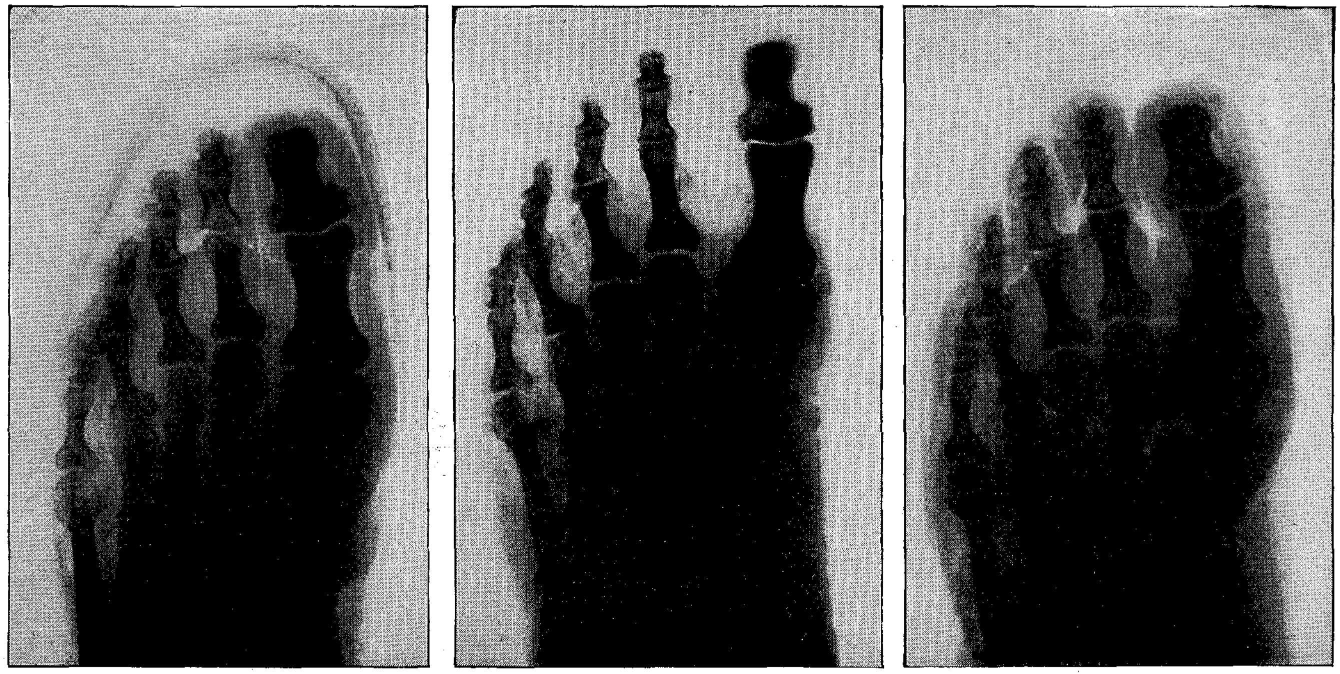


By courtesy of "The Scientific American,"

FOOT INCLOSED IN CONVENTIONAL SHOE. THE BARE FOOT. FOOT IN THE NEW ARMY SHOE.

SCIENTIFIC FOOT TREATMENT FOR THE ARMY—TRYING ON SHOES BY X-RAYS.

get to the upper deck mount the stairs at each end of the car and divide again into two lines which pass out to the two sides of the upper deck. Exit is accomplished by a direct reversal of this process, the alighting passengers getting off the car before others are permitted to enter. On the Pittsburg car the separate doors and stairways are designed solely for the purpose of separating at all times, if possible, the entering and leaving passengers and also for maintaining movements in constant directions. Passengers, after passing the conductor opposite the entrance door, have the alternatives presented of moving forward or to the rear of the lower deck or else up to the second floor, the stairs being just back of the conductor. When leaving, the passengers on the lower deck converge toward the exit door, and those from the upper descend the exit stairs which land alongside of this door.

"The seating capacity of the New York car is 88 and that of the Pittsburg car is 112. Neither car is excessive in size, the New York car being 44 feet long by 8 feet 3 inches wide and the Pittsburg car being 48 feet long by 7 feet wide. The over-all heights of the cars are respectively 12 feet 10 inches and 14 feet 3 inches."

