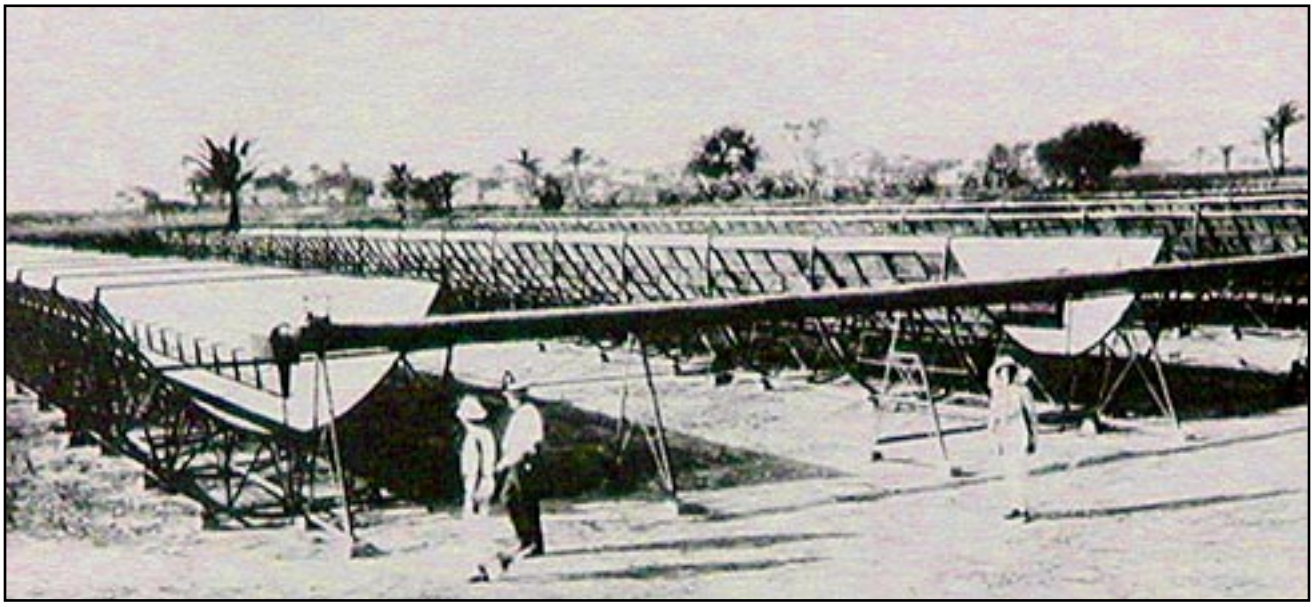
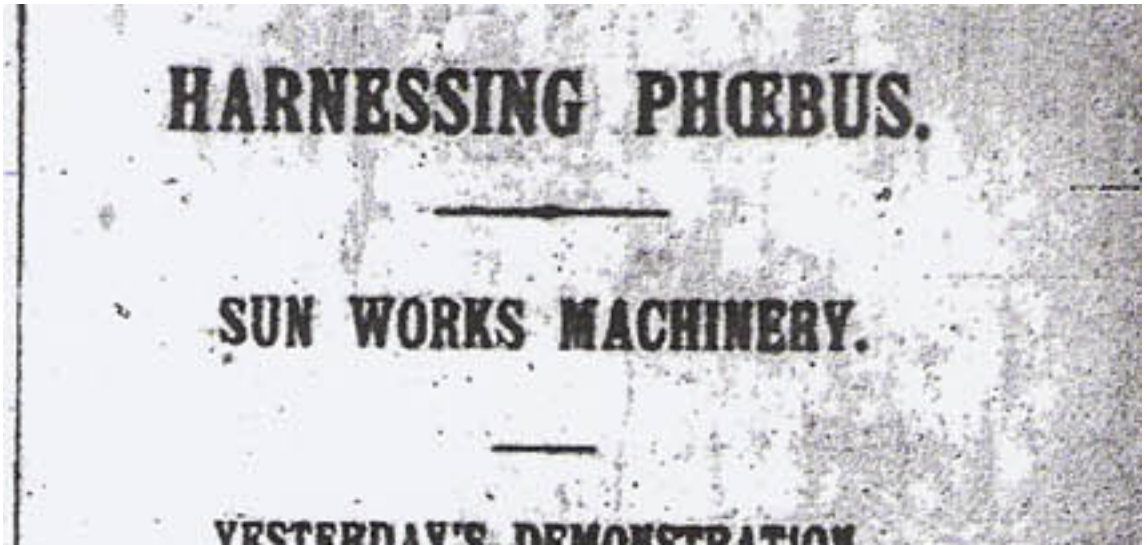
MAADI INTRODUCES SOLAR ENERGY TO THE WORLD IN 1913

