

WINDMILLS AND ULTRA-LOCAL AND ULTRA-OUTER WIND!

The Government Prepares to Harness the Air Currents After 20 Years' Study, and Will Use Windmills for the Storage of Electricity---Drop a Nickel in the Slot and Re-charge Your Auto!

By William L. Aldorfer

THE old adage, "history repeats itself," was never better illustrated than in some recent experiments of the government. Uncle Sam's scientists have gone back 200 years, dug up a lot of data about windmills used by our forefathers of the eighteenth and nineteenth centuries, and combining this with the latest inventions in an effort to solve the greatest problem of the age, so that 50 or 100 years hence, when all the coal and wood of the country is used up, we can fall back on the wind to furnish power for all the necessities of life. By a series of experiments just concluded, extending over a period of more than 20 years, the government shows that everything about the home for which power is required may be accomplished by using the winds.

The winds of the heavens will be harnessed and forced to take part in the labor of the universe. In the old days windmills were supposed to be good for only one thing--to raise a little water from the ground. But, due to constant effort on the part of the government, what was supposed to be a dead industry has been given new life, and even today the windmills are doing a small part of the labor of the world. This has been made possible through the great development of electric energy. And it is predicted that, even though all the coal and wood of the world does become exhausted, we shall always have the terrific forces surrounding the earth--the winds--to fall back upon for power to perform all necessary work.

Evolution of the Windmill
Many people remember grandfather's old windmill, which was looked upon more as an ornament than anything else. The evolution of the windmill is similar to the evolution of the old mill wheel, the principle of which is today embodied in the most powerful engine known to the world--the turbine, used to propel our floating palaces across the seas. The terrific power of this engine is well known, but it is nothing more than a development of the old mill wheel that used to run the mills of our grandfathers. And so it is with the windmill. What was once thought to be of little use has been shown by Uncle Sam's experts to be one of the most useful inventions of the day.

The great possibilities of the windmill of the future, as outlined by the scientists, reads like a fairy tale. It will be, and is now used, not only to irrigate millions of acres of desert land, but in addition electric power can be stored away and kept for future use for lighting the house, cooking heating, and furnishing the water supply. Even the weekly work of ironing clothes can be done by means of the windmill. Among other ideas suggested by the scientists is the establishment along all the roads in the country of electric windmill storage places, where any one operating an automobile may stop, drop a nickel in the slot, replenish the supply, and keep on going. In fact, the possibilities of this latest adaptation of the windmill are so great as to make an enumeration of the many things for which it may be used almost impossible.

Prof. P. C. Day, Uncle Sam's wind expert, has spent more than 20 years investigating the many uses of the wind. In 1892 the idea first suggested itself to him of the vast possibilities in wind power. This was being wasted simply because no accurate study had been made of its possibilities. He knew of the general impression that the winds were so variable they could not be depended upon for any length of time, but his studies proved this to be wrong. He knew that winds increased and decreased in velocity, but he was convinced there was always sufficient unrest in the air currents to maintain a good average for the day. He presented his ideas to the authorities and permission was given for him to take up a systematic study of the wind power of the United States and demonstrate his theory.

"One of the most promising fields for the use of the wind," said Professor Day, "lies in the possibilities of successfully generating and storing electrical energy, which may be used later for heating, lighting, charging electrical motor cars, working agricultural machinery, cooking and other household work, and pumping water for irrigation purposes. Electric turbines are now in successful operation in England, and there is no question that there is a wide field of usefulness open to the electric turbine in this country. It is feasible to connect a number of mills to a single storage battery. This greatly increases its power capacity and at the same time makes it possible to store up energy generated during periods of high winds for use during periods when the wind is low.

"There are many devices for the development of electric power by the winds. In order to insure the delivery of a certain amount of electric energy constantly, windmills may be supplemented by a combustion driven engine, the principle being that when the wind is strong the electric generator will be driven by that power alone. When the wind velocity falls to a point below that necessary to cause the generator to deliver the output required, the engine will automatically start and continue to drive the generator until the wind velocity again reaches the point where it can deliver the required power, when the engine is automatically cut out and shut down.

