

# PUTTING THE WINDS TO WORK.

## When World's Fuel is Gone The Elements Must Toil for Us.

Government Scientists Complete Investigation After More Than 20 Years—Winds of Country, With Tremendous Power, Going to Waste—Vast Possibilities of Future—Expert Tells of Work.

### Evolution of the Windmill—18th Century

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 18th and 19th 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 windmills are doing a small part of the labor of the world. This has been made possible through the great development of electrical 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.

**The 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 doubtful if many people know that 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 washing and ironing may 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 electrical 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.

**Professor Day's Researches.**  
Professor P. C. Day, Uncle Sam's wind expert at Washington, 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 power 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 but 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.

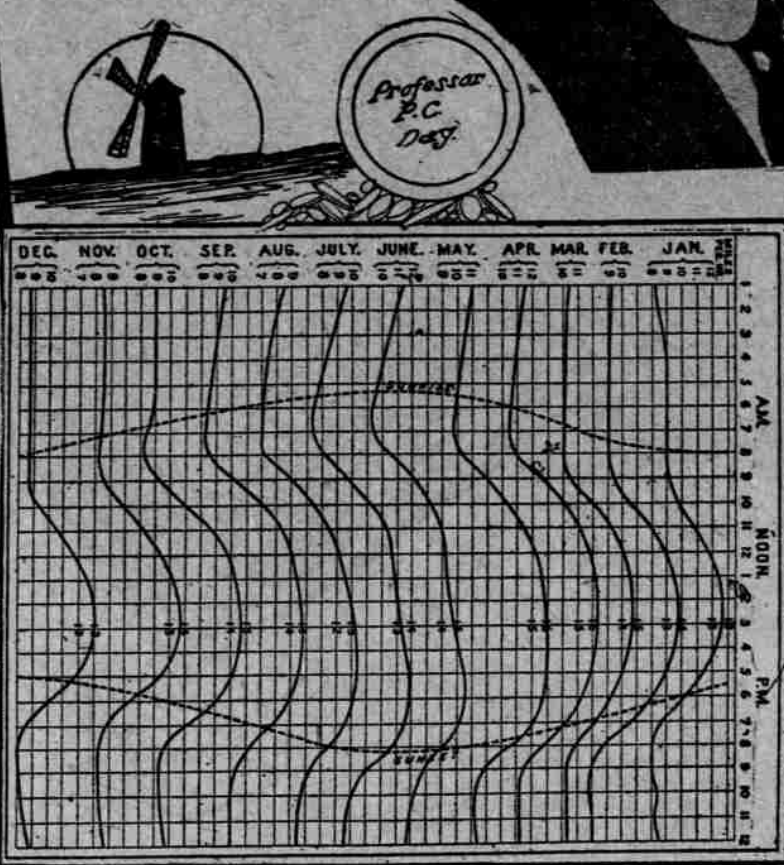
**Air and the Aviator.**  
There are many devices for the development of electric power by the winds. In order to insure the delivery of a certain amount of electric energy constantly, windmills may be supplied by a combustion-driven engine, the principle being that when the wind is strong the electric 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 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



19th Century Windmill and Water Elevator



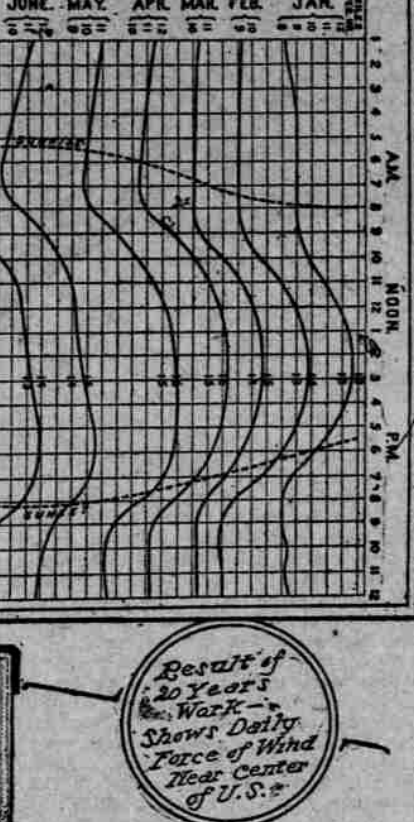
20th Century—Uncle Sam's Testing Station at Chazy, N.Y.

