ELECTRICITY

Scientists Predict New Era of Power Produced Directly from Light

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The Power of the Future

SOONER or later we shall have to go directly to the sun for our major supply of power. This problem of the direct conversion of sunlight into power will occupy more and more of our attention as time goes on, for eventually it must be solved.—Edison Pettit, Mount Wilson Observatory.

HUMAN AMBITION. But not until recent years has the dream come true that light can be transformed directly into electric current. That the phenomenon depends upon the length (frequency) of the light wave, and is not

How Light Cells May Be Utilized to Produce Electric Energy from Sun, Something Already Accomplished Experimentally; Insert Shows Construction of Unit

NOT all the physical forces have been harnessed. We are now subsisting principally on the application of power generated from coal and oil; sources of power stored up for us ages ago.

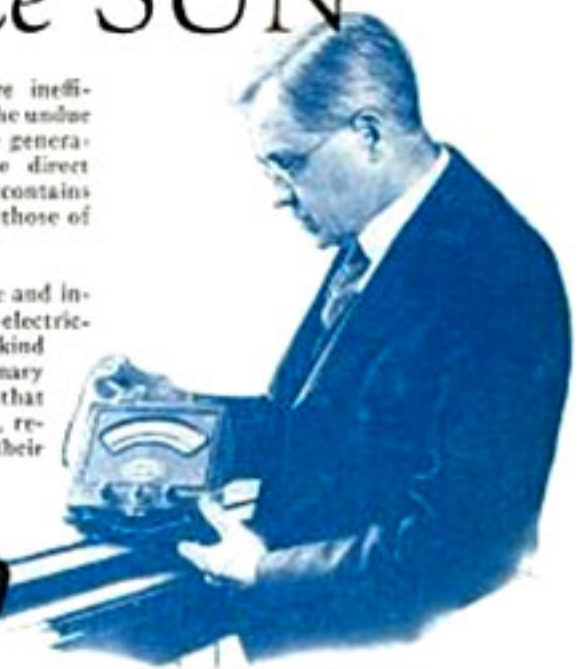
The generation of power from sunlight a photochemical or thermoelectrical reaction appears to be established by the experiments on isolated spots of molybdenite, using measured amounts of radiation of different wavelengths.

The few experimental machines for gen-

from the SUN

erating electricity from light are inefficient. Nevertheless, discounting the undue publicity given to this device, the generation of electric current by the direct transformation of light waves contains unknown possibilities as great as those of the radio of thirty years ago.

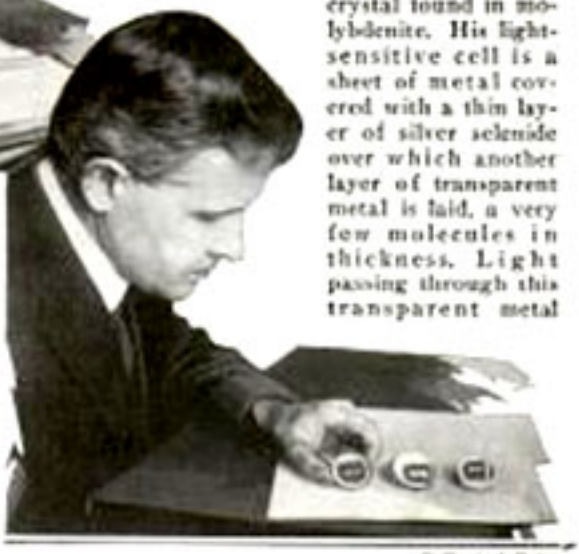
WILL the wheels of commerce and industry one day be spun by electricity taken from the sun? Is mankind on the threshold of a revolutionary source of electrical power—one that will render obsolete the dynamo, release coal, oil and gas from their bondage of servitude?



Above, Doctor Coblentz Showing How He Transforms Sunlight into Electricity; Left, Model of Solar Furnace Now under Construction

"Yes," declares Dr. W. W. Coblentz, noted government scientist, who says: "The generation of power from sunlight is an age-old dream of man's; but not until recent years has he succeeded in wresting the secret of accomplishment from nature—the transformation of light directly into electric current."