"One of the greatest uses of the wind in the past," continued the professor, "has been in navigation of the seas, but water is not man's natural element, and after ages of effort it is apparent that the navigation of the air, man's natural element, is assured. In my study of the winds I have noticed several things



EVOLUTION OF THE WINDMILL NO. 3 - 19th CENTURY - WATER ELEVATOR

that will be of great assistance to aviators.

"First, there is the effect of the increasing heat of the sun as the day advances, which warms up the earth's surface and the layers of air resting on it. As heated air expands and becomes lighter it rises, and during the hours of sunshine ascending currents rise to a great height. In the summer time these currents ascend to the tops of the clouds, which are formed by condensation of the moisture in the surface air, and as this moisture rises to higher elevations it cools by expansion and forms clouds. With the approach of night the earth cools rapidly, and likewise the layers of air. This cooling causes contraction, and as air from above descends to fill the space, there results a general descending movement of the atmosphere during the night hours. This latter motion is not so pronounced, however, as the ascending day currents, and the vertical stability of the air is greatest during the coolest part of the day.

"It is especially important that aviators should escape these ascending and descending currents as far as possible. This can be accomplished in a measure by rising to the higher elevations during heated portions of the day, while during the early morning and late afternoon hours it is feasible to fly much nearer the earth's surface.

Growth of Wind's Importance
"It is almost impossible for me to enumerate all the uses to which the winds may be put to serve the needs of man. Air in motion is a vehicle of energy, whose power depends upon its rate of movement. It has been a potent agent in the work of leveling mountains and filling the valleys of the world's moisture from sea to land, water, electric turbine from one to the other loose fragments of rock, and great areas of the earth's surface have been covered by this action. It transports its moisture from sea to land, water, electric turbine from one to the other loose fragments of rock, and great areas of the earth's surface have been covered by this action. It transports its moisture from sea to land, water, electric turbine from one to the other loose fragments of rock, and great areas of the earth's surface have been covered by this action.

"Man has made use of this force from the earliest periods of history for harnessing it to perform useful work. The development of this force of its power may be traced by comparing the rude sail raised by primitive man to assist him in propelling his craft by a small stream, or from island to island, with the full rigged ship of the present day, as it proudly moves from some great harbor, laden with a mighty cargo, to cross the widest ocean. Likewise may we compare the cumbersome wooden windmills of the earlier settlers of our own country with the powerful steel mills of the present day.

"The uncertainty of continuous or sufficient wind movement when urgently needed has always militated against a more extensive use of this natural source of power in labor saving devices, but there is much work that can be economically performed by the wind, especially since there has been such great development in the use of electricity.

Useful in the West
"While the windmill as a power producer is in successful operation in near-



EVOLUTION OF THE WINDMILL NO. 4 - 20th CENTURY - UNCLE SAM'S TESTING STATION AT CHEYENNE, WYO.

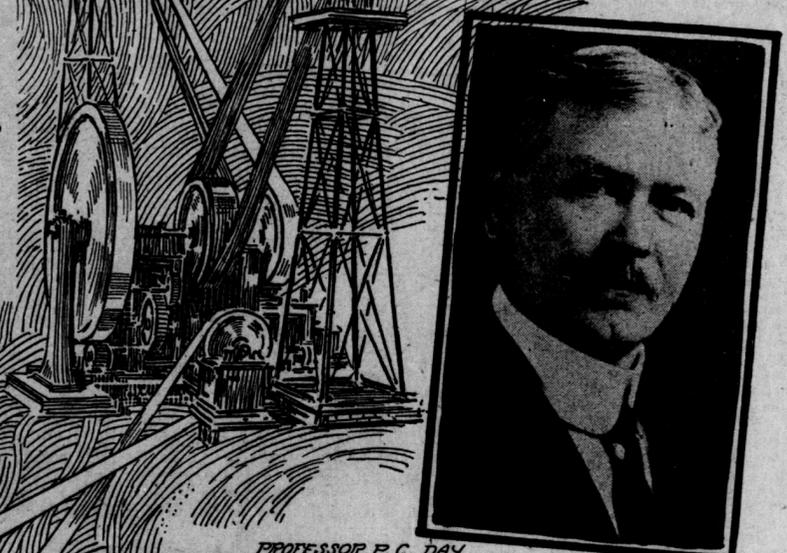
all parts of the country in a small way, there are a few sections where the average wind velocity near the earth's surface is so low that only the very lightest kind of work may be accomplished, and during much of the time no work at all is possible. On the other hand, there are large areas where its strength is such that mills may be relied upon to furnish all the power wanted.



