A NOVEL PROCESS FOR USING BLUE LIGHT AS AN ANÆSTHETIC.

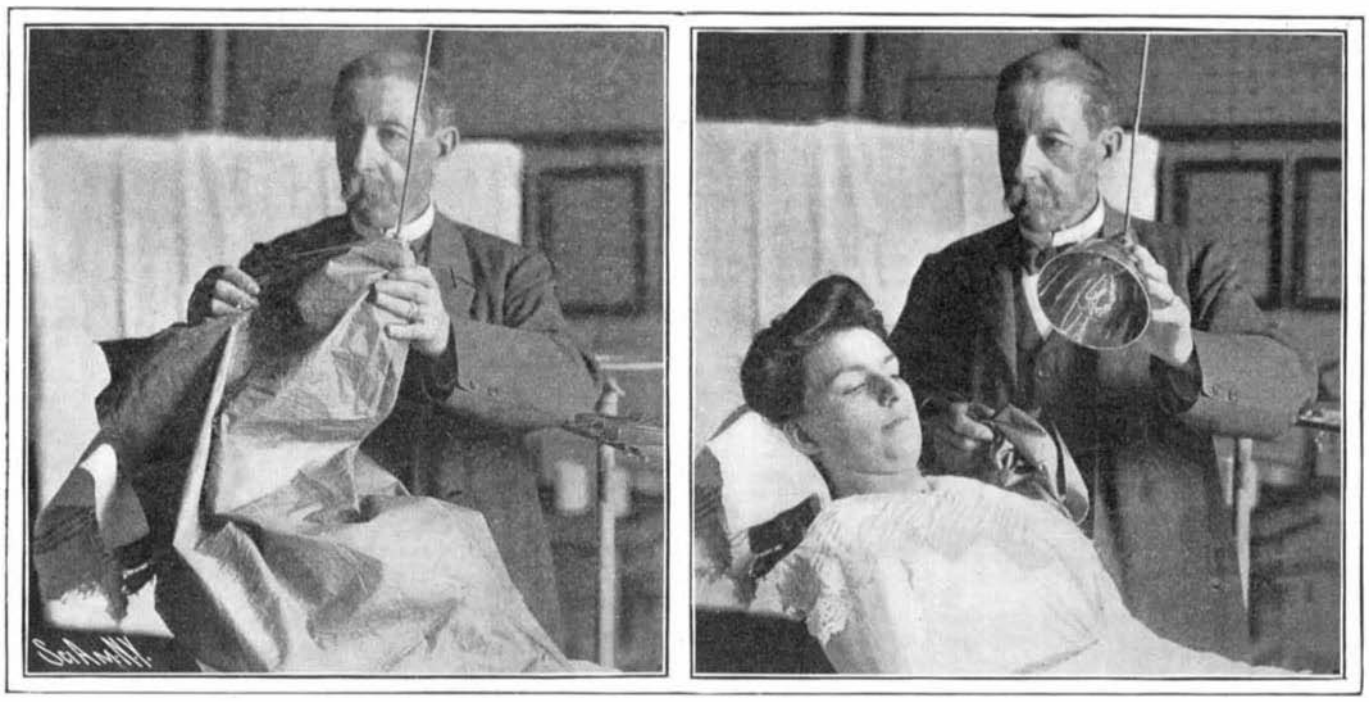
BY DR. ALFRED GRADENWITZ.

Until a few years ago the only method available for rendering the human body insensitive to pain was that of general anæsthesia. The disagreeable and oftentimes highly prejudicial effects of the substance producing insensibility have recently led to the use of local anæsthesia, bearing only on the part directly concerned by the operation. This is rendered insensible by an injection of cocaine or the like, and so highly has this process been improved of late years, that even extensive operations may now be effected by its help, without rendering the patient unconscious.

There are, however, many cases where general anæsthesia cannot be dispensed with, and it is gratifying that even in this direction the modern methods are being more and more developed, any injurious effects being avoided as far as possible by suitable precautions. Ether may be used to advantage instead of chloroform, especially in connection with dental work, but even this anæsthetic is not free from the bad points above referred to. Apart from the danger of giving rise to illness, there is further a rather disagreeable and prejudicial state of excitation previous to insensibility, which, especially with hysterical persons, is a serious drawback to the use of this method.

Prof. C. Redard, of Geneva, Switzerland, has made an interesting observation which he was able to utilize with a view to improving the present methods of anæsthesia.

