

points out that aerial photographs of the edge of the shadow cast by the moon will help materially in determining whether the moon arrives at the times predicted by the astronomers.

The possibility of eclipse observations from the air was pointed out before the California eclipse of last year by Col. John Millis, U.S.A., retired, and airplanes of the Navy and the Army were in the air during that event. Clouds and the speedy movement of the airplanes prevented results of scientific value being secured then but use of lighter-than-air craft is expected to bring better results.

The fact that this event will occur in the morning at about 9 o'clock and the desirability of reaching as high an altitude as possible has also resulted in a decision to reduce the crew of the airship to a minimum and limit the number of astronomers to be carried aloft.

The buoyancy of the dirigible will be decreased by the low temperature of early morning and the lack of sunshine. The great cigar-shaped ship will steal out of its giant hangar at Lakehurst before daylight on the morning of the eclipse in order that it may climb high above any clouds that might obscure the eclipse and station itself some distance out to sea where the time of total eclipse is longer. It is probable that only six or seven scientific observers, under Capt. Pollock's direction, will be accommodated.

"ROTOR" SHIP OPERATES ON BASEBALL PRINCIPLE

A 70-year old scientific principle, easily understood by anyone who knows anything about baseball, is the trick that underlies the new "Rotor" ship invented by Anton Flettner, according to German engineers and scientists who have examined the sensation-causing craft. The smooth surfaces of the great cylindrical "rotors", spinning in the wind, increase pressure on one side and decrease it on the other, just as the surface of the rapidly rotating baseball piles up a difference of pressure on its two sides and causes it to drift into a curve.

That, say the scientists, is all there is to it. The persistent stories of a "windmill ship", whose towers are somehow turned by the air currents, or which contain inside their smooth walls paddlewheels that are so turned, and which drive underwater propellers, are all imaginative and incorrect attempts to explain a very simple thing that looks mysterious just because it is unfamiliar in its present application.

The two tall, cylindrical objects that look like immense smokestacks, are the only propellers the ship needs. They are spun on their axes by small electric motors-- 20 horse power is all the present ship employs. As they spin, they tend to carry a layer of air around with them. In calm weather, this air would simply keep rotating about with the rotors, and nothing would happen. But when a wind is blowing, which would split and flow equally on both sides of the rotors if they were stationary, more of the air is turned with the direction of rotation than against it. That is, the wind is split unequally. The part that travels along with the surface of the rotor blows faster, momentarily, than the part that travels against the direction of motion of the other side. The wind that has its motion slowed down naturally tends to pile up pressure at the point where the slowing occurs, while the wind that is helped to flow faster tends to lower pressure at the point where the "boost" is given. When the wind is blowing across the ship, the rotors are revolved in such a direction that the pressure will be built up behind them and lowered in front, so that the craft moves forward.

This effect is known variously as the "Magnus" and the "Bernouli" principle, from the scientists who first made critical examinations of the phenomenon, in the middle of the nineteenth century. It has been noted in the drift down the wind of rapidly rotating rifle bullets and artillery projectiles, and all army range tables allow for it. But Herr Flettner is the first, so far as known, to attempt a commercial application.

One incidental advantage is claimed for the rotor ship that sets it ahead of either steam or sailing vessels. It can be turned on its own center by rotating the towers in opposite directions. It is claimed also that the ship can be stopped very quickly by reversing the direction of rotation of the towers. This is somewhat analogous to the stopping of a steamer by reversing the screw, and is a feature absent from sailing ships. There has been considerable question as to the stability of a rotor ship in a storm, but the inventor claims that the surface exposed to the tempest by the rotors is not so great as that exposed by the bare rigging of a close-reefed sailing ship.

Since rotor ships must have wind in order to move, they would be competitors only of sailing ships. Since the pressure difference must always be built up by a wind blowing across the ship in order to move it forward, the rotor ship is like the sailing vessel in that it cannot sail directly into a head wind, but must tack across it. The sailing vessel has the advantage when the wind is directly astern, for then it can sail directly before it, whereas a stern wind is almost as useless to the rotor as is a head wind.

