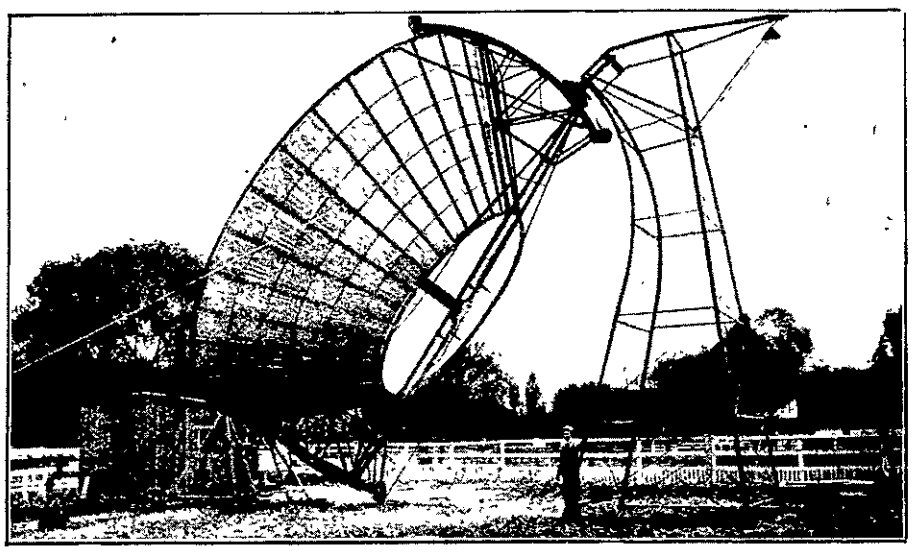
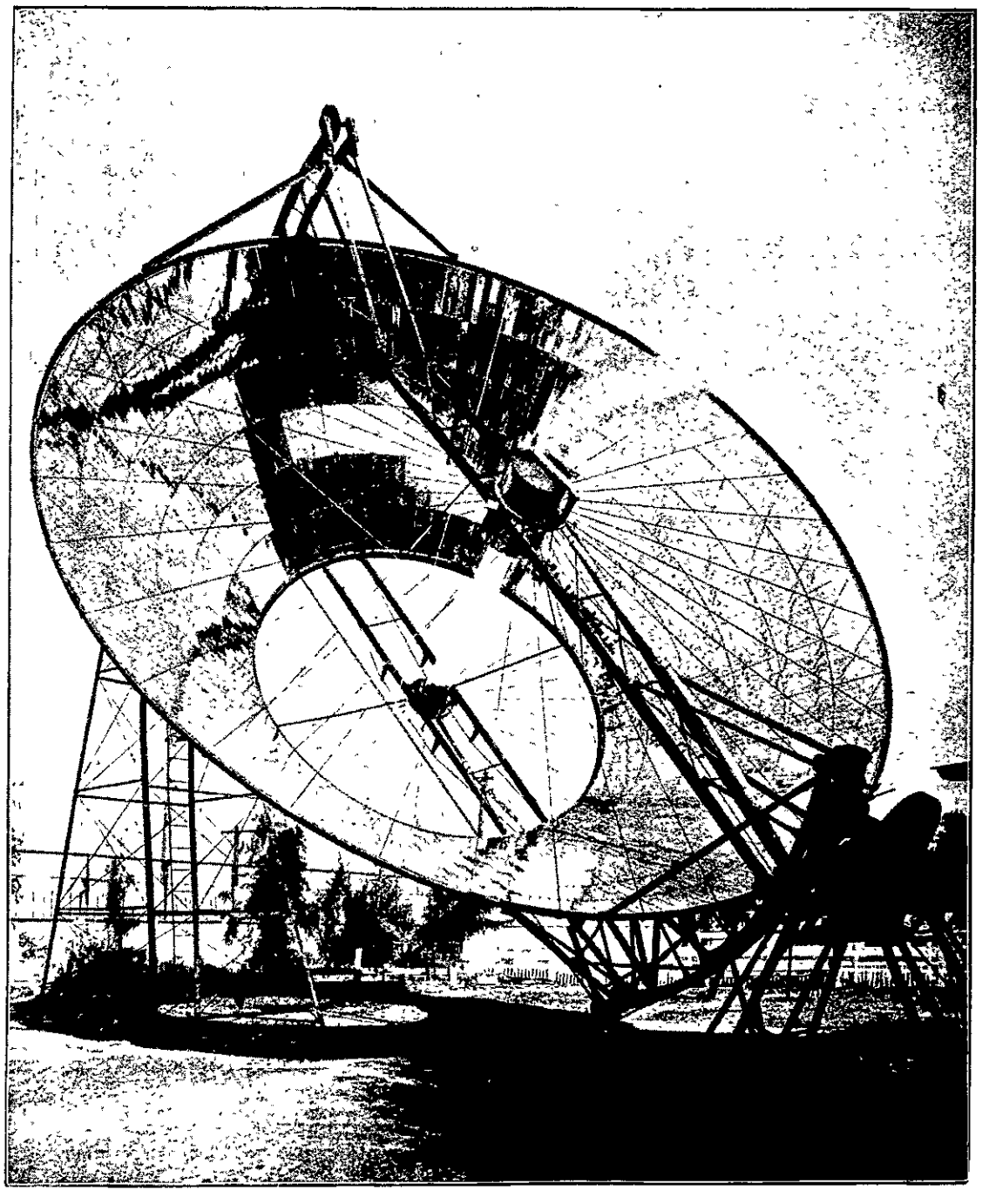
Utilisation of Solar Energy.