Amazing but true, in August 1913 Maadi was the site of history-making innovation when American inventor-engineer Frank Shuman (1862-1918) chose this still-nascent nileside suburb to launch his amazing contraption--a solar panel power plant.

Here's how the *Egyptian Gazette* described this groundbreaking event in its 12 July 1913 issue.





HARNESSING PHŒBUS.

SUN WORKS MACHINERY.

YESTERDAY'S DEMONSTRATION

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The Modern Substitute for Old Sun-Worship.

Our forefathers used to worship the sun—many people do it still—also fire, water, etc. The modern idea is to make practical use of these things; we look upon them with a cold, calculating eye and treat them as our servants rather than as our gods.

The latest idea of Modern Egypt is to make the sun work its machinery for it. We are almost trying to harness Phœbus!

That the greatest interest is being taken in Cairo in the Sun Power experiments now in progress at Meadi was amply demonstrated yesterday by the fact that, although the thermometer stood at little short of 100° F. in the shade, a large crowd, including many ladies, accepted the invitation sent by Messrs. Lambert and Ralli and journeyed to Meadi to see the new sun power plant at work.

The trip to Meadi was made as pleasant as pleasant as possible by the the Delta Light Railway authorities, who arranged a special train which left Bab-el-Luk at about 11.30 and arrived at Meadi about a quarter of an hour afterwards. At the works the visitors

and arrived at Meadi about a quarter of an hour afterwards. At the works the visitors were received by Mr. Lambert, of Lambert and Ralli's, Mr. Frank Shuman, the inventor of the device on which the plant is worked, and Mr. A. G. Worrall, the Assistant Engineer. Amongst those present were many important persons representing the Government, commerce, and society, such as Mr. J. A. Cable, Dr. L. H. Gough, Ibrahim Bey Sherif, Rev. and Mrs. W. Jaffray, Rev. J. J. M. Cowper, Captain Adams, Mr. E. Harran, Mr. Henriques, Mr. C. E. Duffield, Mr. A. Garcias, Mr. J. A. Gunn and Mr. Bearcroft. For some time these and the other visitors kept Mr. Lambert and Mr. Shuman very busy explaining the working of the plant and showing them round the engines; the latter were running at full speed all the morning. An adjournment was then made to a marquee erected close by, where at an excellently arranged buffet the visitors were able to quench the almost terrific thirsts with which their trip to Meadi had endowed them.

A little after 1 p.m. the majority of the visitors returned to Cairo by special train, but a fair number remained to lunch with Mr. Lambert and Mr. Shuman. The lunch like all the other arrangements was first rate and at its conclusion Mr. Lambert delivered a very witty and interesting speech, in which he thanked all present for attending, and also gave some particulars regarding the aims and

witty and interesting speech, in which he thanked all present for attending, and also gave some particulars regarding the aims and objects of the invitation and the means by which it was hoped that those ends would be attained.

Sun Power and the Tropics.

