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SCIENTIFIC AMERICAN SUPPLEMENT

No. 666.

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HOW BEST TO AVOID COLLISION AT SEA.

The recent collision between the steamers Thingvalla and Geiser, the latter being lost, has opened anew in England the discussions regarding lights and signals. The principal objections to such codes of signals as have, as yet, been devised is that, while they give the course being held with admirable promptitude, they do not and cannot give the exact parallel upon which the ship is advancing, if there be any wind, and it is principally under such conditions that danger menaces. Thus, if the signal meaning a stranger is advancing from E. by N. should come over the port bow, the wind being abeam or quartering, the information would be valueless, and indeed misleading, for, should the helm be put a-port, the ship so heeding might only go out of her way to meet the stranger, while, had she heard and heeded no signal, and held her course, she would have run free and clear. Capt. Colomb and Admiral De Horsey have argued the electric side-light question in public letters *pro* and *con*. The Admiral has faith in this system because the lights can be easily regulated in intensity to suit the weather. Another authority proposes electric lights with what he calls a "holophote" reflector, the same to be put on the bridge for the use of the watch officer. An account says: The handle by which this light can be moved is to be regulated absolutely by the position of the helm. When the helm is moved, a detent is released and the ray of light sweeps over the water, giving the same signal to a passing vessel as the driver of a vehicle gives with his hand. When the light has completed its sweep, it is to be automatically shut out.

COLORED LIGHT TRIALS WITH THE INSANE.

The experiments with colored lights in the treatment of the insane made recently at Alessandria, Italy, are being much discussed by the medical faculty, though getting little credence; the cures, if cures were really made, being attributed to unusual treatment and painstaking attention on the part of the medical staff because of the color trials rather than to anything in the theory itself. In the evidence transmitted by Dr. Ponza, he says rooms were selected with as many windows as possible, the walls of the rooms being painted the same color as the window panes. A patient suffering from melancholia, who would not eat, was placed in a room with bright red walls and windows. In three hours he became quite cheerful, and asked for food. Another lunatic, who always kept his hands over his mouth to keep out air and nourishment, was placed in the same room, and the next day was much better and ate with a hearty appetite.

A violent maniac was placed in a blue room, and became quiet in an hour. Another patient, after spending a whole day in a violet colored room, was completely cured. American and English medical authorities seem to regard these cures as effects rather than causes of the treatment, induced, they argue, not because the light was colored, but because it was a novel sensation, making the patients to forget their inclinations, as pebbles put into the ear of a balky horse will cause him to forget his pranks; a sudden bath or shock might have the same transitory effect.

Manufacture of Light without Heat.

Prof. Oliver J. Lodge has been endeavoring to manufacture light by direct electric action without the intervention of heat, utilizing for the purpose Maxwell's theory that light is really an electric disturbance or vibration. The means adopted is the oscillatory discharge of a Leyden jar, whose rate of vibration has been made as high as 1,000 million complete vibrations per second. The waves so obtained are about three yards long, and are essentially light in every particular except that they are unable to affect the retina. To do this they must be shortened to the hundred-thousandth of an inch. All that has yet been accomplished, therefore, is the artificial production of direct electrical radiation, differing in no respect from the waves of light except in the one matter of length. The electrical waves travel through space with the same speed as light, and are refracted and absorbed by material substances according to the same laws. We only need to be able to generate waves of any desired length in order to entirely revolutionize our present best systems of obtaining artificial light by help of steam engines and dynamos, which is a most wasteful and empirical process.

In a paper given in *Nature*, Dr. Lodge further discusses the subject as follows:

The conclusions at which we have arrived, that light is an electrical disturbance, and that light waves are excited by electric oscillations, must ultimately, and very shortly, have a practical import.

