

The Magic of Modern Science

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and as he directed the flame against the side of a fireclay crucible, the clay melted and bubbled away like butter. The hardest metals ran like water under the fury of this heat.

Its temperature, 6400 degrees Fahrenheit, is the hottest that man has yet been able to produce. And it is attained, not by anything burning, but by allowing the atoms of hydrogen, which have been burst from their accustomed systems by an electric arc, to recombine into molecules. The atomic-hydrogen flame is being introduced in industry for welding metals and alloys, such as chromium, nickel, copper, aluminium and silver, as well as for ordinary iron and steel.

Research in Radio Communication.

RADIO communication, which owes so much to Langmuir's explorations within the vacuum tube, continues to be a main line of research here. At the experimental broadcasting station WGY, five miles south of Schenectady, I saw the engineers setting up the 200-kilowatt transmitter which was put to the test last March. Remembering that the most powerful broadcasting station now operating commercially uses but 50 kilowatts, you can realise what a tremendous jump in power has been attained by the Schenectady wizards.

These five-foot super-power valves, when set in their water jackets, are seven and one-half feet long. So rapid is the heating of the plate while operating that fifteen gallons of water per minute are needed to cool each valve. Once a valve was left outside its water jacket. Within three minutes there was a "plunk" as it collapsed inward. Each of these giant valves costs 1600 dollars (\$320), and has a life of about 1000 hours.

Short-wave transmission also is the object of almost continuous experimenting at WGY. Half a dozen steel towers of varying heights are spotted over the fifty-acre lot, and many types of antenna are in use. The beam antenna developed to communicate with the Byrd expedition in the Antarctic is there. It is said that the wire screen used as a reflector with this antenna increased the efficiency of transmission twenty times that of the unreflected wave. Another beam at WGY points to Australia.

Separate from this sending station is the receiving laboratory which stands on a high hill amid the farms north of the city. On a clear icy morning I arose at daybreak and made the eight-mile trip to this hilltop for the precious privilege of talking with Australia. Mr. A. B. Hitt, the Schenectady operator, introduced me over the wireless to Mr. P. M. Farmer, operator in Sydney. Then, over 10,000 miles of land and ocean, we exchanged reports on the weather, discussed the fact that the clock was approaching midnight in Sydney while the working day was just beginning in Schenectady—talked airy nothings, of course—but it was a tingling experience nevertheless.

Coming out of the station into the bright sunlight, I could barely see the misty peaks of the Adirondacks; only a few miles to the north, but I had just the two programmes. No other set

An Englishman's Impressions of America

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could approach this degree of selectivity.

When I last visited the States there appeared to be no heterodyning of stations, but this time I heard a good deal after dark. According to regulations this should not be, but there it was all the same.

Battery Sets Still Selling.

NATURALLY, with the widespread use of electricity practically all sets are a.c., but it will surprise most English listeners to hear that there is still a brisk demand for battery sets, and quite recently a new line of 2-volt valves, specially designed for battery operations, with a comparatively low filament current, has been brought out.

Farming communities buy most of the battery sets, for although they have electricity on the farms the voltage is often low, and D.C.—of no use for H.T. purposes.

Speaking of direct current reminds me that large areas are still supplied with D.C. at 110 volts. A very large part of New York and a considerable area of Chicago are thus supplied. I found that 110-volt D.C. sets were quite good considering the difficulty of designing a good output stage at this voltage. Push-pull, of course, is a great help here.

Tone Control.

EARLIER in this article I referred to a "tone-control" as a fitment on receivers. Many sets have such a control this year. At first it sounds a very useful attachment, suggesting that either high or low notes can be emphasised at will, giving the set user a means of adjusting the set to his own standard of quality.

However, use of the control soon disillusioned the discriminating listener. No set I heard had adequate top-note reproduction with the tone control turned up to the fullest "high," and as one turns the control what top there is is gradually extinguished, giving by the very absence of proper high-note reproduction an illusion of more bass. A very nasty business to the musically minded!