The plant is certainly one of the most ingenious and interesting devices ever seen in Egypt and the successful experiments now being carried out with it are of vast commercial and industrial, and even national, importance. The latter point is brought out very clearly by a communication made by Messrs. Lambert and Ralli to the Press from which the following is an extract.

"Sunlight abounds in the tropics and costs nothing. The sun power plant at Meadi shows plainly that it can be used to the greatest advantage. Any number of plants, like the one at Meadi, or larger, can be constructed, and mechanical power for all purposes without limit can be obtained. By means of this power all our irrigation can be done, artificial fertilizers manufactured to any extent from the nitrogen of the air, artificial ice made, electricity generated, and in fact, all work now done by the steam and petrol engines, can be done directly by the sun. Eventually, the tropics will become the power station of the world through the development of sun power and because of the gradual exhaustion

the world through the development of sun power and because of the gradual exhaustion of the coal fields. That mechanical power without limit was contained in the sun's rays has been known to scientists for many years, but its utilization for practical purposes presented many great difficulties. That these difficulties have been overcome is evidenced by the operation of the simple and practical plant at Meadi."

Mr. Shuman's Early Experiments.

Thoroughly to understand the plant one needs to go back some years and briefly follow the inventor, Mr. Shuman, through the course of his earlier experiments.

Mr. Shuman, when he first became interested in the question of sun power, had little more than the numerous failures of other experimenters who had preceded him to work upon. These failures, however, supplied him with a certain amount of valuable data. All former experiments had been based either upon the use of lenses or mirrors to concentrate the sun's rays upon a small surface, or on the heating of fluids of a low boiling point and obtaining subsequent power generation from the vapour under pressure. The experimenters, however, always attempted to create vapour

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at high pressure and then utilise it in the ordinary engine, with the result that, high temperatures being involved and much loss occurring by conduction and convection, the power produced was practically of no commercial value. Moreover the cost of the lenses and the apparatus necessary to present them continuously to the sun was a serious drawback, and further the fluids used—ether, sulphurous acid etc.—proved to be quite inefficient as power generators.

Bearing these failures in mind, Mr. Shuman set to work in an altogether new direction, basing all his experiments on four axioms, viz: that a sun power plant to be commercially practicable must possess (1) high efficiency, (2) low cost of installation and maintenance, (3) well marked length of service, and (4) the possibility of being worked without the aid of specially trained mechanics.

How Success was Achieved.

Mr. Shuman's earlier experiments showed him that if a vessel were so arranged that the sun's rays could impinge on it, and if all heat losses by conduction, convection and radiation were prevented by a theoretically perfect method of insulation, the temperature within the vessel would rise to a thousand degrees Fahrenheit without any attempt being made

method of insulation, the temperature within the vessel would rise to a thousand degrees Fahrenheit, without any attempt being made to concentrate the sun's rays. For commercial purposes, however, it is impossible to secure any form of insulation that will even approach the theoretical. The first Shuman generator built consisted of a wooden box covered by two layers of glass, between which was a small air space. In the box was placed a miniature ether boiler. This apparatus was exposed to the sun's rays, the ether distilled and the amount of heat which might be absorbed determined.

As an experiment, a small toy engine was successfully run with this apparatus. The next generator consisted of a 2-inch steam pipe 16 feet long, insulated at the bottom and enclosed in a box covered by a double layer of glass. Here again ether was distilled, and the number of heat units absorbed was determined. This led to the third generator, a bed of water pipes properly insulated against heat loss, the unit being 18 × 60 feet, and the motor an ether engine. With this, 3½ hose power was generated.

From such a beginning was the present large and powerful plant, originally constructed in America and which is now in a greatly improved form completed and at work in Egypt, evolved.

Description of the Helouan Plant.