SHOE-FITTING WITH THE X-RAY

ANOTHER RECENTLY discovered use for the valuable Roentgen ray is indicated by its employment by a United States Army board in experiments for insuring a perfect fit to soldiers' shoes—a matter of supreme importance in marching. This plan, we are informed by a writer in *The Scientific American Supplement* (New York, August 17), has been adopted by the board after four years of exhaustive experiment and study of the foot troubles of United States soldiers. Under the old regulations, we are told, shoes of two patterns were ordered, one from a straight and the other from a slightly curved last. Neither gave satisfaction on long marches, and for years the percentage of imperfect feet in the Army has been appalling. The new shoe has a low flat heel, a broad round toe, and a quarter of an inch more swing or curve than the old style, the straight last having been abandoned. To quote from the article:

"The investigations carried on by the board were of the most complete and painstaking character, and X-ray photographs resulted in some very interesting information as to the effect on the feet of standing in certain positions, and marching in both heavy and light equipment. Civilians might study these tests in shoe-fitting with beneficial results, especially those troubled with aching feet. The heaviest tests were made with the soldier in his full uniform and carrying the maximum amount of equipment of forty pounds. In the course of these investigations the tendency of the feet to spread as the weight was thrown on them was fully studied, and the X-ray shows the position taken by the various bones of the feet as affected by the changing position and weight. Photographs showing some remarkable experiments have been taken of the feet in the old-style shoe with forty pounds of pressure on the soldier's back, and the same foot in the new shoe. Invariably in the old shoe some of the toes were pushed completely out of their proper position, but in the new shoe each toe has plenty of room, thus making marching with full equipment as easy as possible.

"The board during its labors examined thousands of soldiers' feet under varying conditions, carefully taking note and making report on each foot where trouble was caused by a shoe. These feet were also measured and photographed in every conceivable position, ranging from the most complete repose to the severest possible strain under the conditions of service.

"In the final tests at Fort Leavenworth the new shoe proved beyond doubt the success of the board's arduous work. A march of nine days, covering 118 miles, was made by 375 men. Part wore the old-style shoe and the others the new shoe. The latter finished the tramp easily, while a great percentage of those equipped with the old-style foot-wear were forced to quit on account of shoe trouble.

"The method now adopted by the Army for 'breaking in' new shoes and making them conform to all the little quirks of individual feet, resulting in a perfect fit, is unique. After the shoes are fitted to the soldiers' feet they are made to stand in water to their shoe-tops until the leather is thoroughly soaked, then they are marched around until the shoes have dried on their feet, when forever after the new foot-wear is as comfortable as the proverbial 'old shoe.' This may seem a somewhat heroic method, but in practise it is found thoroughly effective."

CONCRETE WITH SOAP IN IT—A new and rather curious use of soap has been found by engineers, who have begun to mix it with concrete to make the concrete water-tight. How so soluble a substance as soap could effect this result seems a little difficult to see, just at first; but we are told that the soap used does not remain soap, but unites chemically with other constituents of the cement to form a water-tight binder. The matter assumes importance, we are told by a writer in the *Revue Scientifique* (Paris), when we desire to build a concrete reservoir, conduit, or basin. The soap process seems first to have been described in a German publication, *Beton und Eisen*, which assures us that it is simple, economical, and effectual. Says the French paper:

"Soapy water is used in mixing the concrete, the amount used being 6 to 8 pounds of ordinary potash soap, known as 'green soap,' for each cubic yard of concrete. It is even possible to waterproof concrete walls already made, by applying a coating, in two successive layers, of soap-water concrete. The best plan is to make the first layer of small broken tone about half an inch in diameter, bound with cement mixed with soap-water in the proportion of 800 pounds of cement and 30 gallons of water to the cubic yard. This layer is put on 3½ inches thick. The second layer, which is only half an inch thick, is of a mortar made of one part cement, three parts of fine sand, and a proper amount of soapy water. It seems that the free lime which cement always contains gives rise, by combination with the alkaline elements of the soap, to a calcium oxid that is impermeable to water and fills up all the pores of the concrete."—*Translation made for* THE LITERARY DIGEST.

FUTURE OF POWER-TRANSMISSION

THAT THE FUTURE MAPS of industrial lands will show them covered with a network of high-tension electric-transmission lines branching out from central stations fed either by water-power or by supplies of coal or peat, burned on the spot where they occur in nature, is predicted by an editorial writer in *The Electrical World* (New York, August 3). The transportation of fuel is to cease and the transportation of power will take its place, except perhaps for domestic purposes. All this, the writer believes, is the inevitable result of modern industrial conditions. Our cities are the creations of available power, and more must be brought to them if they are to maintain the supremacy that seems to be so closely connected with the triumphs of modern industry. "If the supply of energy were withheld from cities," says the writer, "these would melt away like icebergs in the Gulf Stream." He goes on:

