Crystal of Quartz Simplifies Television

Physics

A small crystal of quartz, less than an inch thick, has now simplified television by taking the place of a complete telephone line or radio transmitting and receiving equipment. This is the latest achievement of the Bell Laboratories, which perfected a process of television first demonstrated nearly a year ago.

With practically all methods of television so far invented it is necessary to have a disc at the receiving end rotate in exact synchronism with a similar disc in the transmitter. When first demonstrated, the Bell system did this with a separate synchronising circuit. Over land telephone lines, this consisted of a special pair of wires connecting Washington and New York, separate from the two lines used for carrying the actual image and the spoken words. With the radio television, a special signal was sent out over its own wavelength for the purpose.

Only two telephone lines, instead of three, or only two wavelengths, are now required, as the result of the work of W. A. Marrison and J. W. Horton, in making quartz crystal oscillators capable of holding the rate of vibration constant to within one part in ten million.

The control of the picture on the television screen is now as simple as that of a motion picture image on the movie screen. Sometimes the motion picture image becomes "out of frame" when the pictures on the film are out of step with the mechanism. The effect is that the top of the picture is seen at the bottom of the screen, and the bottom at the top. At the touch of a lever by the operator, this can instantly be corrected.

With the television apparatus, the failure of the two discs to keep in step produces a similar effect, except that the picture is displaced laterally, instead of vertically. The remedy is also very simple. Connected with the receiver are two buttons. When one is pushed, the whole picture slowly moves to the right, while the other moves it to the left. The operator merely touches one of the buttons until the picture is in the proper position, then the quartz oscillator holds it in place for a long time. In an hour, it is stated, the image will not wander more than one third of its width.

Despite this great simplification, which represents a step well in advance of anything yet accomplished in television, the engineers point out that it is still full of such complexities that its field of application is still quite restricted.

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Air's Electricity too Feeble for Power

Physics

There is electricity in the air. Benjamin Franklin is credited with making the first "motor" to be driven by atmospheric electricity and since his time hundreds of inventors, lured by the idea of something for nothing, have attempted to make practical such a development.

If investigation proves that the small motor devised by Lester J. Hendershot, West Elizabeth, Pa., inventor, works upon this principle, his name will be added to the long list of those who have hopefully attempted to utilize the minute power of the air's static electricity. But scientists are convinced that it is impractical to obtain more than a minute amount of power from such devices.

If a collecting antenna for the atmospheric electricity covered the whole state of Wisconsin only about one ampere of current would flow at the dangerously high potential of 20,000 volts and in terms of ordinary electric power this output would be worth only about $1.00 an hour, researches by the Department of Terrestrial Magnetism of the Carnegie Institution of Washington have shown. Such an antenna, the height of that of the Arlington, Va., government radio station, but covering the entire earth would collect only enough electricity to cause a steady current of not more than 1,000 amperes to flow from the antenna to the earth. Often when thunder-storms are hovering near or passing over a place tremendous electric currents flow to and from the earth for a small fraction of a second, and during sandstorms and under certain other circumstances considerable quantities of electricity may be collected by radio antennae.

Some of the most efficient atmospheric electricity motors thus far invented are scientific instruments called "electrometers." They have been in constant operation for several years at the observatories of the Carnegie Institution of Washington at Washington, D. C., near Huancayo, Peru, and near Watheroo, Western Australia.

These are quite different from the ordinary electric motor. On the basis of the amount of work they do, they may be considered as mere toys. These electrometers are, however, motors in reality and in principle, and any motor driven by the electricity of the air will doubtless work on the same principle. Automatic records are being made at a large number of observatories in various parts of the world with such electrometers to show continuously the electrical features of the earth's atmosphere. From such records, extending over many years, Carnegie Institution officials declared that enough is known to justify the opinion that motors operating from the electricity of the air will probably never be more than either interesting toys or scientific instruments.

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Working to Learn

Pedagogy

Working in an industry while studying engineering is becoming a popular method of higher education in America, Prof. W. H. Timbie of the Massachusetts Institute of Technology told the National Education Association at its Boston meeting.

"Although Dean Herman Schneider introduced the cooperative plan into America at the University of Cincinnati over twenty years ago, the great possibilities of the plan are just begining to be sensed by the colleges and the industries of the country," he said. Already, eighteen engineering schools are operating co-operative courses, with over five thousand co-operating pupils enrolled. The result is that the theoretical instruction at college has been vitalized by the fact that the student knows at first-hand just how the theories that he is learning are made use of in the engineering field.

"Industry also appreciates the better training which the co-operative students receive, as is evidenced by a study of the positions held by graduates of the co-operative courses in electrical engineering at the Massachusetts Institute of Technology. This study shows that the average salary of these graduates increases at a rate fifty-five per cent faster than that of the average engineering graduate of the country."

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