illustrated in detail herein. The present disclosure exemplifies the principles of the invention and is not to be considered a limit to the broader aspects of the invention to the particular embodiment as described.

[0026] **FIG. 1** shows a pictorial illustration of a lap counter system **10** for multiple runners **12** and **12*a*** automatically counting and timing one or more of the runners **12** or **12*a*** during their travel around a generally oval running track **14** comprising one or more electronic receivers **16** and **16*a*** having antennas **18** and **18*a***, respectively, or other electronic sensing array for electrically coupling the receivers **16** and **16*a*** to a transponder or emitter tag **20** affixed to each of the runners **12** and **12*a*** in any suitable manner (showing an attachments to the running shoe in **FIGS. 1 and 2**) to relay unique information and data concerning each

runner **12** and **12***a* and the number of laps conducted during an exercise workout session at the track **14**, provides one typical embodiment of the system **10**.

[**0027**] The transponder or emitter tags **20** that are generally used in the system **10** are either a disposable radio frequency identification (RFID) passive type tag or a more durable active emitter tag. If the organization uses a passive transponder tag **20** as shown in **FIG. 1**, it is typically affixed to the running shoes **22** of the athlete. However, the tag **20** could be affixed to any clothing on the athlete or even attached to the runner by an armband, bracelet, string or the like. The tag **20** is a generally small rectangular shaped device such as a disposable smart label having an adhesive backing on the label with a RFID tag embedded inside. A passive tag **20** can be encoded with unique identification information about each runner including variable data and tested before an RFID printer at some computer station in the facility or at the track kiosk **16***a* actually begins printing the label. The printed label can further contain all the bar codes identifiers, text and graphics used in a typical exercise workout session for a particular runner or exercise routine. This powerful combination of a disposable tag or label **20** provides data capacity, security and flexibility for enhancing and extending identification of the runner and data collection by the receivers **16** or **16***a* of the system **10**. Companies like Zebra Technologies of Vernon Hills, Ill. make special RFID label printers to encode the labels with each individual runner **12** and **12***a* information.

[**0028**] Sensing distance of the tag or label **20** can vary depending upon the manufacturer of the passive tag or label **20** being used but generally covers at least a meter or two from an omni-directional antenna array **18** or **18***a* located on the side of the box receiver **16** or kiosk receiver **16***a* facing the running track **14**. The receivers **16** and **16***a* including the antenna array **18** and **18***a* are powered by a RFID reader pulse signal that is sent out to the passive tag or label **20** as the runners **12** and **12***a* run past the receivers **16** and **16***a* that energizes the tag or label **20** on the runners to relay their identification information back to the receivers to perform the aforementioned counting and timing functions of the system **10**. The size of a passive tag or label **20** is approximately in the one by three inch range or smaller as electronics continue to miniaturize and the weight is virtually nothing in comparison to the overall weight of a running shoes **22** and socks **22***a*.

[**0029**] The passive tags or labels **20** are very inexpensive and literally can be thrown away or disposed of after each exercise workout session by a health club member or guest doing the running on the indoor or outdoors track. This provides for a high level of security concerning the personal training and fitness of each runner utilizing this lap counter system of the present invention. Therefore, the expense or charge to the individual runner using the track facility with a personal passive tag or label **20** to measure their performance is nominal at best. Also, since the computer in the lap counter system offers virtually an unlimited number of different preprogrammed workout sessions that can be chosen by each runner, the runner spends little time interfacing with the smart tag or label in setting up the parameters of a workout session and instead spends most of the time doing the actual running around the track.

[**0030**] Next, the RFID tag or label **20** may be a more durable active device (not shown). An active tag or label is generally made of a hard or plastic type of material in the appearance of a commercial pager. This active RFID tag would generally be supplied by the organization operating the running track and such a tag has a much greater sensing distance of up to or exceeding 25 meters or more from the receivers **16** and **16***a*. The active tag would require only a directional antenna in stead of an array antenna on the receivers **16** and **16***a* and is powered by its own battery. The dimensions of this type of the permanent active tag is approximately 1.5"×3.0"×0.38" thick.