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



Professor P. C. Day

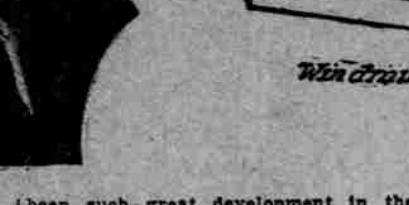


by rising to the higher elevations during heated portions of the day, while during the early morning and late afternoon hours it is feasible to fly much nearer the earth's surface.

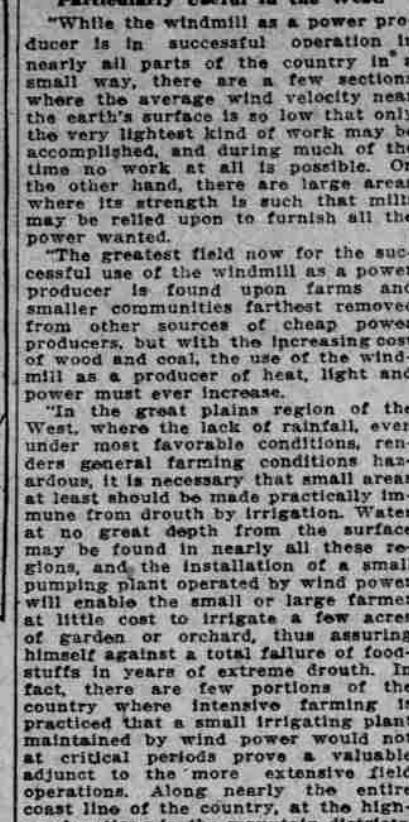
**Growth of Wind's Importance.**  
"It is almost impossible for me to enumerate all the uses to which the winds may be put to serve the needs of man. Air in motion is a vehicle of energy, whose power depends upon its rate of movement. It has been a potent agent in the work of leveling mountains and filling the valleys of the earth by sweeping 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 moisture from sea to land, watering the earth and forming rivers. It scatters the seeds of plants and trees far and wide, and thus fosters the distribution of vegetable life.

"Man has made use of this force from the earliest periods of history by harnessing it to perform useful work. The development of a knowledge of its power may be observed by comparing the rude sail raised by primitive man to assist him in propelling his dugout across a small stream, or from island to island, with the full-rigged ship of the present day, as she 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 the 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



Professor P. C. Day



been such great development in the use of electricity.

**Particularly Useful in the West.**  
"While the windmill as a power producer is in successful operation in nearly 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.

"The greatest field now for the successful use of the windmill as a power producer is found upon farms and smaller communities farthest removed from other sources of cheap power. Producers, but with the increasing cost of wood and coal, the use of the windmill as a producer of heat, light and power is ever increasing.

"In the great plains region of the West, where the lack of rainfall, even under most favorable conditions, renders general farming conditions precarious, it is necessary that small areas at least should be made practically immune from drought by irrigation. Water at no great depth from the surface may be found in nearly all these regions, and the installation of a small pumping plant operated by wind power will enable the small or large farmer at little cost to irrigate a few acres of garden or orchard, thus assuring himself against a total failure of food-stuffs in years of extreme drought. In fact, there are few portions of the country where intensive farming is practiced that a small irrigating plant maintained by wind power would not at critical periods prove a valuable adjunct to the more extensive field operations. Along nearly the entire coast line 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.

**Average Wind Power.**  
"My chief study has been to learn the average day wind power, so that any average day wind power 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 falls as the sun goes down. Near the earth's surface the average increase in wind movement during daylight hours over those of the night time ranges from 20 to 40 per cent, and in exceptional cases the increase is 50 per cent or more above the average night velocity. A few exceptions to this rule occur near the Pacific Coast where the night velocities are equal to or slightly greater than those of daylight. For high elevations, like Pike's Peak in Colorado, the daily march of the winds is reversed from that near the surface, and the night velocities exceed those of the daylight hours.

**Blizzards and Hot Winds.**  
"My work has proved that during daylight the average velocity of the wind rises to 10 miles per hour or more over large areas of the country and falls as the sun goes down. Near the earth's surface the average increase in wind movement during daylight hours over those of the night time ranges from 20 to 40 per cent, and in exceptional cases the increase is 50 per cent or more above the average night velocity. A few exceptions to this rule occur near the Pacific Coast where the night velocities are equal to or slightly greater than those of daylight. For high elevations, like Pike's Peak in Colorado, the daily march of the winds is reversed from that near the surface, and the night velocities exceed those of the daylight hours.