EVOLUTION OF THE WINDMILL NO. 2 - 18th CENTURY

where there are few portions of the country where intensive farming is practiced that a small irrigating plant maintained by wind power would not be at critical periods prove a valuable adjunct to the more extensive field operations. Along nearly the entire coastline of the country, at the higher elevations in the mountain districts, and over much of the great prairie regions of the country the velocity of the wind during some portions of the day is nearly always such as to produce power sufficient for all forms of work.

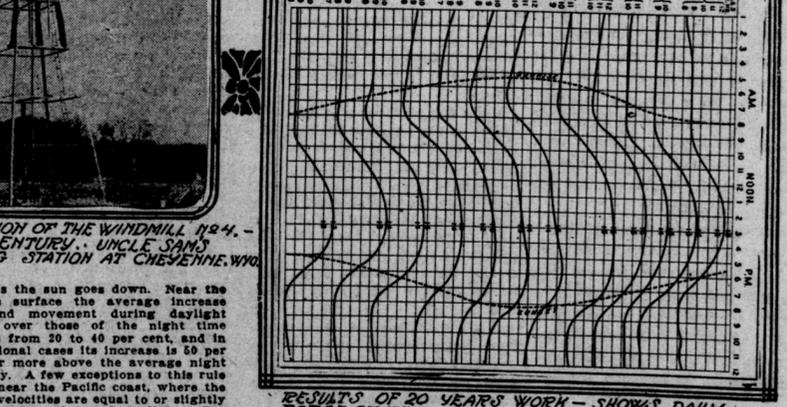
"My chief study has been to learn the average daily wind power, so that any one might know just how much wind could be counted on from day to day. I have found the average daily winds near the earth's surface for each hour of the day and each month of the year for the last 20 years. The wind rises regularly with the increased power of the sun's advancing heat each day and



PROFESSOR P. C. DAY



EVOLUTION OF THE WINDMILL NO. 1 - 17th CENTURY



RESULTS OF 20 YEARS WORK - SHOWS DAILY FORCE OF WIND NEAR CENTER UNITED STATES

mountain regions. These winds frequently follow within a short period after the blizzard, and the first gentle touch of their warmth is like a summer zephyr as compared with the intense cold previously prevailing. They begin usually as light breezes, but frequently increase to high velocities, their warmth and dryness rapidly melting or evaporating accumulated snow, and making it possible for domestic or other animals exposed without shelter to secure food and obtain rest from their fight against the cold. Were it not for the occasional occurrence of these warm winds, animal life could not survive the severe winters of that region without special protection and an adequate supply of stored food.

"There is another peculiar wind known as hot winds. These pass over the southern plains regions and sometimes extend far into the middle states during the warmer months of the year, blowing generally from the southwest with great force. In many cases they have been described as similar to a blast from a hot furnace, absorbing the moisture from the soil and literally drying up vegetation as it stands in the fields. Immense damage has been done in a few hours by these winds, and much suffering to human and animal life from the abnormally heated atmosphere. The damage to crops has been so widespread as to constitute a national calamity.

Along with the study of the winds, Uncle Sam's scientists have been patiently at work with kites and sounding balloons, and with wind gauge ther-

omometer and barometer charting the aerial sea.

Because of his long study of the winds, Professor Day believes the time is not far distant when our people will take advantage of this new source of power which may be had for the asking and as coal and wood and oil become more costly, the attention of the people and the inventors of the country will turn more and more to this virgin field, with results that would be hard to appreciate at the present time. He points to the development of the aeroplane and the balloon, the wireless telegraph, wireless telephone, the taking of pictures by wireless, the aeroplane, and cites these as instances of man's remarkable conquest of the air. So he predicts if all these are possible, why should man not obtain all the power he wants from that same atmosphere?

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