PHYSICS

Better Lighting Promised For World of Future

By DR. S. G. HIBBEN

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Excerpts from address given before the Science Talent Institute.

➤ SINCE we all hope to do tomorrow's jobs in a better way, it is gratifying to realize that better tools and new tools are being invented and developed, especially those making use of radiant energy. In fact in tomorrow's civilization perhaps the greatest promise of better days lies in the great rainbow of the ether spectrum, or the radiations encompassed between long wave radio broadcasting with its relatively low frequencies together with long wavelengths of several miles, all the long way up to the secondary radiations associated with cosmic emanations where frequencies are measured in millions of millions of millions of cycles, and where the inconceivably short wavelengths represent the nadir of nothingness.

We have not developed all of the tools that some day may put to use all of the 80 or more octaves of this great ether spectrum, and since there still are "darkest Africas" to be explored, therein lies an exciting challenge to oncoming generations of scientists. Indicative of the rush of scientific research in merely the one very limited region whereof the human eye is the most common receiving photocell, and in about one octave on either side, or a total of three octaves of radiation altogether, we may note the following developments.

1. Heat lamps signal the beginning of filament type electric "lamps" radiating some 90% of their output energy generally centering around a wavelength of about 12,000 A, and from which the visible light is a by-product. Heat lamps may substitute for many of the present ineffective methods of cooking. Frying eggs or grilling chops figuratively shout aloud for research help.

2. Within the one octave of the visible spectrum it is hoped that the production of cold light, probably by fluorescence, can yet be doubled in efficiency and given a plurality of tints and hues.

3. In the near ultraviolet region, sources of radiation will be needed in expanding numbers to produce "black light," generally of about 3600 A wavelength for the excitation of fluorescent dyed fabrics such as carpets, upholstery and drapery in interior furnishings, or for ornamental changes of pattern and appearance, or in connection with crime detection, analyses of diseases and drugs, for determination of age and quality of materials and for checks on food adulterations, etc.

4. Further into the ultraviolet we find an increasing interest in the tools that are represented by lamps reproducing anti-rachitic sunshine, or for health maintenance in general, while further down the scale in the general region of the 2537 A line of mercury vapor we find perhaps the most important tool of all, namely, the Sterilamp or germicidal lamps to kill pathogenic bacteria and spore of mold forming fungi. These devices promise to control infectious diseases and should become great adjuncts to the operations of air conditioning.

Many "unknowns" await the future scientist—how to get 100 lumens per watt from a light source (or 1/6 of the possible efficiency); how to get two colors from the same electrical discharge in a gas or vapor; how to combine fluorescence with phosphorescence and prolong the rate of decay of the latter; how to conserve fuel by placing radiant heat directly onto the body or into the object involved rather than to heat the air; how to develop indoor sunshine for a vegetable garden in the basement or for comfortable seeing in the factory; how to develop walls and ceilings as softly glowing light sources; or how to use visible light as a glorifying medium, sometimes described as mood conditioning, rather than the heretofore elementary job of simple utilitarian seeing.

Science News Letter, March 18, 1944

AERONAUTICS

Aeronautical Engineering Scientific Methods

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Excerpts from address given before the Science Talent Institute.

➤ THE MAGNIFICENT performance of American Army and Naval air forces in the present war is known by ourselves, by our allies, and by our enemies, but the means for coming up with the excellent airplanes that our unsurpassed air crews use in establishing this record is less well known.

I think we can show that in aeronautics the path from theory or scientific fact to the final practical form of an aircraft, whether we look at the pieces or the whole, is direct, short, and well traveled. We can show that successful airplane design comes only from traveling this path and that the consequences of neglecting this close connection are many and serious.

If the airplane design process is examined, it will be seen that the close and exclusive relation between the job to be done and the part or parts that do it is not just apparent but is real. The connection between theory and practice is a strong and intimate one. Each leans heavily on the other. Parts or features that do not contribute directly to the efficient performance of the aircraft simply do not exist. For this reason aircraft design is perhaps the most nearly functional of any present design activity—the airplane and its parts are designed to carry out their single or multiple functions with the utmost efficiency and with no compromise because of appearance, traditional design, or materials of construction.

In aircraft design, about the only matters considered in addition to function are dependability, serviceability, and

"Science has always been my first love. Subsequently my scientific project is a large and inclusive one, for it will last the length of my life. There are many small but important problems which I am working on, and will continue working on in the future. When I was eleven years old I built a small shop which has grown much larger since that time. My shop is so organized that I can work on one hobby without disturbing another. Chemistry is in one section, radio, electronics, photography, microscopy, lens grinding, etc., in other sections. The reason I follow several hobbies is that I do not believe it is good for a person to become too one-sided or centered in one thing. I think he should have a well balanced knowledge in order to develop fully. I have spent many hours in my shop, assembling the apparatus and wiring circuits I read about in books to learn why a circuit was wired as it was to get a certain result, and a thousand other experiments to learn in a practical way the laws that govern these things. Yes, even our lives, for is not the aim of science to find and apply laws which govern our lives, and by doing so make our life and that of our posterity better? A knowledge of science will make a highly educated and advanced people."
—From the essay of Charles Davidson.