Our present systems of making light artificially are wasteful and ineffective. We want a certain range of oscillation, between 7,000 and 4,000 billion vibrations per second; no other is useful to us, because no other has any effect on our retina; but we do not know how to produce vibrations of this rate. We can produce a definite vibration of one or two hundred or thousand per second; in other words, we can excite a pure tone of definite pitch, and we can command any desired range of such tones continuously by means of bellows and a key board. We can also (though the fact is less well known) excite momentarily definite ethereal vibrations of some millions per second, as I have at length explained; but we do not at present seem to know how to maintain this rate quite continuously. To get much faster rates of vibration than this we have to fall back upon atoms. We know how to make atoms vibrate; it is done by what we call "heating" the substance, and if we could deal with individual atoms unhampered by others, it is possible that we might get a pure and simple mode of vibration from them. It is possible, but unlikely; for atoms, even when isolated, have a multitude of modes of vibration special to themselves, of which only a few are of practical use to us, and we do not know how to excite some without also the others. However, we do not at present even deal with individual atoms; we treat them crowded together in a compact mass, so that their modes of vibration are really infinite.

We take a lump of matter, say a carbon filament or a piece of quicklime, and by raising its temperature we impress upon its atoms higher and higher modes of vibration, not transmuting the lower into the higher, but superposing the higher upon the lower, until at length we get such rates of vibration as our retina is constructed for, and we are satisfied. But how wasteful and indirect and empirical is the process. We want a small range of rapid vibrations, and we know no better than to make the whole series leading up to them. It is as though, in order to sound some little shrill octave of pipes in an organ, we were obliged to depress every key and every pedal, and to blow a young hurricane.

I have purposely selected as examples the more perfect methods of obtaining artificial light, wherein the waste radiation is only useless, and not noxious. But the old-fashioned plan was cruder even than this; it consisted simply in setting something burning, whereby not only the fuel but the air was consumed, whereby also a most powerful radiation was produced, in the waste waves of which we were content to sit stewing, for the sake of the minute, almost infinitesimal, fraction of it which enabled us to see.

Every one knows now, however, that combustion is not a pleasant or healthy mode of obtaining light; but everybody does not realize that neither is incandescence a satisfactory and unwasteful method which is likely to be practiced for more than a few decades, or, perhaps, a century.

Look at the furnaces and boilers of a great steam engine driving a group of dynamos, and estimate the energy expended; and then look at the incandescent filaments of the lamps excited by them, and estimate how much of their radiated energy is of real service to the eye. It will be as the energy of a pitch pipe to an entire orchestra.

It is not too much to say that a boy turning a handle could, if his energy were properly directed, produce quite as much real light as is produced by all this mass of mechanism and consumption of material.

There might, perhaps, be something contrary to the laws of nature in thus hoping to get and utilize some specific kind of radiation without the rest, but Lord Rayleigh has shown in a short communication to the British Association, at York, that it is not so, and that, therefore, we have a right to try to do it.

We do not yet know how it is true, but it is one of the things we have got to learn.

Any one looking at a common glow worm must be struck with the fact that not by ordinary combustion, nor yet on the steam engine and dynamo principle, is that easy light produced. Very little waste radiation is there from phosphorescent things in general. Light of the kind able to affect the retina is directly emitted, and for this, for even a large supply of this, a modicum of energy suffices.

Solar radiation consists of waves of all sizes, it is true; but then solar radiation has innumerable things to do besides making things visible. The whole of its energy is useful. In artificial lighting nothing but light is desired; when heat is wanted it is best obtained separately, by combustion. And so soon as we clearly recognize that light is an electrical vibration, so soon shall we begin to beat about for some mode of exciting and maintaining an electrical vibration of any required degree of rapidity. When this has been accomplished, the problem of artificial lighting will have been solved.

Removal of Rust.

A method of removing rust from iron consists in immersing the articles in a bath consisting of a nearly saturated solution of chloride of tin. The length of time during which the objects are allowed to remain in the bath depends on the thickness of the coating of rust; but in ordinary cases twelve to twenty-four hours is sufficient. The solution ought not to contain a great excess of acid if the iron itself is not to be attacked. On taking them from the bath, the articles are rinsed in water and afterward in ammonia. The iron, when thus treated, has the appearance of dull silver; but a simple polishing will give it its normal appearance.