



**METALLURGY AUTHORITY—**  
**Prof. E. N. daC. Andrade prepares**  
**papers which tell of his research with**  
**single crystal metals.**

by exposing them to sodium vapor. In the case of sheet mica, the surface of which is remarkably free of flaws except at the very edges, it has been shown that the strength of such sheets is ten times greater when the stress is kept solely on the perfect surface than when it extends to the imperfect edges.

### Making Crystals

To make his single crystals, Prof. Andrade encloses an ordinary wire of many crystals in a glass tube in which it fits loosely and from which all the air has been evacuated. He then runs a traveling furnace slowly, at about the rate of half or an inch an hour, over the tube. The wire melts locally and then re-solidifies as the furnace moves along, resulting in a single crystal. In the case of metals with melting points higher than that of glass, Prof. Andrade employs molds made of carbon.

The first specimens ever seen of the single crystal forms of some metals were prepared by Prof. Andrade as long ago as 1913. Since then he has devoted his energies to their study. So interesting and novel were the properties of single crystal metals that between the wars they were studied extensively by scientists in England, Russia and Germany, but for some reason the subject has not attracted American investigators.

### Atomic Flaws Weaken Crystals

One lesson learned from the study of the single crystals is that, because of atomic flaws, the individual metal crystals are exceedingly weak. The greater strength of every day metals lies in their haphazard polycrystalline structure, with the glide-planes and glide-directions of the crystals oriented at random. Thus each crystal is hemmed in by other crystals which will not readily give in the same direction or

plane in which it gives most easily. This is much like the principle of the girder, in which the planes of several sheets of metal are fixed at right angles to each other.

Prof. Andrade believes his experimental results point two tasks for the practical metallurgist:

1. To see if the atomic flaws in metal surfaces can be eliminated.
2. If not, to see how the polycrystalline nature of metals can be increased.

Science News Letter, December 10, 1949

### ENGINEERING

## Electric Discharge Prints Instrument Chart Paper

➤ CHART paper for use particularly with commercial facsimile telegraphy, but usable in many types of recording instruments, has a coating of electrosensitive material which is "printed" by an electric current passing to it from a simple wire stylus.

The new paper, dubbed Teledelts, was developed by the Western Union Telegraph Company and was revealed at the annual meeting of the Society for Experimental Stress Analysis by Grosvenor Hotchkiss of the company. It meets the requirement in facsimile recording by being instantaneous, dry and permanent. The coated paper is light grey in color. The current flowing through it produces a black mark.

In previous facsimile transmission, the record was made photographically by a beam of light on photo-sensitive paper. Facsimile is a system, now coming into wider usage, in which an entire printed page, letter, message or photograph is sent by radio waves or through wire connections from a transmitter to distant receivers. In the transmitter, the copy is rapidly scanned by a beam of light that passes over it in successive lines, each close to the one above. The reflected light, varying with the variations in the markings on the surface being scanned, operates a photo-electric cell from which varying electrical energy is emitted.

At the receiving end, the process is in reverse. The electrical energy causes variation in the beam of light from a photo-electric cell. The varying intensity of the

light reproduces an exact copy of the original on sensitized paper. With this new paper, the record made requires no finishing or fixing. The paper is usable for automatic train position recorders, recording chronographs and galvanometers, wave pattern recorders and other instruments.

Science News Letter, December 10, 1949

### NUTRITION

## Dairy Products Improved By Ion-Exchange Milk

➤ SMOOTHER ice cream, improved quality of baked goods and improvements of various other dairy products by the use of ion-exchange milk are foreseen by Dr. C. W. Gehrke of the University of Missouri at Columbia, Mo., and Dr. E. F. Almy, of Ohio State University at Columbus.

Ion-exchange milk is milk that has been modified by the use of certain artificial resinous materials. Reporting on their joint researches at Ohio State University in the scientific journal, SCIENCE (Nov. 25), Drs. Gehrke and Almy state that these materials seem to "offer a variety of possibilities for modifying the mineral components of milk," either by removing ions, such as calcium, or substituting other ions for those normally present or by both operations.

Science News Letter, December 10, 1949

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