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New Radio Marvels Expected from Giant Mystery Valve

EXTRAORDINARY results already have been secured from the experimental construction of a giant valve to handle 15 kilowatts of power on a wavelength of only six metres. This work has been carried out in the laboratory of the General Electric Company at Schenectady, and it is impossible to predict what will eventually be the outcome of this new work. Amongst other phenomena observed as within the capacity of this valve is the ability to warm the blood of humans within reach, to cook a sausage hung from the aerial, and to kill rats long exposed to the valve's rays. This article, by Robert E. Martin, in the "Popular Science Monthly," will convince readers that we have barely crossed the threshold of radio knowledge.

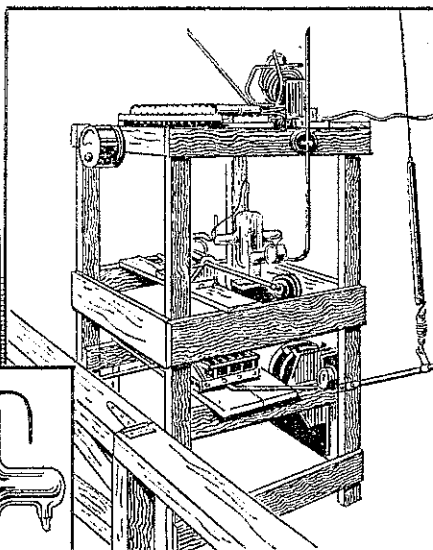
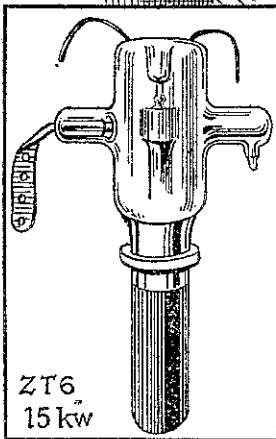
INSIDE the encircling black wire grating of a shortwave radio research laboratory, engineers of the General Electric Company, at Schenectady, N.Y., have just turned loose the most wonderful radio tube in the world—the mystery "ZT-6." And while experts are still trying to account for the startling events that occur when its short waves run wild, engineers under the direction of Dr. W. R. Whitney are launching a new investigation with longer radio waves that promises fresh wonders.

Electric lamps glow without sockets or wires when near the mystery tube. Meters in rooms all over the building run wild. Approach the glass flask when its current is on, and you will feel yourself being baked from the inside out. Apples and sausages, placed on a copper rod "antenna" which is a duplicate of the tube's transmitting aerial ten feet away, are cooked to a turn in a few seconds! Sparks appear out of thin air to crackle about the wire netting that incloses the laboratory; and the engineers stand on wooden platforms because there is metal in the reinforced concrete floor. A metal bar lying on the floor blisters the hand that picks it up, though the bar is cold.

NO one could foresee what would happen when an engineer pulled the switch that set the five-inch-thick, two-foot-high ZT-6 tube glowing in its wooden cage at the south side of the laboratory. That was what Dr. Whitney wanted to find out. Weak radio waves, when their length is short, compared with the quarter-mile waves that broadcasting stations use, are known to perform feats that seem magical to the layman. Only last year Dr. Phillips Thomas, research engineer of the Westinghouse Company, lighted lamps by radio to demonstrate the possibility of radio power transmission—he used extremely short waves produced by a "mouse-power" tube of a mere thirty watts power. But Dr. Whitney strove to create, and try out, a tube that would loose short waves of enormous power simply to see what they would do. His new ZT-6 tube is a titan that hurls into the ether fifteen thousand watts of power—probably fifty times as much as has ever jarred a laboratory on as short a wave as it generates, and enough to kill rats placed in a cage near the mystery tube.

Even now that it has been tested, its possibilities are still unknown. Will it prove the long-sought key to radio power transmission? Does there lie hidden within it the principle on which may be based some future terrible "death ray?" Dr. Whitney, director of the research laboratory in which the tube was developed, warns against such sensational conclusions at this time. "No one can safely predict or promise a utility for such new things," he says. "It is clear that further experiments must first be carried out." Only one prediction he is willing to make—the surprising fact that medicine may have a new tool in the ZT-6 tube.