It is a well-known fact that any external impressions received during the period of somnolence, and even any outside influence during sleep, have great bearing on the dreams attending the latter. Now as, with artificial anæsthesia, the body is left to the influence of any external factors outside of the control of the will to a far higher degree than during ordinary sleep, the possibility of controlling the production of anæsthesia by outside impressions and preventing any disagreeable phenomena that may attend it, should appear plausible to anybody. In fact, it had long been known that external impressions exert a great influence on the period of excitement observed both at the beginning of insensibility, as well as on awakening. Prof. Redard therefore had the idea of utilizing music, when in most cases any disagreeable excitation was found to be replaced by a feeling of well-being. The awakening is also quite free from excitement, there is no nausea, and any disagreeable effects are either avoided or will disappear rapidly, whereas, with ordinary chloroform or ether operations, the feeling of illness is known to last for a very long time. It should be mentioned that the kind of music used at the moment of anæsthesia need not be really artistic; in fact, an ordinary musical box seems to be quite suitable to produce the desired effects. The action of the music should commence at the beginning of anæsthesia, and be kept up to the moment of awaking.



Covering Patient with Blue Veil. Producing Anaesthesia with the Blue Reflector.

THE USE OF BLUE LIGHT AS AN ANÆSTHETIC.

A still more curious process, which will be found described below, was likewise discovered by Prof. Redard and has been used by him for more than three years. This is neither general nor a local anæsthesia, as obtained with anæsthetic substances, insensibility being produced merely by the action of blue light on the nervous center of vision, reacting most likely on the other nervous centers. All the experiments made by the Geneva professor go to show that blue has a decisive anæsthetic action. A great number of patients have been made unconscious by this means, and the results have been presented recently to the Congress of the Swiss Odontological Society, held this year at Lausanne, Switzerland. It should be mentioned that red, yellow, and other rays did not show any result, while green and violet lights, most nearly related to blue light, were found to be also efficient, though to a smaller degree.

The experimental outfit for this anæsthetic process is a rather simple one, a 16-candle incandescent electric lamp, a nickel-plated reflector, and a blue veil being sufficient. The lamp is fitted with a blue bulb and placed at about 6 inches from the eye, this being the point of convergence of the light rays, while the head of the patient as also the lamp itself is covered with the blue veil to avoid any stray daylight. Two or three minutes' action is sufficient to allow of the extraction of a tooth without any pain.

There is one point which apparently remains doubtful. Prof. Redard does not state whether the person rendered unconscious by his process is in a state of sleep, either natural or hypnotic; but according to the process itself, it would seem as though there were a kind of hypnotic sleep, disappearing, however, without any prejudicial effects, the moment the operation is finished and the action of the blue light discontinued, when the one experimented on seems to awake and states that no pain has been experienced.

THE NEW BRITISH BATTLESHIP "KING EDWARD VII."

The accompanying illustration of the latest type of British battleship, known as the "King Edward" class, should have particular interest for Americans, for the reason that she is the first ship in the British navy to make use of a certain disposition of armor and guns which has long found favor with our own naval constructors. In all British battleships, built during the past two decades, the armament has consisted of four big guns, first of 13½-inch, and later 12-inch caliber, and a secondary battery of 6-inch guns, the secondary battery being disposed amidships in protected casemates. In our navy, commencing with the "Oregon" class, most of the battleships have carried, in addition to the 12-inch and 6-inch guns, a battery of intermediate guns of 8-inch caliber. These were generally disposed in four turrets, placed at the four corners of the secondary 6-inch battery. It is the possession of these 8-inch guns that distinguishes our battleships broadly from those of other navies. As regards the distribution of armor, we have always favored the use of a continuous wall of armor for the