PREPARING FOR THE DAY'S WORK.

FOR centuries man has striven to devise a means of utilising the heat of the sun for the production of power. From this source the quantity of energy derivable is shown to be equal to 1-h.p. for about 4 square feet of receiving area. In 1670 Vilette melted silver and copper by focussing the sun's rays with a mirror. Fifty years ago a solar motor operated a printing press in Paris, and James Ericsson, of Monitor fame, is the inventor of a wonderful engine, shown in the accompanying illustrations, which has been improved and rendered more workable than at the time of its appearance in 1868. It is no exaggeration to state that this sun motor, which is in successful operation at Pasadena, California, marks an era in the world's mechanical history. By the illustrations it will be seen that the engine may be likened to an enormous open umbrella, with a part of the top cut off; or to another familiar object—a billiard-table lamp-shade. The interior forms a huge reflector, in which are 1,800 glass mirrors, each about 3-in. wide and 2-in. long; and these reflectors catch the sunshine and reflect it upon a long, slim boiler, set in the centre like the handle of an umbrella. The reflecting surface, however, must be first set at an angle to catch the rays; therefore the whole engine is mounted on a tall iron framework, like that set up for windmills, and under the bottom is an equatorial mounting, something like that used with leviathan telescopes. The solar motor is automatically balanced, the weight resting on roller bearings, so that only a few pounds of hand pressure are required to turn it in any way that may be desired. When the operator wishes to get up steam he turns a crank and swings the reflector into focus, guided by an indicator. When the focus is once obtained, the great umbrella, like a sunflower, automatically keeps its shining face towards the sun, a common clock regulating its movements. The motor works a fifteen horse-power engine employed in pumping water. In that land f almost perpetual sunshine, which was selected as the best place for its first practical trial, the reflector is focussed daily soon after the sun has risen. At first the morning dew is seen slowly to ascend from the gigantic mouth. Then the bright glasses glitter in the sun, and the heat lines begin to quiver inside the circle, the greatest commotion taking place round and about the long black water-tube boiler, which, as the intensity of the focussed rays increases, begins to glisten, so that in any photograph taken of the machine the boiler is shown almost as pure white. Within an hour of the time of turning the crank and getting the focus—provided that no clouds intervene to throw shadows into the reflector—there is a jet of steam from the safety-valve. The engineer opens the regulator, there is a succession of hisses from the umbrella handle, and the high-pressure steam is being conducted in pipes to a compound engine operating a centrifugal pump. The sun, in fact, is drawing water at the rate of 1,400 gallons a minute. This is wonderful enough in all conscience, but the ingenuity of the mechanism does not end here. The fact has already been mentioned that the reflector automatically keeps pace with the passage of the sun across the firmament but there are other labour-saving devices to be recorded The machine oils itself; the supply of water for the boiler is regulated automatically—as is also the steam pressure, which reaches its maximum with a pressure of 210-lb. per square inch—and there can be no explosion. Therefore, once started, the solar motor runs all day without any attention whatever Then when the sun sinks so low that there is no more heat, it will stop, rest over night, and all that is needed to start it when the radiant energy again asserts itself is the twist of a couple of handles It should be added that the reflector seldom requires cleaning, and this, indeed, is practically the only manual work to be done in connection with the machine. This solar engine was made in Boston, and its successful operation is the outcome of ten year's experimenting.

The utilisation of solar energy is not, however, confined to the Ericsson method, for a communication has been received from an American engineer, Mr. H. E. Willsie, 180 Broadway, New York, in which he claims to have invented, and perfected beyond the ordinary experimental stage an entirely new method of producing power from solar heat in continuous commercial quantities. A Willsie plant, it is said, will not only run night and day as steadily as a steam-power plant, but also do the same work in furnishing power for electric lighting, ice-making machinery, city waterworks, irrigation, &c. Hitherto solar motors have stopped at night and when the sun was clouded The new system, says Mr. Willsie, will run a week or more without sunshine, and the cost of storage installation be extremely small. It should last fifty years, and is practical and efficient. With this method it is claimed that a 500, or even a 1000-h.p. plant may be installed with but little more trouble than a steam plant and with nearly as much certainty of the result.



SAFETY VALVE LIFTING AT 210 LBS. STEAM PRESSURE.

The "Gardner" Oil Engine.

THE "Gardner" British-made Oil Engine, as illustrated on the cover of this issue, is the result of many years' experience and close study of internal combustion engines. There are said to be over 5,000 now at work, varying from ½ b.h.p. to 60 b.h.p.

In 1891 1600 persons owned eighteen million acres of land in New Zealand; one fertile tract, aggregating 250,000 acres, then carried only sixty-five people. In many of the resumed estates, under the closer settlement scheme, the returns have proved to be fourteen times greater than those formerly produced under land monopoly.