

as the Thompson electrical balance; but the latter is an expensive instrument, beyond the reach of the ordinary electrical engineer, and is not readily portable.

Professor Ryan's invention, consisting of a method of suspension and the laying-off of a scale, renders the construction of the apparatus a matter of a few hours' labor by any fair mechanic.

As in the Thompson balance, the current passes through two parallel fixed coils, and through a coil swinging between them. In the Thompson balance the current passes into this swinging coil through the suspension, consisting of a great number of fine copper wires, which will conduct a large current, but at the same time offers but little resistance to the movement of the swinging arm. The mounting of these wires is a very laborious operation, which adds greatly to the cost of the machine. Professor Ryan overcomes this difficulty thus. From each end of the axis of the arm a single silk thread extends upward through a hole in the hard-rubber framework above. These holes are drilled at an angle with the vertical, and the threads bearing on their upper acute edges form what is practically a knife-edge suspension. The current is taken into the coil by means of two broad strips of thin silver foil, fastened at one end to the base, at the other to the arm near the axis. This foil is so thin and light that it offers practically no resistance to the swinging arm, but at the same time is capable of carrying a very large current.

The balancing of the coil-bearing arm is accomplished by the movement of an arm carrying a weight and a pointer, and swinging in the horizontal plane. This arm has the greatest moment about the axis of suspension when it is perpendicular to it, and the least when it is parallel to it. In moving from one of the positions to the other, the pointer swings over a quadrant.

The force tending to move the coil, and hence the moment required to balance it, must be proportional to the square of the current. If on a line through the pointer pivot, and perpendicular to the axis of suspension, distances be laid off proportional to the squares of the currents, and perpendiculars be erected at those points, the distances of their intersections with the arc of the quadrant from the axis of suspension will be proportional to the squares of the corresponding currents. If these points be marked with the square roots of their respective distances, the instrument will give direct readings.

INDICATING TEMPERATURES AT A DISTANCE. — For many purposes it would be convenient if the temperature indicated by a thermometer, in some situation not easily accessible, could be telegraphed, as it were, to some spot convenient to the observer. Many methods more or less successful have been devised; and M. Morin, a French inventor, as we learn from *Engineering*, has recently patented another method, which, if of a somewhat limited range of applicability, may nevertheless be useful in certain situations. In a few words, his apparatus consists of a thermometer, with a scale about 8 inches long, reading from 0° to 30° C. The bore of the tube is about .02 of an inch in diameter, and the bulb is constructed to hold about 7 cubic centimetres of mercury. A platinum wire, with a diameter of about .0008 of an inch, runs from one end of the tube to the other, being connected with platinum terminals fused through the glass. The length of wire comprised between the 0° and 30° marks on the scale has a resistance of 200 ohms. The resistance of the whole thermometer, therefore, will vary considerably as the mercury rises and falls in the tube, and it is on this fact that the arrangements for telegraphing the temperature to a distant point depends. The receiving instrument consists of a low-resistance Deprez-d'Arsonval galvanometer, and an auxiliary resistance of about 200 ohms. Two Leclanché cells of large size connected in parallel, the electromotive force of which is very constant for varying temperatures, are employed to send a current through the thermometer, resistance, and galvanometer; and the deflection of the latter indicates the height of the mercury in the thermometer-tube.

METAL SHEETS AS ELECTRICAL SCREENS. — Professor O. Lodge contributed a paper, at the recent meeting of the British Association, "On the Failure of Metal Screens to screen off the Electrostatic Effect of Moving or Varying Charges," which is interesting, inasmuch as Maxwell suggested the bird-cage form as

the best form of lightning-protector. Professor Lodge has found, that, as long as a charge is stationary, the thinnest film of a conductor is indeed a perfect screen. An ordinary wire gauze is also impervious to electric disturbances from without, and so is a silver-coated beaker, as long as the coating is not too thin. This was investigated by placing a very light needle, highly charged with opposite electricities at its ends, within the beaker. When, however, the coating became thinner and thinner, so that the resistance of the silver film increased from a fraction of an ohm to 100 ohms and more, and when the charged bodies were rapidly approached, being shot towards the beaker sometimes, the needle was deflected, the deflections becoming measurable at 1000 ohms' resistance. One may simply say that the protection ceased as soon as the silver film became translucent, as Hertz has observed in his classical researches.

AUTOMATIC ELECTRIC BALANCE. — There has been exhibited in Paris an electric balance, the invention of Mr. William Snelgrove. The placing of the object to be weighed in the pan closes an electric circuit. The current along this circuit operates a motor attached to the weight on the beam, causing it to run out on the beam till an equipoise is established, when the circuit is broken. When the pan is cleared, every thing returns to the original condition.

HEALTH MATTERS.

Chloroform as an Anæsthetic.