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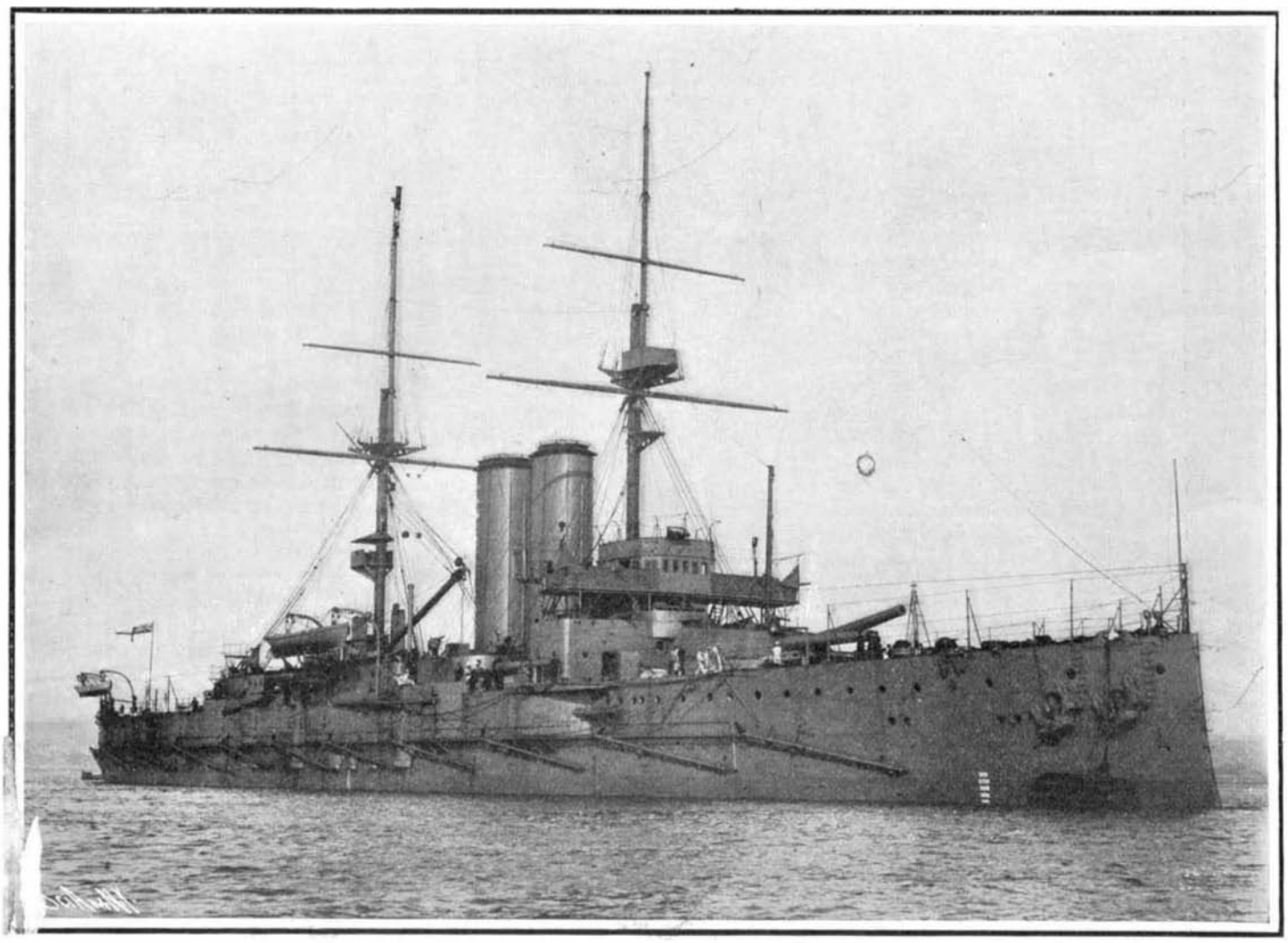


Displacement, 16,350 tons. **Speed,** 19.04 knots. **Coal supply,** 2,000 tons. **Armament:** Four 12-inch; four 9.2-inch; ten 6-inch; fourteen 3-inch; fourteen 3-pounders. **Armor:** Belt, 9-inch; two decks, 2-inch and 1-inch; side armor of central battery, 8-inch and 7-inch; main turrets, 8-inch and 12-inch; secondary turrets, 7-inch. **Torpedo tubes:** Submerged, four. **Complement,** 800.

THE LATEST BRITISH BATTLESHIP "KING EDWARD VII.," ONE OF A CLASS OF EIGHT SHIPS.

productions, much of the excellent effect produced is due to the large sheet of water that fronts and forms part of the stage, and the aquatic and marine effects thereby rendered possible. It would seem, at first thought, that the introduction of a large body of water as part of the "setting" of an indoor stage was, in the nature of things, quite impossible, for the reason that, to secure any adequate effects, the stretch of water would have to be of a size incompatible with the internal dimensions of a theatre or other inclosed place of amusement. Thanks, however, to the enterprise of Messrs. Thompson and Dundy, to whom we are indebted for the plans and data upon which the accompanying illustrations are based, there has been built, in the heart of New York city, a vast amusement house, which will be known by the generic name of Hippodrome, whose dimensions are such as to admit of a stage and a lake of water, large enough for the accommodation of spectacular performances that will rival the outdoor exhibitions to which reference has been made above.