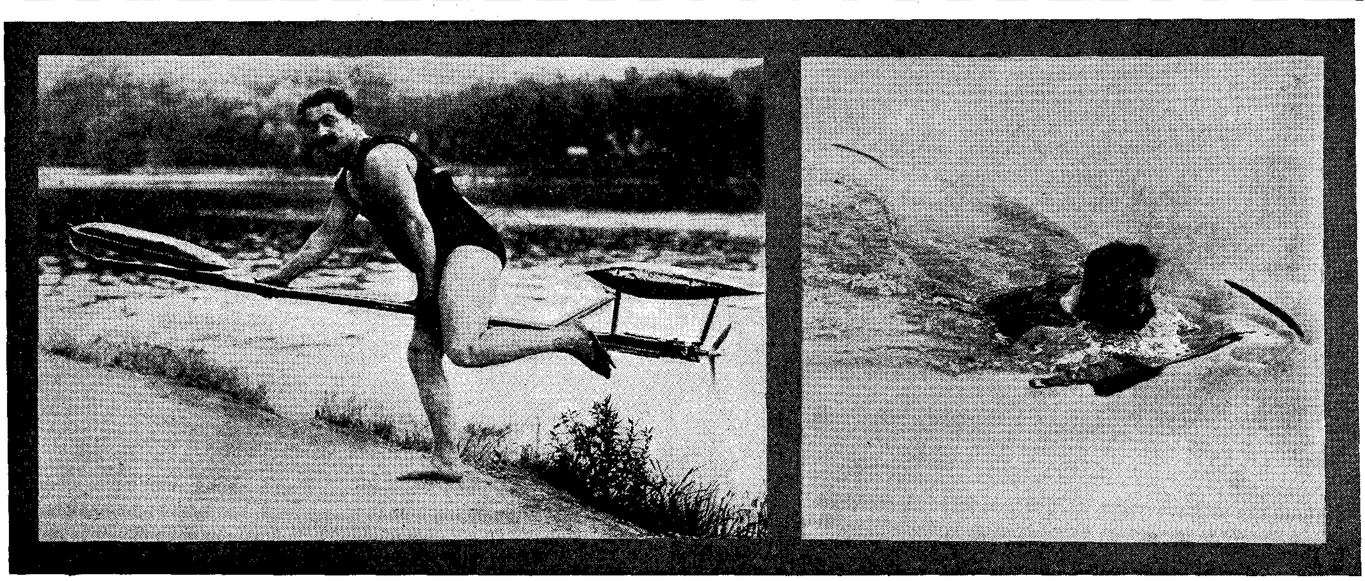
"In the course of modern civilization the leading nations have committed themselves in large part to urban conditions, dense populations, and industrial pursuits. To maintain such pursuits large supplies of energy are needed. The nation with the largest supply of available coal has the greatest economic advantage in the industrial race, especially if bodies of iron and other metals lie at hand for industrial use. In fact, until recently nations not possessing coal supplies have been thereby prevented from taking up industrial pursuits except along those special lines in which a minimum of mechanical energy is demanded. The development of high-tension electric transmission has already changed the fate of nations in so far as waterfalls might become substitutes for coal mines. Thus, in Europe, the nations in and around the Alps are tending to become industrial nations, competing, therefore, for markets, while, in the future, the Norwegian mountains of Europe and the Canadian mountains of North America seem destined to produce marked industrial effects, owing to the waterfalls that only mountainous regions can produce. Moreover, every kilowatt generated from water-power in a country where coal is mined may be regarded as saving at least twelve tons of coal per annum for other uses."

In a paper recently read before the Leipzig convention of the German Electrotechnical Society, Mr. D. F. Bartel discusses the possibility of supplying a large part of the industrial service of Germany from a network of high-tension conductors, fed with energy from central stations consuming lignite and peat. He shows that, whereas the coal beds of Germany are comparatively few, large beds of the inferior fuels lignite and peat are scattered over the North German districts most remote from the coal. By collecting and burning these fuels under central-station boilers the existing industrial needs of North Germany might be met. We read further:

"While the complete scheme of the paper is not likely to be carried into effect for many years, it may well be expected that not only in Germany but also in Great Britain and other industrial countries high-tension networks will steadily extend themselves for the delivery of energy to industries, the energy being obtained either from waterfalls, coal mines or peat mines, whichever may have the local advantage as a source. The transportation of fuel for domestic furnaces may be necessary for an indefinite period, but the transportation of fuel for industrial purposes is likely to be checked by the growth of high-tension mains."

A MOTOR FOR SWIMMERS—The following brief account of a new invention for enabling swimmers to travel through the water without swimming, if we may phrase it thus paradoxically, appears in the *Illustrirte Zeitung* (Leipsic, August 1). Says this paper:

"The apparatus consists of a pole or rod about six feet long, at each end of which is an air-chamber to bear up the swimmer. According to the claims of the inventor, who is a Frenchman, even one who does not know how to swim may, with the help of this device, travel through the water at the rate of six miles an hour. The propulsion is effected by means of pedals, communicating with a small screw propeller."—*Translation made for* THE LITERARY DIGEST.



VIEW OF DEVICE IN THE POSITION IT TAKES IN THE WATER. THE SWIMMER AND MOTOR IN ACTION.

A SWIMMING-MOTOR.