

arc system, which it necessarily is when the current has to traverse a number of small lights, it has the great advantage of possessing perfect steadiness, which an arc lamp can never rival, and for interior lighting this is of great importance. The cost of carbons constitutes an important item in the expenses attached to electric lighting as now employed, and if we consider that in some incandescent systems the consumption of material is for a considerable period nothing at all, we may still work economically even though using considerably more horse-power to obtain our results.

Incandescent lamps, however, as at present constructed, are limited to small lights and a certain steady strength of current, as any sudden increase is apt to break the thin carbon filament employed. In addition to this it is necessary to protect the incandescent carbon of such lamps from the influence or access of oxygen, as it would be rapidly consumed by even the slightest amount of oxygen present. Therefore it must be protected by inclosing it in a vacuum, and it is a matter of considerable difficulty to produce a sufficiently perfect vacuum to prevent some small quantity of free oxygen from coming into contact with the light-giving material. Incandescent lamps are very capricious. Difficulties arise from the extreme thinness and delicacy of the glass employed, leakage from defective sealing or fractures, the liability of the incandescent material to shake loose in its supports,

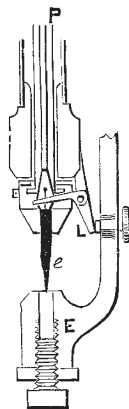


Fig. 6.

and the great care required in manipulation. The Joel lamp is free from these objections, and as in lamps that are purely incandescent, the heat is produced by the current only (the carbon not undergoing combustion by reason of the absence of oxygen), it follows that the incandescent portion cannot attain so high a temperature as when the carbon consumes, and therefore the light must necessarily be of less power than that in the lamp described. The offices of the Electric Light Agency in Queen Victoria Street are lighted by this system, and in the workshop two of these lamps take the place of fifteen gas jets with highly satisfactory results. The carbons employed are of 5 mm. diameter, and in length of about 1 m. The lamp burns for seven or fourteen hours, according to the dimensions of the carbon.

The Swan lamp is the only purely incandescent lamp that has met with any success in England. The Maxim light, the most successful in America, has not reached here yet. Dr. Draper's house in New York is lit by it, and he is able to manipulate his lamps with all the ease and comfort of gas-fittings. Sir William Armstrong, at Craigside, near Newcastle, has utilised a brook to run a dynamo-machine by means of a turbine, and he is able to maintain thirty-seven Swan-lights in his house. Mr. Spottiswoode occasionally gratifies his friends by illuminating his rooms with Swan-lights, and the rooms of the Royal Society were so lit at their last *soirée*. But such lamps remain luxuries, and nothing more.

Wherever the electric light has been introduced for internal illumination it has met with considerable favour. It not only lowers the temperature of a gas-lit room within reasonable bounds, but it clears the atmosphere of vitiations, and men work more cheerfully and better. In fact the extra amount of work got out of men is said in some instances to pay for the change. Moreover, since it renders the illumination comparable with that of daylight, it enables the aged and the weak-sighted to read and work without spectacles.

Electric lighting has however passed the experimental, it has now reached the practical stage.

HOW TO PREVENT DROWNING

I WISH to show how drowning might, under ordinary circumstances, be avoided even in the case of persons otherwise wholly ignorant of what is called the art of swimming. The numerous frightful casualties render every working suggestion of importance, and that which I here offer I venture to think is entirely available.

When one of the inferior animals takes the water, falls, or is thrown in, it instantly begins to walk as it does when out of the water. But when a man who cannot "swim" falls into the water, he makes a few spasmodic struggles, throws up his arms, and drowns. The brute, on the other hand, treads water, remains on the surface, and is virtually insubmersible. In order then to escape drowning it is only necessary to do as the brute does, and that is to tread or walk the water. The brute has no advantage in regard of his relative weight, in respect of the water, over man, and yet the man perishes while the brute lives. Nevertheless any man, any woman, any child who can walk on the land may also walk in the water just as readily as the animal does, if only he will, and that without any prior instruction or drilling whatever. Throw a dog into the water and he treads or walks the water instantly, and there is no imaginable reason why a human being under like circumstances should not do as the dog does.