But Herr Flettner claims that this slight advantage is offset by the greater speed of his vessel, by its greater cheapness of construction, and above all by the very small crew required as compared with the men on a sailing ship. He states that operating costs for a rotor ship should be eighty per cent. lower than those for a sailing ship of the same tonnage.

The ship used in the demonstrations of the new device is the yacht "Buckau", of 600 registered tons, built by the Krupp-Germania shipyard at Hamburg. The rotors are tall cylinders of sheet iron, approximately nine feet in diameter by sixty in height, one located forward and the other aft, and geared to turn on a central shaft by electric motor drive. The trial trip, which Herr Flettner claims was a full success, was made from Hamburg to Eckernfoerde. He states that a speed was attained, with the rotors running on 20 horsepower, equivalent to that of a screw-driven ship of the same size running on 1000 horsepower.

Herr Flettner is an engineer with at least one successful invention to his credit already. During the world war he devised a type of balanced rudder for aircraft, which by employing small auxiliary vanes caused the main rudder surface to turn itself by the force of the air current as it streamed past. This device, which required but little muscular force on the part of the pilot to operate it, has since been widely adopted in airplane construction, and has also been modified for use on ships. It was in an endeavor to adapt the same idea to the handling of sailing vessels that Herr Flettner was led to the application of the Magnus principle and the invention of the "rotor".

The inventor is now raising funds for the construction of a 10,000 ton ship which he states will make the pioneer voyage to America.

Government scientists in the Bureau of Standards, the Weather Bureau, and the Navy Department, have adopted an attitude regarding the Flettner invention, which though not entirely skeptical is distinctly cautious. The Magnus or Bernouli principle, they say, is commonplace and perfectly well known; but preliminary calculations,

based on formulas known at present, do not seem to indicate the development of very large amounts of power. They are for the most part adopting a "watchfully waiting" attitude.

NEW MECHANICAL LARYNX HELPS DUMB TO SPEAK

Three mutes, deprived of their voices as an unavoidable result of operations for cancer of the throat, spoke distinctly and clearly before an audience of medical men, using an artificial larynx, invented by Dr. John E. Mackenty of New York.

Sufferers from cancer of the throat have heretofore been able to save their lives only at the expense of their voices, for the radical operation necessary in such cases necessitates the destruction of the vocal apparatus, and after recovery the patients must breathe through an opening in the neck. The new device is strapped over this opening, and receives air which it sets into vibrations similar to those caused by the natural vocal cords. This vibrating column of air is carried to the mouth by a small tube, and there modified into human speech by the lips and tongue. The result differs from ordinary speech mainly in that it is a monotone.

The new device, according to Dr. Mackenty, represents practically a philanthropic contribution to mankind. There are so few persons who require it, and the possible sales are so far between, that his efforts to interest manufacturers to develop the idea met with no response. Finally, executives of the laboratories maintained by the American Telephone and Telegraph Company and the Western Electric company decided to undertake the work, even though no certain return of their expense was in sight. Using the knowledge of human speech acquired in their telephonic studios scientists of these laboratories have now produced a device which will enable many unfortunate people to talk again.

Not only will the artificial larynx add to its users' happiness and earning power, but it will remove one barrier to the proper treatment of cancer of the throat. In the early stages of the disease, when a radical operation offers a practical certainty of cure, sufferers have often hesitated because they dreaded the loss of their voices. Delay, even while trying other treatments, has usually allowed the disease to progress to a point where cure is impossible. With the fear of future silence removed, Dr. Mackenty believes that sufferers no longer will risk their lives, but will have the cancerous tissues removed and do their talking with an artificial larynx.

ANARCHY IN THE HUMAN BODY

By Dr. Edwin E. Slosson.

The human system is ordinarily a well ordered empire. The numerous organs and innumerable cells carry out their diverse duties in close cooperation due the subordination to the central powers. If the body is attacked, say, by the cut of a knife or an army of microbes, the blood cells hasten to fill up the breach in the wall or to overpower the invading host. Because of the vigilance and well regulated activity of the cells, the ravages of wounds and disease may be staved off for seventy years or longer. And physicians have found that they can aid the