[**0031**] Again, each individual runner's information is then stored on the active tag similar to the previously described passive tag or label **20**. Again as the runners **12** and **12***a* go past the receivers **16** and **16***a* mounted adjacent the running track **14** and the active tag provides a signal captured by the receivers **16** and **16***a* through their respective antennas for processing by the facilities microprocessor within the box or kiosk enclosures or back to a main computer in the facility with the runner's data being recorded and logged during each exercise workout session.

[**0032**] **FIG. 2** shows in greater detail, the passive and generally rectangular RFID tag or label **20** attached to the running shoes **22** of the runner **12***a* as shown in **FIG. 1**.

[**0033**] **FIG. 3** shows in greater detail the typical setup of the box receiver **16** in the lap counter system **10**. The box receiver **16** is generally mounted to an inner track floor space **14***a* and includes a protective housing **24** of any suitable and durable material like plastic or metal surrounding the electronics and antenna **18** in the lap counter system **10**. The protective housing **24** includes a generally flat, pair of flanges **26** extending perpendicularly outward on opposing sides of the protective housing **24**. The flanges **26** include one or more holes **28**. One or more fasteners (not shown) like screws, nails or other similar type fastener pass through each of the holes **28** on the opposing flanges **26** to secure the receiver **16** to floor **14***a* adjacent the track surface **14** as shown in **FIGS. 1 and 3**.

[**0034**] A power cord **32** is connected to an AC adapter **34** that provides the required voltage and amperage to power the electronics within the box receiver **16**. The AC adapter **34** is plugged into a receptacle **36** having either 110VAC or 230VAC. Then the runner or operator of the system **10** sets the time and date on the display **38** and then the track parameters for each workout session. The display **38** of the time and date is typically either a light emitting diodes or graphic LCD. The box receiver **16** includes operator-actuated buttons **40** and memory tree ports **42**, **1** through **10** as shown in **FIG. 2**.

[**0035**] **FIG. 3** shows a block diagram of the electronic circuitry **44** of the system **10** that fits conveniently into the box receiver **16**. A microprocessor or other computer is at the heart of the system **10** which may include a CPU that is either a 486 Pentium or proprietary microprocessor. Preferably, a Pentium motherboard incorporates a RFID reader. The type of Pentium CPU is a 200 MHz, 128 MB RAM, 32 MB Memory, card/stick, display driver, RS 232 serial or RS 422, and a USB (hub). A typically designed Microcomputer includes a 16-bit, 20 MHz, 256K Flash Memory, 2K EEPROM, USB, SPI, SCI and a RTC (real time clock). The motherboard CPU communicates with a RFID Reader (not shown) (reference Texas Instruments part number RI-STU-251B) via RS 232 or RS 422 with ACSII protocol. Such a

RFID Reader is capable of handling approximately 900 distinct passive or active tags simultaneously. Therefore, the capacity of the running track would be as many as nine hundred runners using the running track at one time. This far exceeds any general use of most running tracks at health clubs or other runner facilities. Generally, most running tracks typically have only a handful of runners **12** and **12***a* using a running track **14** at one time.

[**0036**] The external antennas **18** and **18***a* of the receivers **16** and **16***a*, respectively, are connected to the RFID reader. When the antenna is a larger omni-directional antenna array, it is capable of generating a pulse signal for activating the passive tag or label **20** as the runner **12** or **12***a* passes through the signal range of the antenna **18** or **18***a* and thus collect data pertinent to each runner who runs past the receivers **16** and **16***a* to log in the data concerning that runner's workout session. The antenna type or array depends upon the type of tag selected for the system **10** and whether the tag or label **20** is active or passive.

[**0037**] Referring now to the block diagram of **FIG. 5**, a keypad **48** with push buttons on the box receiver **16** or a touch screen keypad **48***a* on the kiosk receiver **16***a* permits the operator or runner to input a particular program or data into the microprocessor **46** of the computer in **FIG. 5**. A graphic LCD display **50** is connected to the microcomputer/microprocessor **46** to display the data, time and date information and other aforementioned runner information as to count of laps, speed, distance and time of each runner workout session. The power adapter module **34** provides the necessary current and voltage to run the microcomputer **46**. Also, an USB hub **52** is connected to a USB Memory Tree **54**. The microcomputer **46** includes another output **56** to drive the optional display monitor **58** as shown in **FIG. 1**, in which a single or multiple monitors **58** is placed at predetermined locations around the running track **14**.