The valve below radiates 15 k.w. of power at 50,000,000 waves per second.



The mystery tube in its wooden cage with the maze of equipment that feeds its tremendous power. The copper bar with its glass insulator at the lower right is the transmitting aerial of the strange ZT-6.

PERSONS approaching the tube have felt a warm glow not unlike that produced by an alcoholic stimulant—and, if they remained too close, pain in their limbs and joints. With a doctor present, several laboratory workers volunteered to stand in front of the tube for tests of its effects on them. In fifteen minutes' time, the physician had observed what were probably the first cases on record of artificial "electric fever." The subjects' blood temperature had risen to nearly 100 degrees before the tube was shut off. "Fever is sometimes artificially produced to start convalescence," Dr. Whitney points out, "and it may be assumed that if we had here a perfectly harmless method for warming the blood it might have value."

Fruit flies, and also rats, were placed before the tube in an effort to learn more about the strange radiations. When a cage of rats was placed near the antenna that hurled the tube's waves into the air, the rats became excessively animated. Exposed longer, they died.

Engineers set about finding why the mysterious waves warmed the blood. They placed vessels of salt water near the antenna, and found that when the solutions were of similar consistency to human blood—with about one teaspoonful of salt to a pint of water—they, too, grew hot under the radio bombardment. Salt water would do, then, as a substitute for blood in the unique tests of the new tube.

The tests disclosed that, at the extremely short wave length of six metres—a wave no longer than the laboratory itself—the salt water reached its greatest heat.

AT the particular wavelength of six metres, the human blood becomes a veritable electric network teeming with stray currents. For the comfort and safety of the experimenters, therefore, the tube has been readjusted to produce a longer, and hence harmless, wave. All the weird phenomena have not yet been photographed for scientific record. Some of the most spectacular ones, though, have been recorded.

Picture a dazzling, spluttering plume of greenish-white electric flame, hurling molten copper in all directions, until it is blown out! When the experimenters touch a metal-tipped pole to the copper transmitting aerial—or even to the receiving rod, connected only invisibly, by radio, to the glowing tube ten feet away—this electric flame, more than two feet high at the transmitting end, shoots into the air! They take the pole away. The mysterious flame remains, spluttering as it melts the copper bar. It resembles the "ball of fire" reputed to accompany tropical thunderstorms. By skilful manipulation they raise three or four such flames on a single rod. Some are higher than others, and their heights make a spectacular graph of the voltage or electrical pressure at points along the rod!

Not an electrical instrument in the entire building that houses the shortwave laboratory can be used while the ZT-6 tube is in operation. Through walls and ceilings, delicate measuring instruments feel the tube's force. Their dial needles quiver and run wild, just as the compass plays strange pranks during a brilliant display of northern lights. The story is told of a man who came into the laboratory with a wave meter, a delicate radio instrument. Suddenly the wave meter he was holding became red-hot and blew up!

When a sausage, placed in a glass tube, is hung from the copper bar that serves as a receiving aerial, it immediately begins to steam. A few seconds later, it is beautifully cooked by the stray electric currents that have coursed through it. An apple impaled on the rod is speedily baked. Cookies are baked in other tests with slightly altered apparatus.

THE wonder room where these things happen is a bare-looking, screened laboratory; inside its sliding door wooden tables stand piled with electrical apparatus, while wooden gratings bridge the concrete floor between them. The tube rests in its framework cage, surrounded by an intricate-looking maze of wires, condensers, and oscillators that feed it its titanic power. Beside it hangs the ten-foot, horizontal piece of copper tubing that projects its mysterious "rays" straight through the air, to be picked up by another ten-foot rod four or five paces away, mounted upon a table. This is the rod on which the experimenters cook sausages and fry eggs.

Not very different in appearance from the ordinary high-power vacuum tube that radio broadcasting stations use is the new ZT-6, or high-frequency tube as it is called because of its fifty-million-wave-a-second speed. Its ability to pack its whole fifteen kilowatts of power—enough to light brilliantly half a dozen dwellings and run their toasters and vacuum cleaners as well—into the short wave length of six metres is the real secret of its astounding effects.