The Hippodrome is a popular and recognized form of public amusement in large cities abroad; but this is the first of the kind to be constructed in the United States, and it also has the distinction of being by far the largest building of its kind in the world. The New York Hippodrome occupies the westerly half of the block bounded by 43d and 44th Streets and Sixth Avenue. There is no playhouse, either here or abroad, that rivals it in size, construction, or equipment. The main façade, which is of impressive and characteristic treatment, has a length of 200 feet, and the building extends for 240 feet on 43d and 44th Streets. It is built of brick, marble, and steel, and it extends to a height of 72 feet on Sixth Avenue and 110 feet at the rear. In its construction every possible precaution was taken to render it perfectly fireproof, and it has more than usual capacity for rapid exits.

To a technical journal, of course, the chief interest of this building centers in the stage, and the entirely novel mechanical arrangements for operating the movable platforms, filling and emptying the tank, raising and lowering the stage, and handling the scenery. But before passing to these features of the building, it will be interesting to mention some of the statistics that tell, better than words, the story of its vast size and capacity. In the first place, the total seating capacity of the Hippodrome is 5,300, which may be compared with the Metropolitan Opera House, 3,400; the Academy of Music, 3,000; and the Broadway Theatre, 1,800. The building is lighted by 25,000 electric lights, and the sunburst in the center of the ceiling alone contains 5,000 electric lights. On the main floor will be fourteen rows of orchestra seats, with accommodations for about 1,100, behind which will be the stalls, which are a common feature of European theatres. Then comes a line of boxes encircling the promenade. Above this is the balcony, seating about 1,600, and over that is the gallery, seating no less than 2,600 persons, or more than most large theatres. The building has thirty-five regular and emergency exits. The roof is carried on four main steel trusses, which are the largest ever placed in a building of this type in the United States. These trusses weigh 50 tons each, and are 115 feet in length by 25 feet at the point of greatest depth. There are also four subordinate trusses, weighing 32½ tons apiece, which are each 110 feet long.

It is in the stage and its accessories, however, that the greatest interest centers. It may be divided for purposes of description into two portions: that which is behind, and that which is in front of the Proscenium Arch. This arch, by the way, is the largest in the world, having a total width of 96 feet and a clear height of 40 feet, and its fire curtain is the biggest piece of asbestos ever woven. The depth of the stage from the extreme front to the back wall is 110 feet, or 50 feet from the back wall to the Proscenium Arch, and 60 feet from the Arch to the extreme front of the stage. The main stage at the rear of the arch measures 50 feet in depth, by 200 feet in width between the side walls. Of this area, the central portion immediately back of the arch, measuring 50 feet in depth by 100 feet in width, is carried on four 12-inch hydraulic rams, and is capable of a vertical movement of 8 feet. The weight of this platform, which is virtually nothing more nor less than a huge elevator, is carried upon four deep plate girders, with the plungers placed at the four intersecting points. This rear stage and the movable apron with their fittings weigh about 230 tons, and the rear stage can be raised from the normal level to a height of 8 feet.

The movable stage is provided with massive counterweights, one line of which will be noticed in the accompanying photograph, showing the under side of the stage and one of the hydraulic plungers. The stage is guided in its vertical movement by steel columns, at the top of which are carried the sheaves for the counterweight cables. Attached to the under side of the stage are vertical guides, which slide within the steel columns. These guides are provided with slots, which are engaged by massive dogs that slide horizontally in the steel columns, and serve to lock the stage at any desired elevation. The dogs are operated in unison by means of lines of countershafting, which are driven by a single electric motor. At each column the countershafting carries a small pinion, which engages a rack on the upper side of the dogs, and when the motor is started, the dogs are thus simultaneously moved into the locking position. The plungers which lift the stage are made to travel at one and the same speed by means of the automatic equalizing valves shown in the accompanying illustration. In the movable stage itself there are seven "traps" provided, each capable of independent operation.

