

V



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ELECTRONICS—The New Science

"THIS is Aladdin and a lamp. This is Icarus, rising to the sun. This is Midas, and Mercurius, and Paul Bunyan. This is a boy on stilts. Again, this is Herschel, scanning the clustered skies; Marco Polo, Priestley, Lister. . . . This is a striving in the heart. This is Electronics!"

IN such language as that quoted above, a new science is being proclaimed to Americans, and to the world. "Electronics" may soon be as much a household word as "plastics," and now is the time to separate the bragging and ranting from the quiet revolution that is going on in the laboratories. Periodicals and newspapers in England and America have already begun to explain to the layman the significance of some of the recent discoveries that have been accelerated by vast wartime research, although their possibilities have been known for 20 years or more.

The layman's first question might be: "What is electronics?" and he might be told in the words of an expensively illustrated booklet recently sent to *The Listener* by General Electric Company, Schenectady, New York:

"Electronics is the science of the electron—a tiny, invisible particle of pure electricity, the basis of all familiar matter. A rose bush, the planet Jupiter, a child's blue dress—everything in the universe—is formed of an incomprehensibly vast number of electrons, whirling around their nuclei. Only within the last two generations has science discovered how to control electrons by the vacuum tube, and put them to work for the good of mankind. To-day, through electronics, tiny marks on a strip of film become the voice of the Hollywood actor on the screen astronomers, calculating by electronics, can measure iron in the dust of interstellar space."

The layman still seems puzzled, and he remembers the definition of an atom given to him at school: "The smallest indivisible particle of matter." The Concise Oxford Dictionary will confirm him, calling it "a body too small to be divided." How, he asks, can you go beyond that?

The answer is that for about 50 years now the atom has been known to be a sort of infinitesimal solar system—a nucleus with tiny particles of energy (not matter, because the smallest particles of matter are atoms), rushing round it in their various orbits. The character and behaviour of the atom—and therefore of the element which it constitutes—is determined by the number and character of these rotating particles. They include electrons, and protons and neutrons, with possibly a few more whose nature is being investigated.

Some truth, then, is seen in the words of one of the earliest experimenters with wireless communication, Prospero,

Rightful Duke of Milan, who said to his daughter, Miranda:

*"We are such stuff
As dreams are made on."*

Scientists who have taken up the theories of the great English physicist, Sir J. J. Thomson, have born out Prospero; to them, all the substance of the universe is

*melted into air, into thin air;
And, like the baseless fabric of this
vision,
The cloud-capp'd towers, the gorgeous
palaces,
The solemn temples, the great globe
itself,
Yea, all which it inherit, shall dis-
solve. . . .*



SIR J. J. THOMSON
Shakespeare said it first

"But hold on," the layman says. "Real scientists can't afford to talk like that. They have to keep calm and get on with the job, and not let the importance of it go to their heads—not even for the sake of quoting Shakespeare."

Yet their excitement can be excused, as we can see when some of the practical applications of electronics are explained. And for the high-pitched language which is being used to communicate it to the layman, we can blame the fact that in America as *Fortune* says, "this year the electron will be the cornerstone of a four-billion dollar industry—more than the whole pre-war U.S. auto industry. Millions in advertising dollars since the first of the year have painted strange futuristic pictures of the coming age of electronics." Thus a vast concern such as General Electric, which is probably leading the world in the development of civil uses for electronics, is announcing its discoveries in terms that recall the extravagant tales of travellers in the 16th century, rather than the almost tentative statements of the scientists of that age. But in these days, it is not a heresy that may cost you your head to reduce all matter, living or inanimate, to mere mathematical patterns. And no scientist need sign a recantation such as Galileo did, to save his life.

The Philosopher's Stone

Put in crude terms and not those of lecture room or technical journal, the procedure by which the electron is being harnessed is something like this: The scientist takes Thomson's conception of atoms as being all aspects of the one

thing, whether atoms of gas, solid or liquid, and he sees that there are 92 known elements of matter made up in

(Continued on next page)



Left: The ancient alchemist dreamed of a day when gold could be secured from earth's coarsest metals. A woodcut by Hans Weiditz, 1519. To-day electronic transmutations produce elements many times more valuable than gold.