[**0038**] A commercially available pedestal Kiosk like TouchScreens.com from Mass Multimedia, Inc. offers a variety of interactive hardware and software solutions in an attractive, angled touch screen display as shown in **FIG. 1** that can be used as an input station for the runner in the lap counter system **10** of the present invention. The Kiosk receiver **16***a* is capable of printing and providing disposable tags or labels **20** with the requisite information about each individual runner and type of program to be run. Other versions of the Kiosk pedestal receiver includes a printer and output tray for generating passive, disposable RFID labels on demand for each of the runners **12** and **12***a*.

[**0039**] The active, durable tag version of the pedestal Kiosk receiver **16***a* would feature top mounted and integrated active receptacle that identifies the durable tag as it is positioned or plugged into the receptacle and then the Kiosk receiver **16***a* prompts the runner **12** or **12***a* to initiate the input. The runner would then be assigned a permanent active tag by his club or organization and would bring it to the running track each time that the runner wanted to record or log a workout session.

[**0040**] Obviously, all of the components like the computer and its related circuitry that may be found in the box receiver **16** and its antenna **18** as previously described above, are also easily incorporated into the pedestal Kiosk receiver **16***a* located adjacent the running track **14**.

[**0041**] **FIG. 6** is a block diagram of the description of operation of the system **10**. An operating system **60** of the system **10** is connected to the following User blocks: Identify Block **62**—new runner identified via USB ports on box receiver **16**; Setup Block **64**—sets the running distance via the keypad; and the Clock Block **66**—runner actuates upon passing the box or kiosk receivers **16** and **16***a* with an active or passive tag or label in the possession of the runner. The Data blocks comprise the following blocks: Access Block **68**—connects to the database and adds a new workout session; Log Block **70**—logs in the time of start and the desired distance of a workout session; and Record Block **72**—records the time, distance, speed, last or fastest lap. And finally the Display blocks comprise the following blocks: Greeting Block **74**—Displays Name and Greeting through the unique coding for each individual runner; Display Block **76**—displays the time of start and distance to go; and Record Block **78**—records the time, distance, and distance to go. In a programmable CPU as previously mentioned herein, this above mentioned description and its blocks could be changed by the operator or even the runner of the lap counter system **10** to provide other data and information concerning each workout session that might be desirable.

[**0042**] The flowcharts of **FIGS. 7-8** describe a number of steps in the lap counter system **10**. When a runner approaches the box receiver **16** or the pedestal Kiosk receiver **16***a* to start the workout session, the system **10** asks if the runner has had a badge or tag issued as shown in decision block **1**. If the runner does not have a badge or tag then the badge issue subroutine in block **3** is launched. A runner with a previously issued badge or tag places it upon or plugs into the Kiosk sensor marked with an "X" indication or on block **5**. Once the sensor on the box receiver **16** or the Kiosk receiver **16***a* identifies the runner's badge information the user data is stored in memory of the computer. An RFID channel is assigned to the runner in block **7**. After all the runner's data is stored to memory the pedestal Kiosk changes to workout session monitoring or block **9** mode for this runner as shown in **FIG. 7**.

[**0043**] Next, in **FIG. 8** the pedestal Kiosk CPU will initialize the process variables in block **11** of the flowchart (i.e. Lap Number, initial time, pace, speed, distance, etc.). Upon completion of the variable initialization, the CPU enters approximately a two-minute wait period, block **13** of the flowchart. During this wait period, the pedestal Kiosk receiver monitors for an initial trigger in block **15** being the first pass of the badge or emitter tag **20** within the particular antenna field. If no trigger occurs after the two-minute wait period, the runner's workout session is ended and the runner's workout session must be reinitiated back at block **3**. After a successful trigger various process variables are updated and stored to memory in block **17** of the flowchart. When all variables are current the unit again monitors for a trigger input. When the next trigger is recorded, the process variables are again stored to memory and new variables are computed (i.e. pace, time, speed and count of laps) in block **19**. These variables are then transmitted to the display **54** for the runners to observe as progressing around the running track **14** during a workout session. Before the program loops a background routine check the last lap time against the computed average plus an additional time factor in block **21**, which is a function of the running track length and location. If the last lap time is greater than this computed value then the session is placed in a "cool down" mode. The last lap information is subtracted from current totals, which provides only data relating to laps run. If the last lap time is greater