That portion of the stage, 60 feet in depth, which lies forward of the proscenium arch, is known as the apron. It is generally elliptical in form, and measures 48 feet in depth and 92 feet in width. Like the main stage, it is carried on 12-inch hydraulic plungers, with, in this case, a vertical travel of 14 feet. Normally, the movable apron will be at the same level as the main stage. It is large enough to contain two circus rings, each 42 feet in diameter. Beneath the apron is built a huge steel and concrete tank, over 14 feet in depth, and large enough for the whole apron to sink within it. When aquatic performances or naval pageants are to be given, the tank is filled with water, and the movable apron is submerged below the water to the bottom of the tank. Two circular inclined runways lead on each side of the main stage, down to the basement to the animal stalls, and adjacent to the main runway is a narrow runway for the wild beasts. As the runways communicate on a common level, it is possible for processions to make the circuit through the basement and across the stage.

The use of such large quantities of water necessitates an extensive hydraulic plant. The main tank is served by three centrifugal pumps of a combined capacity of 8,000 gallons per minute. Around the back of the stage, at a height of 14 feet, a 12-inch pipe extends for a distance of 180 feet. From this pipe, by means of flexible connections leading to a cataract and fountains, a fine cascade with a fall of 14 feet is formed, with the full capacity of the three centrifugal pumps to maintain it in constant flow. There is also an 8-inch pipe, placed just inside the runway, by means of which a considerable flow of water is produced across the surface of the tank, giving the effect of a river. Flowing water in large volume is also used in the Andersonville battle scene, where a considerable mountain torrent is shown rushing under a bridge of 30-foot span, and flowing with a slower current across the whole length of the tank in the foreground.

The total height from the stage to the gridiron is 80 feet, and this great height well matches the other proportions of the stage. It is here, in connection with the handling of the scenery, that this stage presents some of its most original and striking features. The scenery, in place of being dropped and lifted, is carried, by means of traveling electric hoists, on four separate lines of overhead tracks, which are attached to the gridiron, and curve in concentric semicircles above the stage, and extend into deep side wings known as scene pockets, each of which is of sufficient depth to enable the whole of the one-half of the scenery to be moved within it, clear of the stage. The tracks consist of 12-inch I-beams, upon the lower flange of which run the traveling trolley hoists for handling the set pieces and scenery. There are four double electric hoists and two single hoists. Each hoist is provided with its own electric motor, and has a capacity of from two to three tons. There is a man to each hoist, which he controls by wires reaching to the floor, and by this means the whole of a complicated and heavy scene may be picked up from the stage and carried into the scene pockets, with great rapidity. In each of the side wings of the stage is a series of winding drums designed specially for lifting set pieces. There are in all sixty separate drums, with a lifting capacity of 800 pounds each. The drums are operated from a constantly-rotating shaft by means of friction clutches, and each drum is provided with an automatic catch, which throws the clutch out of gear at the proper moment, when the piece of scenery has been raised to the desired height, or lowered into position. As showing its great capacity, it may be mentioned, in closing, that in one of the scenes as many as six hundred performers will be massed on the stage at one time.

THE NEW BRITISH BATTLESHIP "KING EDWARD VII."

(*Continued from page 240.*)

broadside 6-inch battery, as against the separate armored casemate positions favored by the English and some other powers. In the "King Edward" class, which was the last battleship design brought out by Sir William White, the former chief constructor of the British navy, a new 9.2-inch gun has been introduced, four of these being carried in four single turrets placed at the corners of the central battery. The casemate system of protection is discarded, and the ten 6-inch guns are carried within a central box battery with a continuous wall of armor to protect them. The 9.2-inch guns fire a 380-pound shell, as against a 250-pound shell fired by our 8-inch gun; but we have eight 8-inch as against the "King Edward's" four 9.2-inch guns in the intermediate battery.

The "King Edward" and class—there are eight of these ships altogether—are 425 feet in length, 78 feet in beam, and on a draft of 26¾ feet they displace 16,350 tons. The complement of officers and men is 800. The armament consists of four 40-caliber, 12-inch wire-wound guns, four 9.2-inch 45-caliber, wire-wound guns, and ten 6-inch 50-caliber guns, besides fourteen 3-inch and fourteen 3-pounders. There are also four submerged torpedo tubes in the "King Edward" and three other ships, and an additional, or fifth, torpedo tube is built in the stern in the submerged position.

The armor protection consists of a 9-inch belt tapering to 3 inches forward and to 2 inches aft, with which is associated a 2-inch protective deck with an additional 1-inch deck at the gun deck. The side armor is 8 inches thick amidships between the berth and gun decks, and 7 inches thick up to the main deck. The 12-inch guns are protected by 8-inch hoods and 12-inch barbettes, and the 9.2-inch have 7 inches of protection.