**Study With Kites and Balloons.**  
Along with the study of the winds, Uncle Sam's scientists have been patiently at work with kites and sounding balloons, and with the use of a thermometer and barometer charting the aerial sea.

At the Weather Bureau is a general map showing the extent of man's small triumph over upward space. One picture shows the dirigible and a rainy nimbus floating at the height of a mile, the aeroplane soaring among the clouds at two miles—for the aeroplane it is now more than two and one-half miles—the highest human perching on nothing at the altitude of three miles where the curve of the horizon is visible. The highest of all, the spherical balloon, the 1901 record of which just grazes the 30 below zero curve of six and one-half miles.

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 will turn more and more to this practically virgin field, with results that would be hard to appreciate at the present time. He points to the development of the wireless telegraph, wireless telephony, the taking of pictures by wireless, the aeroplane, and cites these as instances of man's power to conquer 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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# TOLD BY THE SHERIFF—A STIRRING, ECYEN, DRAMA

BY W. T. FERNANDEZ.

"HAT is a rustler?" asked the Doctor, as Sheriff Bill Jeffords, sun-browned, booted and spurred, a murderous glint along each hip, flipped his sombrero on one chair and deposited himself in another.

"No-holdup," answered Bill, stuffing a short pipe with cut plug. "That gang what held up the Overland a few days ago. Had to chase 'em 30 miles into the hills before we could convince 'em they were our game, an' then had to plant three of 'em out there. The boys are fetchin' the other two, a little the worse for wear, down to the calaboose. Curious how things keep a comin' up after a fellow's almost forgotten 'em. A story'll begin in Texas an' wind up in Alaska, an' its mighty disturbin' to meet the son in Arizona of the fellow you had to hang in Montana, but it's a cussed small world an' I found it out again today for about the four hundred and fifty-fourth time, by comin' across a woman's picture on one of those gins coiled."

The Doctor pricked up his ears. The Sheriff's yarns were drawn from a varied experience as scout, cowboy and Indian fighter, and always showed, like a flash of Summer lightning, a thread or two of the fiber that made to make up the men of the frontier. A terror to evil doers was Sheriff Bill, but he had never harmed a fallen man and never feared a strong one. Hurrying the completion of the prescription he was mixing, the physician went his boy off to the patient's house with it, and suggested that the Sheriff fire away with his yarn.

"Well, Doc, as I said, when we searched the two gins, I come across a picture on one of 'em that took me back 15 years, when I was a Captain of Rangers down in Lone Star country. Those were lively times, Doc, what with Infans, rustlers an' Greasers, not to mention gangs of boozey cow punchers what'd tear into a town an' paw it up to see what made it grow an' shoot out all the mirrors in the

well gin emporium of the said town. IAT is a rustler?" asked the Doctor, as Sheriff Bill Jeffords, sun-browned, booted and spurred, a murderous glint along each hip, flipped his sombrero on one chair and deposited himself in another.

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quietly an' just said, 'I don't want to expose your whole force, Captain. A few men can render me enough help until the relief comes from El Paso.' 'I give you 15,' I said, an' the rest of us will straighten up the Rio Grande for a general bit.' I put it up to the tribe for 10 volunteers to go with the tribe that had been picked out first, an' told them to form one yard forward. The whole column moved forward, an' when the First Luff looked at them a moment later the column was as solid as before.

"Well, damn my eyes!" he bawled. 'Ain't there a man in the whole bunch?' An' with his neck an' face the color of a turkey gobbler's comb, he reaches for a gun. 'Oh, shut up, Jim,' I said. 'They've all offered for the job.' That closed him out.

"The fifteen went off with the padre, an' the rest of us got busy around the town. It only covered about an acre.

"I picked him up and carried him down to the creek an' sprinkled some on his face, the First Luff fetched some chicken broth in a pannikin an' hustled off to the medical chest—we did our own doctorin' in the Sunday school days—for some whiskey. I got a few drops down his throat, an' in a few minutes he opened his eyes an' said something about bein' thirsty. I gave him a drink when they needed him most. I don't know just why he called them Greasers, 'cause a Greaser's a Greaser, an' if I was goin' to call him any other name, I'd call him a snake. But it seemed to worry the Padre a heap, an' then he said he'd hate to die without the consolation of the rites of his church.

