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No. 686,

For the Week Ending March 10, 1888.

Price 10 cents. For sale by all newsdealers.

MINOR PHENOMENA OF THE INCANDESCENT ELECTRIC LAMP.

The incandescent electric lamp has already been cited as giving an illustration of irradiation. When in full action, it presents no longer to the distant eye a simple loop of glowing carbon. By irradiation the outline is lost, and it resembles a gas flame. The same object illustrates very perfectly some of the phenomena of persistence of vision. The old example of the whirling ember, the thaumatrope and many other scientific toys, could be cited that are based upon this principle. It is also well known that if a spot of specific color is looked at intently for some time and the eye is then turned upon a white surface, the complementarily colored spectral image of the spot will appear. The nerves of the eye, it is assumed, become fatigued for the original tint, and hence, receiving white light, are affected by the residual colors. This is the reverse effect of persistence of vision. By the latter, properly speaking, the true image retains its effect. But the two are intimately related, as opposite effects so often are in the world of nature.

If an incandescent burner is gazed at while near the eye, the filament can be distinctly seen. Now, if the eye is closed, the image of the filament remains, and appears in clear outline in a purplish or violet color. The characteristic shape of the particular filament is especially distinct. If, in looking at it, particular care is taken to avoid remembering its appearance (and this disciplining of the mnemonic faculty is not difficult), the spectral image seen with the closed eye will vividly portray the filament and its peculiarities. Sometimes it seems as if the effects of irradiation could be partly overcome; as if the image of a distant lamp could be reproduced free from the glow of irradiation. To a degree this may be possible, but a fully ignited and distant lamp always gives a confused spectral image to the closed eye.

The filament of the high resistance lamps illustrates elasticity very well. Surrounded by a vacuum, so as to be free from the damping effects of the air, no object more sensitive to vibrations or shocks can be found. The least tremor of the wall to which the lamps are attached makes the loop vibrate for a long period. This only takes place when they are cold. When the current is passing and they become red or white hot, they are no longer so elastic, and cannot be made to vibrate as before.

By the same vibrations sound is often produced. The vacuum of the globe prevents the sound from being heard by atmospheric transmission. But the filament is in solid connection with the globe and socket. If it is set in strong vibration, and the lamp is held pressed against the ear, a ringing metallic sound will be heard. This cannot be done with all burners. A certain size is naturally essential, as the sound is at best a weak one.

It would seem possible that a visual seismograph of extreme sensitiveness could be made on the general lines of an incandescent burner. It is probable that a filament could be obtained in this way more affected by external vibrations than is the most sensitive device now used.

TESTS FOR MODERN WAR SHIPS.

Admiral Fremantle, R. N., had some valuable experience recently, when, in a sham battle, he tried to break through the lines established by Admiral Hewitt, in the Irish Channel, and it is for this reason mainly that his paper on "Speed as a Factor in Naval Warfare" has a special value. Once more the man of action shows the mistakes of the theorist. Once more figures that are said never to lie are shown to be at least capable of deceiving. In not a single case, it seems, have the big war ships fulfilled the promises made for them by their builders; for though apparently within the power of the mathematician to calculate what speed can be got out of a certain shape and weight with engines of a certain power, when tried in smooth water and under favorable circumstances, they are apparently wholly unable to estimate what this mass can accomplish under other and less favoring conditions, and this inclines the old sailor, like Admiral Fremantle, to look upon all their computations with suspicion. In the recent experiences in the Irish Channel and North Sea, when the seas were heavy and the winds high, many of the ships set down on paper as the fastest fell sadly behind, and those which had been recommended for steadiness and mobility, to make up for their want of speed, often refused to answer their helms.

Admiral Fremantle has learnt, he says, that the best way to test a modern ship is to send her to sea and let her go her best for say 1,000 miles. This will show what she is good for in all weathers as to speed, how she minds her helm in a beam, quartering, fair, and head wind, the length of time her bunkers are capable of supplying her with coal, and the distance she can get over without recoaling. Such cruises would, of course, run up large coal bills, but, as he says, they would pay in the end, because furnishing reliable data of what can really be expected from each individual ship.