A CONTRIBUTOR to *The Lancet* states that in the medical journals for the last ten years there are reported one hundred and twenty (if not more) cases of death under chloroform. Many of these are very imperfectly described, but in at least forty-nine cases the patients were in good general health at the time of administration, and required an anæsthetic merely for the performance of some minor operation; e.g., extraction of teeth (eleven cases of death), reduction of dislocations (nine cases), eye operations, fistulæ, and so on. In some fifty-nine cases death occurred before the commencement of the operation, and so was clearly due to the chloroform alone. In about twenty of the cases it is noted that chloroform had been successfully given on previous occasions, in one as many as eight different times before the fatal administration. It is evident from the foregoing that chloroform is uncertain in its action; that not only do people die while under chloroform, but also from it; frequently, too, even when it is used by skilful hands. Of course, it is possible to retort that "it was not properly given," which may be correct. This will not alter the fact that these accidents prove chloroform to be a powerful agent, very difficult to administer properly; indeed, so difficult and dangerous that it is scarcely suitable for a routine anæsthetic, when a drug less powerful for evil can replace it.

The nauseous flavor and the sense of suffocation from ether can be entirely done away with by the use of nitrous oxide, and its inhalation made more agreeable than even that of chloroform, while the patient quickly becomes unconscious without the struggling so common with chloroform. The writer goes on to say, "I have not yet found a single patient who has once inhaled ether preceded by nitrous oxide complain of suffocation, or object to take it again on the ground of its unpleasantness."

"The readiness with which chloroform affects the heart, the smallness of a fatal dose, and especially the ease and suddenness with which such a dose can be inhaled, almost by a couple of deep inspirations, will make its safe exhibition always a difficult task to invariably accomplish. Having had many years' experience, I have gradually come to believe chloroform to be a less safe anæsthetic than ether."

Preventable Blindness.

AT a meeting of the Boston Society for Medical Observation, April 1, 1889, a paper was read by Hasket Derby, M.D., on this subject. We have recently published the report of the Albany committee on the increase in blindness. A certain proportion of this loss of sight is preventable. Being desirous of estimating the relative number of such cases in his own community, Dr. Derby

applied for permission to examine the inmates of the Perkins Institution for the Blind in South Boston, and was enabled to take notes of 183 cases, all but one of which he personally examined. The single exception was absent at the time of the visit, but his recorded history left no doubt as to the cause of his loss of sight. Following the classification of Magnus, Dr. Derby divided these cases into four classes: I. Congenital blindness; II. Blindness in consequence of idiopathic diseases of the eye; III. Blindness of traumatic origin; IV. Blindness attributable to general disease.

It is with the figures in the second class that we are more immediately concerned, and especially with those of blindness dependent on the ophthalmia of new-born children. There were 34 such cases out of 183, being a percentage of about 18.6. This is, however, a smaller proportion than has been obtained by other observers, and can only be accounted for by the limited number of individuals he was able to examine. At the Sheffield School for the Blind, Mr. Snell found 38.3 per cent blind from this cause, and observers in general estimate that some 30 per cent of all blindness is due to this disease. Even the examination at South Boston reveals the fact that at least one in every five of the inmates of the institution need not necessarily have ever come there. For it is an established fact that the ophthalmia of new-born children can, with few exceptions, be successfully prevented when there is reason to apprehend its occurrence. It is also not an exaggeration to claim that hardly a disease of the eye yields with more certainty to appropriate treatment. Modern observers are united in the belief that efforts at disinfection should mainly be directed to the eyes of the child, which are most apt to receive the poisonous matter after birth. Such being the case, is strict cleanliness alone sufficient, or should an active disinfectant in addition be employed?

Experiments carried on by different observers have demonstrated that the purulent infection of the eyes of new-born children can be reduced to a minimum by the use of a disinfectant, and that the most efficacious disinfectant is the nitrate of silver. Simple cleansing of the eyes with water was found by Bischoff to reduce the number of cases only one-half. Crede, the original proposer of the use of nitrate of silver, had, before the introduction of prophylaxis, 314 cases among 2,897 children, 10.8 per cent. After beginning to use the 2-per-cent solution of nitrate of silver, he had but from one to two cases in 1,160 children, being 0.1 to 0.2 of one per cent. Other agents have been tried.

In the present state of our knowledge, it is not presumptuous to assert that a case of this disease, terminating in a manner fatal to sight, and treated without topical applications of nitrate of silver, would be regarded as having been culpably neglected. So much for the principal factor that operates in causing preventable blindness. Of that from trachoma it is less necessary to speak, as that disease appears to be greatly decreasing in this community. The greater care used in the regulation of emigration, the gradual improvement in the housing and sanitary surroundings of the poor, and the discovery of jequirity as a remedy, are all working such a change for the better that one is almost justified in looking forward to a time when "granular lids" will be a tradition of the past. There is but one other cause of preventable blindness on which Dr. Derby briefly dwelt, — traumatic sympathetic ophthalmia, — of which he found 12 cases at the Blind Asylum, something over 6 per cent of all affections investigated. With young children the occasion for the occurrence of this disease is most frequently the wounding the other eye by forks, scissors, and knives carelessly left in their way. It can be guarded against by the timely removal of the injured eye.

