

[54] DEVICE FOR DETERMINING THE SPEED, DISTANCE TRAVERSED, ELAPSED TIME AND CALORIES EXPENDED BY A PERSON WHILE RUNNING

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[21] Appl. No.: 465,274

[22] Filed: Feb. 9, 1983

[51] Int. Cl.4 ..... G01C 22/00

[52] U.S. Cl. .... 364/565; 364/410; 364/561; 340/323 R; 235/105

[58] Field of Search ..... 364/143, 561, 565, 413, 364/410, 469, 417; 340/323 R; 235/105, DIG. 5; 272/100; 375/5; 73/489, 490

[56] References Cited

U.S. PATENT DOCUMENTS

Table with 3 columns: Patent Number, Date, Inventor, and Reference Number. Includes entries for Veech, Zipser, Heywood, Adler et al., Greber, Zoepfl, Sipe, Tamiz, Sherrill, Hiller et al., Crowninshield, Searcy, Smith, Barney, Karr et al., Segar et al., and Lowrey et al.

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Hoshikawa, T. et al., "Analysis of Running Pattern in Relation to Speed", Medicine and Sport, vol. 8 (1973), pp. 342-348.

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(List continued on next page.)

Primary Examiner—Gary Chin

Attorney, Agent, or Firm—Banner, Birch, McKie & Beckett

[57] ABSTRACT

A device for measuring the speed of a person while running along a surface is disclosed. A pressure switch or transducer located in a shoe senses when a foot of the runner is in contact with the surface and produces a foot contact signal having a duration proportional to the time the foot is in contact with the surface. A radio frequency transmitter is coupled to the pressure switch or transducer and transmits the foot contact signal. A radio frequency transmitter receives the foot contact signal transmitted by the frequency transmitter and a microprocessor coupled to the radio frequency receiver calculates, solely from the foot contact signal, an output speed signal representing the speed of the runner. A liquid crystal display coupled to the output of the microprocessor displays the speed of the runner in accordance with the output speed signal.

25 Claims, 4 Drawing Figures

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FIG. 1.