than the computed average plus the factor then an end variable is set equal to on in block **21** of the flowchart. This end variable allows the program in the system **10** to exit the loop and begin the session ending routines in block **23**. The runner is then asked to confirm that the workout session is complete via the pedestal Kiosk in block **25**. If the runner answers no, then the session is changed to a "paused mode" in block **27**. If the session is complete the runner is asked if a hardcopy printout of the workout session data is required in block **29**. If yes, then a hardcopy of the runners' workout session is printed in block **31**. If no, then the workout session proceeds to store the workout session data to an offline storage location in block **33** of the flowchart as shown in **FIG. 8**.

[**0044**] Now how does a runner or operator interface with the system **10** of the present invention? The runners **12** and **12***a* will each approach the pedestal Kiosk and initiate a workout session with either the active durable RFID tag by placing the tag in a receptacle at the pedestal Kiosk or the passive RFID tag by first generating a new disposable tag at the printer in the pedestal Kiosk station that inputs the appropriate runner identification information.

[**0045**] Once the runner RFID tag is initialized, the runner proceeds to the running track **14**. Upon running past the RFID antenna for the first time, the system **10** initiates tracking of the runner's progress through the workout session. Data is displayed real time, overhead, on one or more ceiling or wall-mounted displays **58** (LED or LCD Scoreboard Type). Each runner is identified by name and the following information is relayed to the runner: laps completed, pace (minute/mile), speed, total distance completed (miles or kilometers), total time, last lap time, etc.

[**0046**] Information is computed by the CPU housed in either the box receiver **16** or the pedestal Kiosk receiver **16***a* based on each passing of the respective antenna sensors and displayed only when the runner is in view of the display, per the aforementioned description in the flowchart.

[**0047**] The box or the pedestal Kiosk receiver CPU keeps track of a runner's average pace, and when this pace drops to a significant lower level indicating that the runner is walking instead of running, the system **10** assumes the runner is in a cool down mode and halts computation of the runner's performance.

[**0048**] Upon completing the cool down period, the runner approaches the pedestal Kiosk and ends the workout session by placing the RFID tag back into a receptacle for the hard, durable tag or on a spot location on the either the box or Kiosk display. Upon completion of this task, the runner is given the option of printing out a hardcopy of the runner's performance during workout session just completed.

[**0049**] These and other improvements would be within the realm of an ordinary person skilled in the art of lap counter systems once reviewing this invention.

[**0050**] Having described and illustrated the principles of the invention in a preferred embodiment thereof, it should be apparent that the invention can be modified in arrangement and detail without departing from the spirit and scope of the invention as claimed.

We claim:

1. A lap counter system for counting and timing a runner during a workout session at a track comprising:

A receiver located a predetermined distance from the track, an antenna electrically coupled to said receiver creating an electrical field that the runner passes through during each lap around the track, a RFID tag affixed to the runner for generating a signal when it passes through said electrical field, a computer connected to the receiver for capturing and processing said signal to provide counting and timing information related to the cumulative laps completed by said runner.

2. A lap counter system of claim 1, further comprising a RFID reader electrically connected to said antenna for processing said signal.

3. A lap counters system of claim 2, wherein the RFID reader is capable of reading two or more runner tags and extracting unique information related to each tag.

4. A lap counters system of claim 1, wherein said RFID tag is either an active or passive device.

5. A lap counters system of claim 1, wherein the computer is a programmable microprocessor having one or more programs subject to activation by the end user and related to a desired runner data or information output.