The brute indeed walks in the water instinctively, whereas the man has to be told. The ignorance of so simple a possibility, namely the possibility of treading water, strikes me as one of the most singular things in the history of man, and speaks very little indeed for his intelligence. He is, in fact, as ignorant on the subject as is the newborn babe. Perhaps something is to be ascribed to the vague meaning which is attached to the word swim. When a man swims it means one thing, when a dog swims it means another and quite a different act. The dog is wholly incapable of swimming as a man swims, but nothing is more certain than that a man is capable of swimming, and on the instant, too as a dog swims, without any previous training or instruction, and that by so doing without fear or hesitancy, he will be just as safe in the water as the dog is.

The brute in the water continues to go on all fours, and the man who wishes to save his life and cannot otherwise swim, must do so too, striking alternately, one two, one two, but without hurry or precipitation, with hand and foot, exactly as the brute does. Whether he be provided with paw or hoof, the brute swims with the greatest ease and buoyancy. The human being, if he will, can do so too, with the further immense advantage of having a paddle-formed hand, and of being able to rest himself when tired, by floating, a thing of which the animal has no conception. Bridget Money, a poor Irish emigrant, saved her own life and her three children's lives, when the steamer conveying them took fire on Lake Erie, by floating herself, and making them float, which simply consists in lying quite still, with the mouth shut and the head thrown well back in the water. The dog, the horse, the cow, the swine, the deer, and even the cat, all take to the water on occasion, and sustain themselves perfectly

without any prior experience whatever. Nothing is less difficult, whether for man or brute, than to tread water, even for the first time. I have done so often, using the feet alone or the hands alone, or the whole four, many times, with perhaps one of my children on my back. Once I recollect being carried a good way out to sea by the receding tide at Boulogne, but regained the shore without difficulty. A drop of water once passed through the rima of the glottis, and on another occasion I experienced such sudden indisposition that if I had been unable to float, it must, I think, have gone hard with me.

Men and animals are able to sustain themselves for long distances in the water, and would do so much oftener were they not incapacitated, in regard of the former at least, by sheer terror, as well as complete ignorance of their real powers. Webb's wonderful endurance will never be forgotten. But there are other instances only less remarkable. Some years since, the second mate of a ship fell overboard while in the act of fisting a sail. It was blowing fresh; the time was night, and the place some miles out in the stormy German Ocean. The hardy fellow nevertheless managed to gain the English coast. Brock, with a dozen other pilots, was plying for fares by Yarmouth; and as the main-sheet was belayed, a sudden puff of wind upset the boat, when presently all perished except Brock himself, who, from four in the afternoon of an October evening to one the next morning, swam thirteen miles before he was able to hail a vessel at anchor in the offing. Animals themselves are capable of swimming immense distances, although unable to rest by the way. A dog recently swam thirty miles in America in order to rejoin his master. A mule and a dog washed overboard during a gale in the Bay of Biscay have been known to make their way to shore. A dog swam ashore with a letter in his mouth at the Cape of Good Hope. The crew of the ship to which the dog belonged all perished, which they need not have done had they only ventured to tread water as the dog did. As a certain ship was labouring heavily in the trough of the sea, it was found needful, in order to lighten the vessel, to throw some troop-horses overboard which had been taken in at Corunna. The poor things, my informant, a staff-surgeon, told me, when they found themselves abandoned, faced round and swam for miles after the vessel. A man on the east coast of Lincolnshire saved quite a number of lives by swimming out on horseback to vessels in distress. He commonly rode an old grey mare, but when the mare was not to hand he took the first horse that offered.