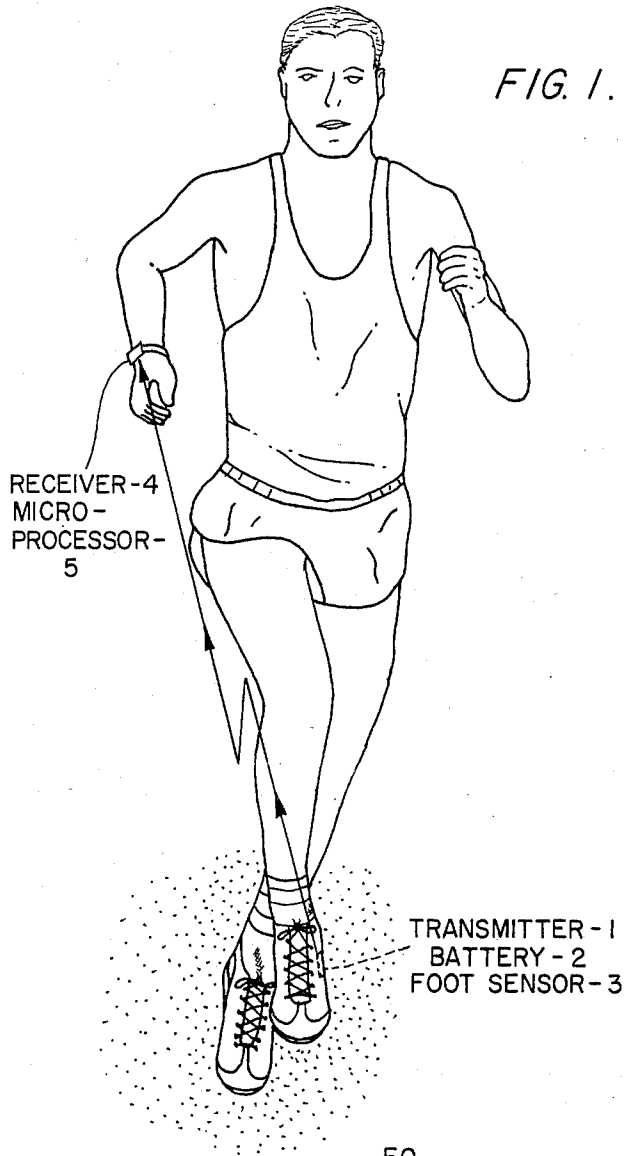


FIG. 2.

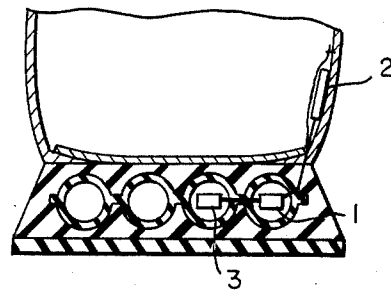


FIG. 3.

