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H. C. POLLOCK

Research Laboratory

ATOM SMASHERS: The electrical constitution of matter has become understood only since the turn of the century. The fact that the principal constituent of matter, the atom, is made up of a central positive core, the nucleus, which is surrounded by negatively charged electrons became accepted after 1911 from the work of Rutherford. Since that time the most important details of atomic structure have been fairly well worked out. During recent years the physicist has shifted his attention to the nucleus, the center of the atom. What keeps the protons and neutrons together despite the enormous repulsive forces between the protons? To answer this and similar questions, it is very useful to have beams of very highly accelerated projectiles with which to bombard the nucleus, to study scattering, to cause disintegrations, and to produce new particles in the field of the nucleus. The projectile particles are electrons, protons, deuterons, and alpha particles. The effort to impart to these particles very high energies, corresponding to a drop through electric fields of millions of volts, has led to great engineering progress in the design of accelerating machines...

When the interest is in obtaining one-hundred-million-volt particles—and so on up—then it is necessary to use new principles...

Machines are now being built in which the elementary particles can obtain energies corresponding to millions or even billions of volts without any such formidable potentials being present in the machine. Such machines are the cyclotron, the betatron, the synchrotron, the synchrocyclotron, and the linear accelerator...

University of Virginia
April 25, 1949

MATTHEW LUCKIESH
A. H. TAYLOR
THOMAS KNOWLES

Lamp Research Laboratory

AIR DISINFECTION: The oldest and commonest method of reducing the bacterial content of air in occupied rooms is by ventilation, which replaces contaminated room air by filtered or outdoor air. While this might reason-ably be expected to reduce the concentration of air-borne organisms by dilution, Yaglou and Wilson found that a high-velocity air stream which stirred up the floor dust actually increased the bacterial content of the air with increasing numbers of air changes per hour. Furthermore, there is a practical limit to the frequency of air changes because of the creation of drafts which add to the discomfort of the room occupants. In the cooler climates, the economic aspect of increased air changes cannot be ignored.

Another method of air disinfection is the use of aerosols which are added to the room air by suitable vaporizing apparatus.

The third method, which is the principal subject of... our researches for many years, is the use of short-wave ultraviolet energy radiated by so-called germicidal lamps. These lamps are very efficient sources of λ2537 energy, which is in the spectral region of maximum germicidal effectiveness. Since this ultraviolet energy can produce conjunctivitis and erythema if the eyes and skin are exposed to it for a sufficient period, special fixtures and installations have been developed for these lamps. The fixtures, employing reflectors of suitable material, are usually mounted on the walls to project the germicidal energy across the room above eye-level. Most oil paints reflect less than 10 per cent of this energy, hence relatively little is reflected by ceiling and walls into the lower occupied part of the room. It has been found that this method is safe and effective...

A single 30-watt germicidal lamp in a suitable fixture consumes approximately 40 watts in lamp and auxiliary. Extensive data indicate that, for occupied rooms, one of these units is sufficient for a floor area of approximately 200 to 300 square feet if properly designed and installed. The cost of operating such a fixture eight hours daily, including lamp renewal and reasonable amortization of the original cost, is of the order of one dollar a month at the present time.

General Electric Review
August, 1949

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