If, and I say it with emphasis, a set has too much top, then means can be adopted for reducing the top rendition.

A tone control consists of a condenser of about .004 or .006 mfd. in series with a continuously variable resistance of about 250,000 or 500,000 ohms, this combination being placed across the output of the set.

If you think for a moment you will see that a resistance of, say, 200,000

heard a man's voice halfway around the globe, and had got his every word and accent clearly and instantly. Magic! Is there anything in the Arabian Nights or any dream of the old alchemists to equal this actual experience in wonder and improbability? Such miracles the wizards of the laboratory are steadily and surely making commonplaces of everyday life.—George W. Gray, in "Popular Mechanics."

ohms in series with a .004 mfd. practically cuts it out of circuit, but if the resistance is lowered to a few hundred ohms then we have a state of affairs practically equivalent to shunting the speaker with .004 mfd., a value of capacity which will very effectively by-pass a large proportion of the higher frequencies.

Between these two limits a wide range of by-passing is possible. Just such a device is the much advertised tone-control of modern American receivers. And a whole lot of people like it! They call the result "mellow!"

On the other hand, cutting off the higher frequencies also cuts off a lot of high-pitched background noise, as well as needle scratch in radio-gramo-



MR. H. C. SOUTH, whose talks from 2YA on "Books, Grave and Gay" are universally appreciated.
—S. P. Andrew, photo.

phones. The first is useful in long-distance listening with the volume control turned full on.

Interesting Construction Details.

ABOUT the second, opinions differ, many people thinking that the advantage of reducing needle scratch is too highly paid for by the loss of brilliance in reproduction.

The constructional details of modern American receivers are very interesting to the home constructor. Stiff wiring has entirely disappeared, due in the main to the risk of broken joints due to vibration from factory to dealer and from dealer to user.

All those wires which can run together without harm—and a surprising number can!—are bunched and "cabled" in flexible leads, and even the separated wires are of the stranded or flexible type with insulating coverings.

To distinguish them in assembly and fault-tracing the wires are differently coloured according to their particular circuits, and connections are generally made with eyelets of the stamped

variety, screwed under nuts which are held secure with shake-proof washers.

Component Design.

CHASSIS construction is universal, either aluminium or steel being used. Soldered connections are cut down to the minimum by careful design, and when you realise how much of the cost of a set goes in labour, the saving of a few joints and the reduction of assembly processes are very important manufacturing considerations.

Components are designed with ease of assembly in mind, and astonishing simplifications have been brought about in dozens of ways. Valve holders, for example, consist generally of five holes stamped out of a thin strip of bakelised fibre, or stamping riveted on to the underside to form contact with the valve pins. You may think this shoddy manufacture, but such sets work well and give far less trouble in servicing than the older forms of construction.

Mains units are fairly well standardised in these days, and valve rectification is practically universal in factory-built sets.

America's "Midget" Sets.

OF late, due to the financial stringency, and consequent reduction in spending power of the public, the so-called midgets sets are becoming very popular. The American midget set about the size of our larger cabinet loudspeakers, and contains a five or six-valve mains receiver with two or three stages of radio frequency, and a moving-coil speaker.

Single-control tuning is, of course, standard here, as in all other receivers, and the sets are made to work on small exterior aerials. Their range is limited in comparison with the larger sets, but they put up an astonishingly good performance for their price, which averages about £14 in English money.

2YA's Aerial Damaged

BECAUSE of its exposed position on the heights of Mount Victoria, the recent gale played havoc with 2YA's aerial gear. The aerial is badly twisted and the transmitter has suffered damage through power surges. In addition, early on Friday morning the neon illuminating tubes were ripped from the familiar sign and deposited at the foot of one of the towers.

However, temporary repairs were immediately effected, and the station was back on the air on the afternoon following the mishap, though with only part of the aerial working.

If You want to get Ahead

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