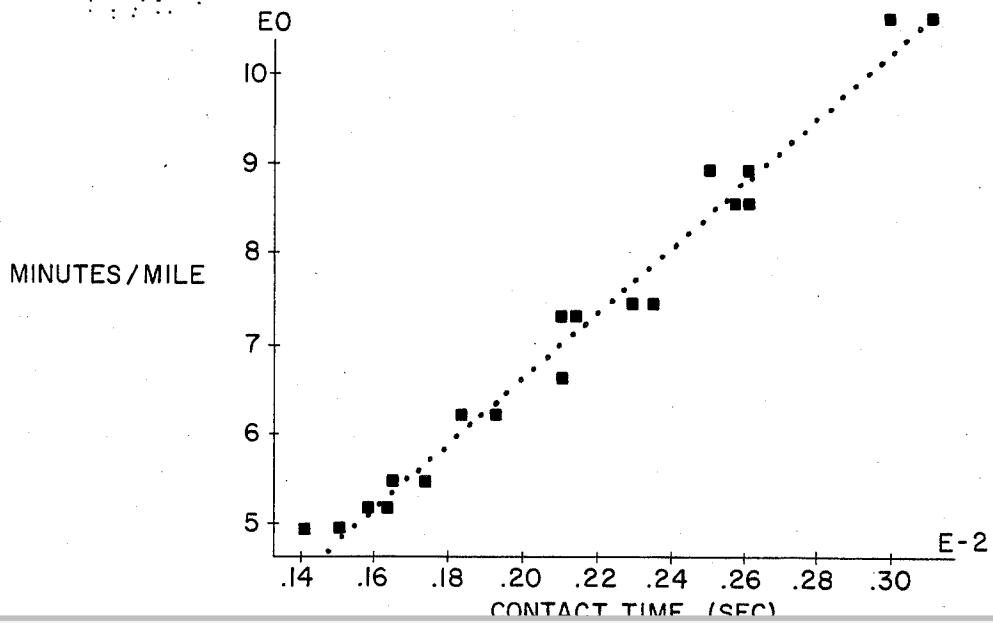
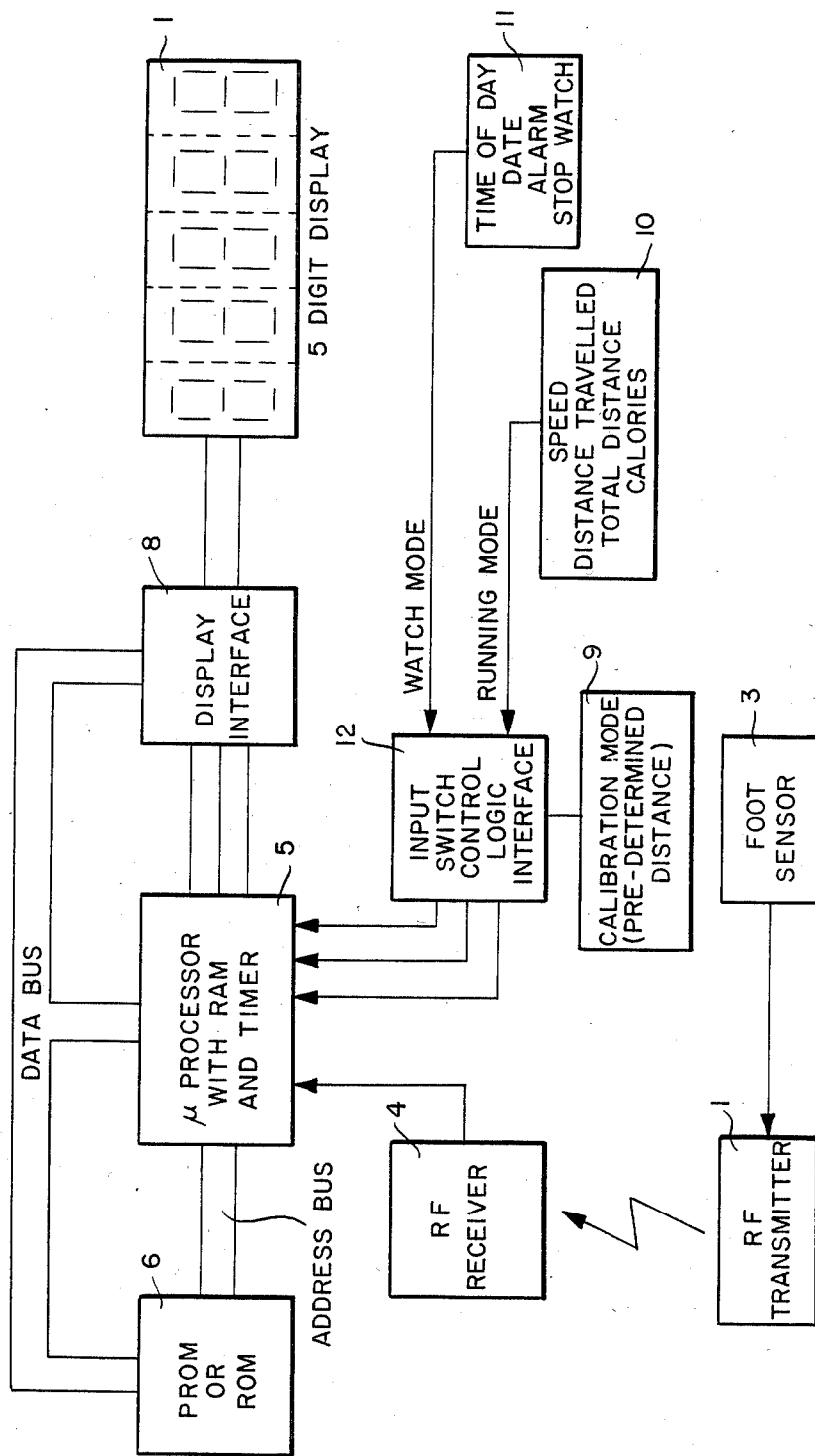


FIG. 4.



**DEVICE FOR DETERMINING THE SPEED,  
DISTANCE TRAVERSED, ELAPSED TIME AND  
CALORIES EXPENDED BY A PERSON WHILE  
RUNNING**

**BACKGROUND OF THE INVENTION**

This invention relates generally to the field of measuring instruments and is particularly directed to a method and apparatus for determining the speed, distance traversed, running elapsed time and calories expended by a person while running.

In recent years, concern over the increasing numbers of cardiovascular illnesses reported each year has led to much greater public awareness of the importance of maintaining good physical body conditioning. This concern has spawned the development of a wide variety of health spas, fitness centers and other similar commercial establishments. While many of these facilities offer excellent fitness programs, a large number of individuals are foreclosed from participation because they do not have the time, financial resources or a convenient schedule to devote to a professionally supervised fitness program. Many individuals have, therefore, turned to their own fitness program of regular jogging. As used herein, jogging is also intended to include running and the two words are used interchangeably.

