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Computer Helps Design Shoe That Walks on Air

Dr. Gideon Ariel and his company, Computerized Biomechanical Analysis (CBA), have designed a shoe that allows the wearer to walk on air. The shoe was created as a result of a study on the efficiency of shoe design, which revealed that the common shoe is not an efficient design. The new shoe, filled with air, provides a cushioned step and a rolling effect when walking or running. The design has been acquired by the Pony Shoe Company and is expected to be used in various sports, including basketball and football. The shoe could also be used in regular footwear for the general public.

In addition to the air shoe, CBA has also designed a new exercise machine that requires less space and a tennis racket with a pivoting handle for maximum force and accuracy. The company is also conducting a study for the Department of Defense on how to make foot soldiers more efficient.

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Below find a reprint of the 1 relevant pages of the article "Computer helps design shoe that walks on air" in "Daily Hampshire Gazette":

Computer helps design shoe that walks on air

By MILTON COLE

AMHERST — Walking on air. The very thought is so pleasurable that the expression is used constantly to describe emotionally inspiring success. But now a computer and a former Olympic athlete have merged knowledge and technology so they could make "walking on air" totally commonplace.

Dr. Gideon Ariel of Beichertown and his Computerized Biomechanical Analysis company in Amherst have designed shoes in which one does walk on air.

How efficient the shoe. They are the result of a survey on how efficient is the design of shoes in general, and how can they be made more efficient.

The result of that survey and study could be shoes that have one walking on air.

And if the air shoes are the most unusual of the products of CBA, they are not the only ones.

For example, there is a new exercise machine that makes it unnecessary to have a large room to house it, and makes it possible to do all your exercises in half the average-size bathroom.

There is a tennis racket with a pivoting handle that enables a player to absorb the shock of a ball hit at him and return it with maximum force and accuracy.

And there is a study being made for the Department of Defense on how to make the foot and more efficient as far as equipment and uniforms are concerned, and what is the most efficient way to hold and shoot a submachine gun.

These are some of the more unusual studies that have been being made. But there are others, enough others that the business started by Ariel six years ago has now grown into a multi-million-dollar firm that is expanding.

Take the air shoe. Originally the U.S. Bureau of Standards contracted with CBA several years ago to do a survey on the efficiency of design of the common shoe.

The study, including filming of people walking and then slowing the film down to analyze frame-by-frame what happens when a person takes a step, showed that the common shoe is not as efficient design.

The protruding heel causes a person to step onto the heel of the foot first, putting the strain of each step on it, and then expanding that strain up through the leg into the lower back.

"It showed that the way we walk and the kind of shoes we walk with can be a cause of lower back trouble as well as the cause of foot and leg problems."

"The computer showed that the most efficient way to walk is the way we walk barefoot, with a rolling motion so that the force we generate as our foot hits the ground will cause a rolling motion, pushing the body forward on the foot, instead of jarring the force up the leg."

How is this knowledge? How to utilize that knowledge? After the report was sent to the federal agency, Gideon and his associates at CBA worked on putting theory into reality.

One shoe was designed, aimed at providing the rolling motion, but still sending some of the jarring motion up the legs. Then came the idea of using that jarring action to provide forward motion.

The air shoe was born. The prototype is designed for athletes, and has been used successfully in practice by the members of the U.S. women's volleyball team.

They have found that they jump higher, and they end up with fewer leg problems, muscle pulls, etc. as a result of landing on their feet after a jump.

Basketball players are experimenting with them, along with runners.

The design is of a regular nylon-bodied running shoe, with the rubberized rippled or cleated sole.

But the inside has another rippled rubberized insert running the entire length of the shoe. In the outside of the heel of the shoe is a small air intake valve.

A rubber-bulb pump is inserted into the valve and the insert is filled with air, like filling an auto or bicycle tire or a football or basketball.

Then the shoe is put on, laced and tied. And when one walks on it, he or she is literally and actually walking on air.

Air forced out. Each step forces the air from one spot in the insert into another by use of computer-designed valves, and the result is a cushioned step whether walking or running or jumping, and a rolling effect when one walks or runs.

"They should end problems with leg muscles, shin splints, bone spurs, etc. And they should cut foot fatigue for runners," Ariel said.

Right now the design has been acquired by the Pony Shoe



PUMPING UP the sole prepares the new "air shoe" for use. It was designed by Computerized Biomechanical Analysis in Amherst, and CBA president Dr. Gideon Ariel is getting the shoes ready. (Richard Carpenter Photo).

Company, which makes footwear for all kinds of sporting activities.

Ariel figures that the shoe will be used in Olympic and other national and international competition. He believes it will find a place in sports, particularly basketball, and perhaps football as well.

But it also should result in use in regular shoes worn by the general public, and could have the nation, if not the world, walking on air, and being healthier for it, if Ariel and his company are correct.

"Imagine how great this would be for paratroopers or others jumping from considerable heights," enthuses Ariel. The driving but husky University of Massachusetts doctoral graduate also is enthusiastic about the exercise machine he has designed.

Originally used weights. Originally designed one for the Universal firm, one of the top such companies in the U.S., using the established method of actual weights attached to pulleys and handles.

It was different and easier to operate than others on the market at the time, but still quite bulky and space-consuming.

The latest design, made possible by the omniscient and omnipresent computer, is a simple large cylinder connected to a variety of bars or pedals or overhead handles.

The computer is hooked up on a shelf as part of the system. You press a button, and the computer asks if you want to exercise.

You press buttons that indicate that you want to do weight lifting, and how much force or pressure you want to lift.

The computer then sets the valve that controls the hydraulic fluid in the cylinder and thus the amount of force necessary to lift the piston in the cylinder.

It eliminates the need for the actual weights to be there. One of the people involved with Ariel in his enterprises is former U.S. Treasury secretary William Simon. He is interested in forming their own manufacturing firm to turn out the new tennis rackets that CBA has designed.

Doing research on tennis racket efficiency and how the alignment, "tennis elbow" occurs, CBA and Dr. Ariel found that the impact of a ball on the racket, sends a jarring force through the racket handle up the arm and against the elbow joint.

The computer suggested a rotating handle that would use that force to twist the handle, making it so the face of the racket is directly against the ball each time it hits the racket.

This not only eliminated the jarring force going into the elbow, it also made possible the opportunity for a perfect return shot.

Using that racket, which Ariel says will be produced by someone within a year, either their own firm or one of the regular sporting goods manufacturers, with the tennis ball CBA designed for Spalding, could make for much improved tennis.



DR. GIDEON ARIEL demonstrates how the computerized exercise machine his Computerized Biomechanical Analysis firm of Amherst designed, with computer operating hydraulic piston to provide the same resistance as weights used on traditional exercise machines. (Richard Carpenter Photo).

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