To sum up the results of his investigation, Dr. Derby found 34 cases of ophthalmia neonatorum, 4 of trachoma, and 12 of the results of sympathetic ophthalmia, — together, 50 instances of preventable blindness; in all, 27 per cent of the inmates of the South Boston Asylum who need never have gone there had they received suitable care or enlightened treatment at the proper time. To diminish such a percentage in the future, the more careful medical education of the present day will not alone suffice. Those who propose to follow the profession of nursing must also be properly instructed, and some degree of knowledge on these subjects be diffused in the community.

SUGGESTIVE THERAPEUTICS. — Binswanger, in the *Therapeutische Monatschrift*, Heft iii., 1, 2, 3, 4, 1889, warns against the inconsiderate and incautious employment of hypnotism. He says that hypnotism under all circumstances has a disturbing effect upon the mental condition, and that subjects of experiment are always transiently hysterical, that the results in different individuals cannot be predicted, and that unfavorable results may follow. He further says, according to the *American Journal of Insanity*, that in severe hysteria is the chief ground for suggestive treatment, where the hypnotic suggestion is the most effective and the least dangerous. When other methods are available for cure, hypnotism is not needed, and in hysteria minor it should be kept in mind that the possibility of a transition into hysteria major cannot be excluded in the use of hypnotism.

OXYGEN INHALATION. — The opinions held among medical men concerning the therapeutic value of inhalations of pure oxygen are so various that any careful observations upon the subject are worthy of attention. In the *Practitioner* (August, 1889) Dr. Thompson discusses the subject from a theoretical point of view, and gives also the result of experiments upon animals and of observations upon patients. From experiment, and from consideration of the laws of physics as they bear upon the absorption of oxygen by the blood, it is quite evident, that, if an animal in a state of perfect health is made to breathe pure oxygen at the pressure under which this gas exists in the atmosphere, but very little more oxygen will be taken into the blood than if it breathed common air. In order to make any considerable amount enter the blood above that which is usually absorbed by it, a degree of pressure is necessary which causes mechanical interference with circulation and respiration. The old idea that animals cannot live in an atmosphere of pure oxygen is erroneous. As might be expected from the foregoing statements, it is now proven that animals can live for many hours in pure oxygen, under ordinary atmospheric pressure, without any symptoms or appreciable change, provided the CO₂ exhaled and the nitrogenous waste products of the body be removed. The vague and inconstant sensations, experienced by healthy persons who inhale pure oxygen freely, may be due to impurities contained in it. Practically, Dr. Thompson, as we learn from a summary in *Medical News*, has found the inhalation of oxygen valuable in many cases. In anæmia and chlorosis he has derived no decided benefit from it. In malignant diphtheria with rapid respiration, subjective dyspnoea, and cyanosis, relief was afforded only to the subjective dyspnoea, the cyanosis remaining the same, and the patient dying from pulmonary oedema and heart-failure. In a case of illumination-gas poisoning, with persistent unconsciousness and subsequent pneumonia, the continuous inhalation of oxygen had no effect whatever, either upon the breathing or upon the cyanosis which occurred during several attacks of pulmonary oedema. In a case of malignant endocarditis, with extensive valvular disease and dilatation, oxygen failed to relieve the dyspnoea, either before or after obstruction occurred in the lungs. In pneumonia, with rapid breathing, dyspnoea, and cyanosis, he has often found oxygen of very great value. The dyspnoea may diminish, while the cyanosis quickly vanishes, and the respiration becomes slower and more natural. So also in capillary bronchitis and asthma, especially when it is accompanied by much bronchial secretion. In uræmic dyspnoea he has found it of great use. In one such case, with normal lungs and very intense dyspnoea, lasting for three days, each inhalation of oxygen was followed in fifteen minutes by slowing and quieting of the breathing, slight improvement in the cyanosis, and great increase of comfort to the patient. Upon stopping the inhalation, the dyspnoea always returned. A bibliography of the subject is appended to the article.

NOTES AND NEWS.

THROUGH the efforts of Professor J. E. Denton, Stevens Institute is to have a new foundry and machine-shop. The building will be 40 feet long by 26 feet wide, and will adjoin the end of the main shop. It will be two stories high. The lower floor will be used as a foundry and blacksmith's shop, and the upper floor for wood-turning and carpentry.