After explaining how important speed is in working ships, the Admiral proceeds to look with favor upon many of the ships which gave such a poor account of themselves in the recent maneuvers, because they are, in his opinion, well enough in their class. He says: "The ironclads of the 'Admiral' class and the belted cruisers designed by Sir N. Barnaby form groups of the fastest vessels in the world of their respective classes." But it has been and is a subject of controversy whether or no some of these classes are useless because wholly unable to serve the purpose for which they were designed. If, for instance, there is any service to which the slow belted cruisers with small batteries can be put, the same has not yet been shown. There are ships twice as powerful now afloat, which are fast enough to overhaul them when it comes to speed. They are not heavy enough to resist the guns of a modern fortress, and have not sufficient stability to carry heavier batteries.

Naval Constructor White, who is quoted by the Admiral, throws every other condition aside and demands speed first of all. He says: "Wide differences of opinion exist on many if not most of the features of war ship design, but there is almost absolute agreement that high speed is of primary importance in all classes. It has been well said that, in future naval actions, speed will be the equivalent of 'weather gauge' in the past. The swiftest vessels have the power of choosing their range and relative position, forcing or avoiding an action."

In other words, in the general action of the future no one will stop to learn if such or such a ship is really fast "for her class;" if she cannot stand the pace she must fall behind, or if too slow to get away from heavier batteries, she must go down before them. This is the practical principle which Naval Constructor White is pressing to the attention of the British Admiralty, and it would seem a sound one for us to keep in view in building our new navy. Another interesting study for us will be found in these coming long distance tests of the several classes of British war ships, if they are really made. Admiral Fremantle says: "We want practical trials as to the possibility of turret ships keeping the sea and making a passage at speed in dirty weather in the bay. Are the barbette vessels better sea boats and better able to steam fast? Have the echeloned turret ships any advantages at all?

The answer to these questions we may await with quite as much impatience as the British, for until we have them, we cannot proceed with naval construction with open eyes and proper precaution.

THE KEROSENE EMULSION FOR SCALE INSECTS.

A paragraph is going the rounds of the agricultural press entitled "Remedy for Scale Insects," quoting Professor Riley as having had the best results in fighting scale insects with kerosene emulsion prepared after the following formula: "Take the white of two eggs, three tablespoonfuls of sugar, three-quarters of a quart of water, and one quart of kerosene. Mix thoroughly, by working them together by means of a force pump and cyclone nozzle for five or ten minutes. The emulsion so produced can afterward be diluted with water to any desired amount."

This is in reality, as we have reason to know, quite misleading. What Professor Riley has said in reference to this matter is contained in the introduction to his last annual report as United States entomologist:

"In connection with the subject of kerosene emulsion, I may put on record here an important discovery made last spring, in carrying on further experiments at the office in emulsifying this oil. It is that the white of eggs with a little sugar may be used as a satisfactory substitute for milk where this is not accessible.

"If the white of 2 eggs, about 3 tablespoonfuls of sugar, ¾ quart of water, and 1¼ quarts of kerosene are worked through a force pump and cyclone nozzle for from 5 to 10 minutes, a cream-like emulsion is produced, which can be diluted with water to any desired amount without any separation of the oil; provided that the emulsion is not allowed to stand for any length of time."

This method of emulsifying kerosene oil is, as will be seen, suggested only as a substitute for milk where that is not accessible. The formula that Professor Riley has from the beginning recommended, and which is frequently attributed to others, is really that found to be most satisfactory in experiments made under his direction by Mr. G. H. Hubbard, in 1881. It is as follows:

Kerosene..................................	2 gallons	=67 per cent.
Common soap or whale oil soap........	½ pound	=33 per cent.
Water....................................	1 gallon	

Heat the solution of soap and add it boiling hot to the kerosene. Churn the mixture by means of a force pump and spray nozzle for five or ten minutes. The emulsion, if perfect, forms a cream which thickens on cooling, and should adhere without oiliness to the surface of glass. Dilute before using, 1 part of the emulsion with 9 parts of cold water. The above formula gives 3 gallons of emulsion, and makes when diluted 30 gallons of wash.