6. A lap counter system of claim 1, further comprising a graphic display device connected to the computer and located at a predetermined point around the track for viewing unique counting and timing information related to the accumulated laps related to each runner during a workout session.

7. A lap counter system of claim 1, wherein the receiver is a pedestal Kiosk positioned next to said track for housing all of the hardware and software components of said lap counter system having a RFID printer for generating a disposable RFID label tag and for encoding information on the RFID label tag unique to an individual runner, said pedestal Kiosk having an integrated active receptacle for receiving and reading a durable active RFID tag to prompt the runner to begin the workout session and wherein the pedestal Kiosk reads the disposable RFID label tag to prompt and initiate a workout session for the runner.

8. A lap counter system for accumulating lap information about a runner doing laps around a track during a workout session, comprising:

(a) a pedestal positioned adjacent the track;

(b) computing means housed within the pedestal for acting upon the accumulated lap information about the runner and for generating a graphical display of the accumulated lap information that is viewable by the runner during the workout session;

(c) a RFID antenna connected to the computing means for creating an electrical sensing field across the track;

(d) a RFID tag removably affixed to the runner for generating a signal each time the RFID tag passes on the runner passes through the antenna sensing field during a lap on the track; and

(e) sensing means on or in the pedestal for recognizing the runner RFID tag when it is positioned on or about the pedestal to initiate the computing means to begin a workout session of that runner and to accumulate the lap information for display and to end a workout

session when the runner approaches the pedestal for a second time and places the RFID tag on or about the pedestal.

9. A lap counter system of claim 8, wherein the pedestal is a kiosk type interface with an angled touch screen display having a keypad, a RFID printer and an output tray for producing a RFID tag with the appropriate unique runner information for each workout session.

10. A lap counter system of claim 8, wherein the pedestal is a kiosk type interface with an active integrated receptacle for the insertion of a durable, active RFID tag to read the unique runner information and to begin the runner workout session.

11. A lap counter system of claim 8, wherein the RFID tag is either a passive RFID label tag or an active, durable RFID tag.

12. A lap counter system of claim 8, further including an RFID reader connected to the RFID antenna wherein the RFID reader is capable of receiving signals from the RFID antenna to handling runner data from several hundred distinct RFID tags simultaneously from multiple runners on the track.

13. A lap counter system of claim 8, wherein the acted upon accumulated lap information includes laps completed, pace (minutes/mile), speed, total distance completed (miles or kilometers), total time, last lap time, and average lap time.

14. A method of a lap counter system for a runner on a track, comprising the steps of:

(a) affixing a removable RFID tag to a runner for generating an encoded signal with unique characteristics related to the identity of the runner and to cumulative lap information derive about each runner during a workout session;

(b) sensing the encoded signal each lap around the track;

(c) feeding the sensed encoded signal to a computer for calculating various variables concerning the laps completed by the runner; and

(d) displaying the various variables on a monitor viewable by the runner on the track during a workout session.

15. The method of claim 14, wherein the RFID tag is affixed to the running shoes of the runner.

16. The method of claim 14, wherein the encoded signal from the RFID tag is sensed by an external antenna of an omni-directional array type or of a directional type.

17. The method of claim 14, wherein the RFID tag is either an active or passive device for tracking the running information around the track.

18. The method of claim 14, further including:

(a) utilizing a computer based pedestal Kiosk having a sensing means for sensing the presence of an RFID tag and having an antenna projecting an antenna field for sensing the encoded signal from an RFID tag;

(b) placing the RFID tag near or about the sensing means on the Kiosk to initiate or terminate the workout session;

(c) running laps pass and through the antenna field projected by the Kiosk to generate the encoded signal;

(d) feeding a plurality of encoded signals to the computer in the Kiosk for generating the running information; and

(e) developing running information from the accumulated encoded signals for logging onto a data bank about a runner workout session.

19. The method of claim 18, wherein the RFID is plugged into the Kiosk having a RFID reader therein to gather information about the unique runner information to begin a workout session.

20. The method of claim **28** wherein the RFID is placed near or next to a point on a touch screen in the Kiosk to initiate or end a workout session.

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