"Oh, damn my cats, Padre," I said. 'You're not all in yet, by a jugful. Brace up, man, we'll get you to camp, an' a few hours' rest will do you a heap of good. Have a good sleep an' you'll be as good as new.' But he said that, an' he said that, an' the big team 'an

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We corralled some chickens an' soon had a chicken dinner with corn cakes an' coffee for the sick folks, an' mighty glad they was to get it, too. The Padre tried to do the cookin' nussin' an' everything else, but it was a little too much for him.

"We'd pitched camp a short ways out of town an' shortly after midnight the grub in, I saw the Padre headed our way. 'Got it,' says I to myself, as I started toward him. He waved me back, sayin' he'd just come from a sick boy an' I might get the smallpox from him, but I wasn't worryin' about that, 'cause, you see, Doc, I'd taken a great shine to that Padre. From what the boys had told me when they came out for the grub, that man was a 'white' man all the way through, an' while I don't go much on 'key pilots,' I'll take off my hat to the kind of 'key pilot' he was in any county I meet him. It ain't the kind of pious talk a fellow puts out, Doc, but the way he lives it that keeps the herd straight, an' the Padre showed down—that's what he did. I just got to him in time to grab him as he collapsed. He was clean played out, an' bein' a sickly kind of man, was no way fitted to do all that he did before he got word up to El Paso.

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down his cheeks at the thought of leavin' his sick Greasers when they needed him most.

"The Padre, I felt pretty darn bad myself, Doc, 'cause you see, I was sort of in the dark about the rites of his church, an' so I couldn't make an offer of puttin' him over the 'Divine' story, he had gathered around. He rested a minute after swallowin' the broth, an' then began to talk in a weak voice.

"He told me the woman had been his wife some years before, an' instead of raisin' a family as a decent woman should, she'd just raised the devil, an' would up by skippin' out with a cattle rustler, an' takin' her life. He said he could get no trace of her anywhere, an' broken-hearted, he had joined a brotherhood of priests that were tryin' to keep the Greasers straight, an' he had been until just before the smallpox hit his town, when he heard she had come back to El Paso an' was stayin' at a joint that wasn't in the Sunday school line—not by a jugful. He'd made up his mind to get the boy away from her, an' was just ready to go to the courts when the smallpox hit his town, an' he had to tie the town there. He gave me a message of forgiveness for her an' to tell her to bring the boy up decent an' try an' make a 'white' man of him.

"Well, the good padre didn't last long. He was just worked an' worried to death. His heart went back on him along toward sunset an' he died, with his crucifix against his lips, an' a smile that was just like a mother's blessing. We buried him alongside his church, in a shady spot where the birds he used to feed could sing to him all day long.

"Not havin' any Catholics in the bunch, eight or 10 of them bein' Protestants an' the rest heathens, we were

kind of stood up as to the proper kind of send-off to give him, until Jim Thompson, the First Luff, an' Daggonne, I, Cap, he was a ranger of the sort, wasn't he? We'll give him a soldier's funeral! An' we did, with three volleys an' 'Taps' at the wind-up.

"The doctor an' I came a few days later, an' we pulled our freight for El Paso. I hunted up the woman, an' she was a sizzler all right. Must have been a fine woman, an' more to the point, but what with booze an' a continual raisin' of the devil she made a mighty tough showdown when I struck her trail.

"She laughed in my face when I gave her the good padre's message about the kid, an' said she'd raise him any way she darned please, an' when I pointed out to her that it'd be considerable difficult to keep a boy straight in the bunch she was runnin' with, she laced into me with all kinds of abuse. I never said my hands on a woman yet, Doc, but I came mighty near it that day an' I gave her some Texas talk that didn't put any polish on her kind.

"Well, then, Doc, 'cept that one of the fellows that's gone down to the calaboose is the padre's son. He'd kept the picture I carried to El Paso years ago, 'cause he had the same writin' of his father's on the back. The boy's kept straight in spite of his mother, an' older heads led him into the holdup, 'cause he had a talk with him about his father an' if you should hear a fellow hittin' the breeze for the county line about moon-up tonight, forget it, 'cause he'll be on the Sheriff's best bronc an' I s'ort think 'twill kind the padre to know the boy's been given a chance."

The Sheriff looked off toward the snow-capped hills, as he finished, and said meditatively: "A Ranger of the Lord, yes sizzles—that's what he was—an' his smile was just like my old mother's blazes that's stuck to me all these years."

The doctor looked at the sun-browned, square-jawed face and caught a light in the keen, gray eyes, that revealed to him why the Sheriff was called "white" by every man, woman and child in the county.

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