Jogging has long been recognized for its therapeutic effects on the body. It increases cardiopulmonary fitness, helps to lower blood pressure, decreases cholesterol and triglycerides associated with heart disease and reduces weight. Jogging is also one of the easiest exercises to do. It requires no athletic ability and can be done almost any time and any place with a minimum of equipment and without assistance. In more recent times, jogging has also gained acceptance for its recreational value as well and is recognized as a positive factor in establishing psychological stability. The popularity of jogging today is well documented by the large numbers of products and literature available to the running public.

As in many exercise and sporting endeavors, there exists in the prior art a wide variety of devices for aiding those who jog. The simplest running aids are basic pacing timers as disclosed in U.S. Pat. No. 3,540,344 to Veech and U.S. Pat. No. 3,882,480 to Greber. Pacing timers generate a repetitive audio tone signal at selected intervals for pacing the strides of the runner. The length of the interval between tones is adjusted to suit the pace of the individual jogger.

There are other running aids known in the prior art such as pedometers as disclosed in U.S. Pat. No. 4,053,755 to Sherrill. These devices usually count the number of steps taken and for a particular stride length, the approximate distance traversed can be determined.

While pacing timers and pedometers are useful to the jogger, they are deficient in several areas. For example, it is known that above a certain speed, stride length begins to increase as speed increases. The relationship of stride length to speed is not directly proportional and is different for each jogger. It is, therefore, a difficult task to determine the correct stride length for an individual jogger at various speeds. Thus, pacing timers can provide no more than a constant running pace and pedometers are only useful as an approximation of distance traversed.

Running aids known in the prior art are further deficient in that they add weight to the runner while pro-

viding only marginal utility in terms of the amount of information available and its accuracy. Further, it has become desirable to accurately measure the speed of amateur and professional runners, both in training and during competition. In the prior art, such measurements were made with a stop watch timing the runner over a known distance. Heretofore, it has not been possible to obtain accurate instantaneous speeds of runners using the measuring devices currently known in the prior art.

With the foregoing in mind, the ideal running aid should, therefore:

1. be light in weight;
2. serve a number of useful functions;
3. be inexpensive;
4. provide measurements that are readily available to the user;
5. be reliable and easy to use; and
6. provide accurate measurements of speed, distance traversed, running time elapsed calories expended and other useful information.

**SUMMARY OF THE INVENTION**

It is the overall object of this invention to provide a new and improved running aid which overcomes the disadvantages of the prior art devices and substantially increases the amount and accuracy of information available to the jogger.

A specific object of this invention is to provide a new and improved running aid in which the speed of the runner or jogger can be easily and accurately determined.

A further specific object of this invention is to provide a new and improved running aid in which the distance traversed by the runner or jogger can be easily and accurately determined.

A still further object of this invention is to provide a new and improved running aid in which the elapsed time of the run can be determined.

Another specific object of this invention is to provide a new and improved running aid in which the calories expended by the runner or jogger can be easily determined.

A still further specific object of this invention is to provide a new and improved running aid which also includes the date, time of day, stop watch an alarm signals.

A still further object of this invention is to provide a new and improved running aid having the above advantages which is light in weight, relatively inexpensive and is convenient to use.

This invention comprises a measuring apparatus having a foot contact sensing transducer or switch located in the shoe of the jogger or runner for providing a first output signal when a foot of the runner is in contact with the running surface and a second output signal when the foot is not in contact with the surface. Reference to the foot being in contact with the surface is intended to broadly include contact with the surface through the sole of the shoe. Laboratory tests have shown that a definite relationship exists between the length of time that a foot of a runner is in contact with the running surface and the speed at which the person is running. At speeds between approximately 4 and 12 minutes per mile this relationship is approximately linear and can be accurately determined for each particular person.

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