Doctor Coblentz picks up a mysterious little pasteboard box—the familiar circular pill box of the drug store—from which protrude two tiny wires, like insect antennæ. A peep into the box discloses these two wires soldered to a sliver of whitish mineral—molybdenite. Closer inspection through a microscope reveals a tiny particle, not so large as a pinpoint, of some mineral or substance buried in the sliver. He places the top on the pill box and attaches the wires protruding from its side to an ammeter. Then the apparatus is moved into the sun where the light may penetrate through a pin-pricked aperture in the top of the box directly over the tiny mineral crystal buried in the sliver of molybdenite. The needle of the ammeter jumps. He covers the aperture and the needle subsides. Light falling on the "unknown speck" has gen-



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Above, Dr. Charles G. Abbott, Authority on Solar Radiation; Below, Dr. Coblentz and His "Pill Box"

erated a current of electricity. Or as Doctor Coblentz puts it, "Light has—supposedly, for we do not know exactly how—knocked the electrons out of the crystal particle and they flow in a circuit."

Doctor Coblentz has measured the length of the light waves that do the trick. They are in the visible range, a little beyond the infra-red rays. They are not longer than one micron—the thousandth part of one millimeter.

His experiment is, however, after all only an experiment. It remains yet to produce electric current from sunlight on a grand scale—and more cheaply than it is produced today in plants, hydroelectric and otherwise, if mankind would be benefited. If only we knew what that tiny crystal is hidden in the molybdenite. If we could only isolate it, find it elsewhere in greater surface measure, manufacture it or locate its counterpart, what unknown possibilities for the progress of man would be opened up through the transformation of sunlight into electricity!

Let us leave Doctor Coblentz and America now, for a moment, and go to Germany. We are in the great Kaiser Wilhelm institute in Berlin. A young German scientist, Dr. Bruno Lange, is our host. He has before him an apparatus that looks somewhat like a dressing table mirror from milady's boudoir. From it leads a wire cord attached to a small motor. Doctor Lange sets his "mirror" in the sun. Immediately the motor begins to purr. Light has been transformed into electric current and the current is running a motor. The accomplishment of the age-old dream is realized. The practical transformation of light into electricity has taken place. The output of energy from this one photo cell is sufficient for use without amplification.

Doctor Lange has not used the hidden crystal found in molybdenite. His light-sensitive cell is a sheet of metal covered with a thin layer of silver selenide over which another layer of transparent metal is laid, a very few molecules in thickness. Light passing through this transparent metal coat generates a current of electricity between the two layers of the "metallic sandwich." The use of silver selenide as a "filler" for the sandwich results in fifty to 150 times more current from the sandwich than can be got from a copper-oxide filler. The photo cells of Doctor Lange are very sensitive, comparing favorably with the sensitivity of the human eye, being but ten per cent less. They are also peculiarly sensitive to color differences.

Doctor Lange has taken out patents at home on his newly developed photo cell and looks forward to its use in the production of electrical energy from sunlight,

though he believes this will not come hurriedly. First an arrangement of a large number of cells in aggregate must be worked out, but the first hurdle is over.

Practical application of these cells to date consists in transmitting phonograph records and sending signals by them. As a future possibility infra-red telephony over long range looms up. Also automatic control of rollers in steel mills, the red-hot iron giving out sufficient light to work the cells, causing them to automatically change the direction of the rollers.

One of the German liners is now equipped with these cells in a new smoke and fire-control system. Air from over the ship is pumped past them through a tube, and smoke in the passing air causes the cells to set off an alarm.

The cost of installing a sun power-generating plant is estimated at about $25,000 per kilowatt, while the initial cost of present plants ranges from $100 to $300 per kilowatt and up. But it must be remembered, points out Doctor Lange, there is practically no second cost to a sun power-generating plant. A 300,000-kilowatt station, he estimates, would require about one square mile of silver-selenide cells.

Here is a promise of enormously more power than mankind shall ever use and from the source of all energy—the sun. Its possibilities are as great as the application of the expansive power of steam to engines, or of wireless.