The loss of life from shipwreck, boating, bathing, skating, fishing, and accidental immersion is so disastrously great, that every feasible procedure calculated to avert it ought to be had recourse to. People will not consent to wear life-preservers, but if they only knew that in their own limbs, properly used, they possessed the most efficient of life-preservers, they would most likely avail themselves of them. In every school, every house, there ought to be a slate tank of sufficient depth, with a trickle of water at one end and a syphon at the other, in order to keep the contents pure. A pail or two of hot water would at any time render the contents sufficiently warm. In such a tank every child from the time it could walk ought to be made to tread water daily. Every adult, when the opportunity presents itself, should do so. The printed injunction should be pasted up on all boat-houses, on every boat, at every bathing place, and in every school. "Tread water when you find yourself out of your depth" is all that need be said, unless indeed we add, "Float when you are tired." Every one, of whatever age or sex, or however encumbered with clothing, might tread water with at least as much facility, even in a breaking sea, as a four-footed animal does. The position of a person who treads water is, in other respects, very much safer and better than is the sprawling attitude which we assume in

ordinary swimming. And then the beauty of it is that we can tread water without any preliminary teaching, whereas "to swim" involves time and pains, entails considerable fatigue, and is very seldom adequately acquired after all.

The Indians on the Missouri River, when they have occasion to traverse that impetuous stream, invariably tread water just as the dog treads it. The natives of Joanna, an island on the coast of Madagascar, young persons of both sexes, walk the water carrying fruit and vegetables to ships becalmed, or it may be lying-to, in the offing miles away. Some Croomen whose canoe upset before my eyes in the seaway on the coast of Africa walked the water, to the safe-keeping of their lives, with the utmost facility; and I witnessed negro children on other occasions doing so at a very tender age. At Madras, watching their opportunity, messengers, with letters secured in an oilskin cap, plunge into the boiling surf, and make their way, treading the water, to the vessels outside, through a sea in which an ordinary European boat will not live. At the Cape of Good Hope men used to proceed to the vessels in the offing through the mountain billows, treading the water as they went with the utmost security. And yet here, on our own shores, and amid smooth waters, men, women, and children perish like flies annually, when a little properly-directed effort—treading the water as I have said—would haply suffice to rescue them every one.

Belfast

HENRY MACCORMAC

NOTES

WE learn from the *Times* that at the meeting of the Royal Society on Thursday last the vacancies in the list of foreign members were filled by the election of Gabriel Auguste Daubr e of Paris, Jean Charles Marignac of Geneva, Carl N geli of Munich, and Carl Weierstra s of Berlin.

SIR JOHN LUBBOCK has been nominated to succeed Prof. Allman as president of the Linnean Society, and Mr. G. J. Romanes for the post of zoological secretary, vacant by Mr. Alston's lamented death.

In the current number of the *Revue Scientifique* there is an article by M. de Lacaze-Duthiers descriptive of an interesting enterprise on which he is engaged, viz. the construction of a zoological laboratory at Port Vendres. Backed by the recommendation of the Academy of Sciences, he obtained a liberal offer from the municipal authorities of the place, which among other considerations determined him in the selection of the site. Altogether he is provided with 32,000 francs as a capital sum, 750 francs per annum as a fixed income, with the gift of building ground and a boat. It will thus be seen that the municipal authorities deserve all credit for the substantial encouragement which they have extended to the undertaking. In a few months the laboratory will be completed, and is then to be thrown open to workers of all nationalities. As its situation on the coast of the Mediterranean is an admirable one for the procuring of fauna, the institution is in every way favourably circumstanced, and we cordially wish it all success.

THE English Transit of Venus Commission having expressed a desire for an understanding with the French Commission, so as to secure a uniform method of observation, M. d'Abbadie and M. Tisserand are coming to London to compare notes with the English Commission.

A LETTER from M. Mascart, director of the French Central Meteorological Bureau, read at last week's meeting of the Paris Academy of Sciences, stated that the French Government intend to establish an observatory for terrestrial magnetism at Cape Horn. The expedition will set out in the same vessel as will