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The plant, now covering several acres of land on the left bank of the Nile, consists, broadly, of a series of reflectors and absorbers, a low pressure steam engine, condenser and auxiliaries, and a pump. The reflectors, five in number, are each 204 feet long, parabolic in shape, spaced 20 feet apart and are composed of a series of glass mirrors each $\frac{1}{8}$th inch in thickness. These reflectors present a total light absorptive surface of 13,500 square feet but only 10,000 square feet are being used. They are arranged on iron frames which are connected with one another and geared, by means of central rack and cog wheels, to the engine. They are controlled by a thermostat, the secret of the whole invention, which presents a continuous eye to the sun, and through it the reflectors revolve automatically, following the course of the sun throughout the day. Down the middle of each reflector, exactly in the centre of each, runs the absorber or boiler comprising a hollow box $\frac{3}{8}$th inch thick and an upper tube. This box, by means of an automatic feed, is always kept half full of water.

The arrangement is such that the full force of the solar rays, as reflected by the mirrors, are thrown on the boilers which absorb them, the water being thereby heated and steam generated. The steam so raised is conducted by the upper tube to a branch

and steam generated. The steam so raised is conducted by the upper tube to a branch steam pipe situated at one end of each boiler and thence to the main steam pipe through which it passes to the engine, a 100 horse power low pressure one working at atmospheric pressure. The exhaust passes into a condenser working at 28 inches vacuum created by the engine and, in the form of water, it returns to the absorbers again. The engine is geared to a reciprocating suction pump by chain drive, the pump having a delivery capacity of 6000 gallons of water a minute at a head of 30 feet.

The Cost.

As the inventor himself admits, the initial cost of the sun power plant is rather heavy—in fact it is about twice as great as that of a similar horse power coal plant. But, once installed, it saves the cost of the fuel and effects a large economy in the matter of staff. Its main province lies therefore in places where high prices have to be paid for coal, such as Egypt and the Sudan.

At present the work being done at Meadi is merely by way of experiment, the water being simply pumped out of the Nile and then pumped back again; or perhaps, as the experiments have so far proved pre-eminently successful, it would be more correct to say that the work is a demonstration. By it the

successful, it would be more correct to say that the work is a demonstration. By it the proprietors hope to attract the attention of the Government and the public in general to the vast possibilities of sun power.

That they have already succeeded to some extent in doing this was, as we have said,

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proved by the large number of visitors who turned up at Mesdi yesterday. It now remains to be seen whether the interest taken by the public is shared by the Government—both here and in the Sudan—and, if it is, whether the said Government will avail itself of the opportunities which the new invention appears to offer.

AL-AHRAM 9 July 1913

استخدام قوة الشمس

وزع الخواجات لامبرت ورالي اوراق الدعوة على فريق من الوجهاء والاعيان والادباء لحضور اختبار الالة التي ركبتها شركة سن باور الانكليزية في معادي الخبيري لحصر قوة الشمس واستخدامها في ادارة العدد والآت وذلك عند ظهر ١١ يوليو


العدد والآت وذلك عند ظهر ١١ يوليو
وتعد الشركة للمدعوين مأدبة فاخرة وقد
وصفت هذه الآلة في نشرة جاء فيها ما يلي :
بعد زمن طويل قضي في التجارب
العديدة من غير توان ينوف عن السبع
السنوات تقريباً توفقت شركة سان باور
الانكليزية ان تتم وتقيم بجهة معادي
الخيري بقرب القاهرة طامبه عظيمة جداً
او آلة مع كل مشتملاتها لرفع المياه وفي
وسعها واستطاعتها رفع ستة الاف جالون
من الماء في الدقيقة الواحدة (٢٧٢٦٠ لتراً)
وذلك من غير احتياج الى أية مادة احتراقية
فالبخار اللازم لهذه القوة هو ناتج من تجمع
أشعة الشمس على قزانات ملانة ماء وهو
بهذه الطريقة يحرك ويدير هذه الطلمبة
الكبرى او الآلة الرافعة

LNKS:

Frank Shuman - Earth Encyclopedia
Power of Light
solar energy history

Interactive options:

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