The "King Edward" is driven by twin-screw engines of designed horse-power of 18,000. On trial, however, the engines indicated much higher than this, and drove the ship at a speed of 19.04 knots. The maximum amount of coal carried is 2,000 tons, and the total cost of each of these fine vessels is $7,500,000.

The Current Supplement.

The current Supplement, No. 1525, is largely devoted to an exhaustive review of the engineering work on the Simplon Tunnel. The article is written by Charles R. King, a civil engineer, who has made a personal inspection of the work and who writes with an intimate knowledge of its scope. Naturally, considerable care has been taken to illustrate the text fully. Mr. King's treatise will be considered one of the most painstaking that has thus far been written on one of the finest engineering undertakings in the world. Prof. Charles Baskerville's paper on the "Elements, Verified and Unified," is concluded. Emile Guarini contributes an interesting study on various automobile trucks, and presents some striking illustrations of leading types. Prof. Vivian B. Lewes concludes his thorough examination of the theory of the incandescent mantle. Useful formulas for waterproofing fabrics are published. With the ninth installation of Prof. Hopkins's articles on Electrochemistry the series is concluded. Considered as a whole, the articles supply a much-needed want in scientific literature, for there is no book to which the student can turn which will give him such valuable help in experimental work in electrochemistry. For the benefit of those readers who have not read every installment, it may not be amiss to state that the articles have appeared in Supplements 1509, 1511, 1513, 1515, 1517, 1519, 1521, 1523, 1525.

The Charcot Expedition Safe.

News comes from Buenos Ayres, that the Charcot Antarctic expedition has arrived at Puerto Madrin, Argentina. A telegram received from Dr. Charcot is as follows:

"We wintered at Wandel Island and carried out all our scientific work under favorable conditions. The question of Bismarck Strait was solved, our party passing through it. We reached Alexander the First Land, though ice prevented our landing.

"We explored several unknown points on Graham Land. Notwithstanding the fact that our vessel grounded, sustaining a serious leak, we were able to continue the voyage and determine the contour of the external coast line of the Palmer Archipelago."

A plant for burning household waste is now operating very successfully at Zurich, Switzerland. It contains twelve furnace grates which consume 130 tons per day of garbage such as is collected by the city wagons, without adding any combustible. The garbage wagons are unloaded by an electric crane. A powerful air-fan draws air through the furnace and sends it into conduits on each side of the latter. The air is thus heated, and after passing the combustion grate it is sent into the main conduit. This is kept incandescent by the gases themselves, after which the gas is led to the boiler house where it goes into two boilers of 200 square yards heating surface. The steam from the boilers is superheated and then taken by piping into the machine hall. The latter contains a Brown-Boveri-Parsons steam turbine which is direct-coupled to a 200-horse-power alternator furnishing current at 220 volts. The speed is 3,000 revolutions per minute. The plant was first erected with the object of burning the waste only, but it was found that a considerable amount of power could be obtained. Part of the current is used to operate electric motors in the plant and for lighting, and the rest is delivered to the city mains. The cinders, which represent 30 or 40 per cent of the garbage, can be used in the manufacture of a special kind of brick.

What Dr. Osler Really Said.

The sensational press has so unfairly distorted what Dr. Osler really said in his valedictory address at Johns Hopkins University on the subject of men over forty that we take this opportunity of quoting his own words. His plan of chloroforming men over sixty sinks into a humorous perversion of Anthony Trollope's whimsical suggestion:

"I am going to be very bold and touch on another question of some delicacy, but of infinite importance in university life, one that has not been settled in this country. I refer to a fixed period for the teacher, either of time of service or of age. Except in some proprietary schools, I do not know of any institutions in which there is a time limit of, say twenty years' service, as in some of the London hospitals, or in which a man is engaged for a term of years. Usually the appointment is *aut vitam aut culpam*, as the old phrase reads. It is a very serious matter in our young universities to have all of the professors growing old at the same time. In some places only an epidemic, a time limit, or an age limit, can save the situation.

"I have two fixed ideas well known to my friends, harmless obsessions with which I sometimes bore them, but which have a direct bearing on this important problem. The first is the comparative uselessness of men above forty years of age. This may seem shocking, and yet, read aright, the world's history bears out the statement. Take the sum of human achievement in action, in science, in art, in literature—subtract the work of the men above forty, and, while we should miss great treasures, even priceless treasures, we should practically be where we are to-day. It is difficult to name a great and far-reaching conquest of the mind which has not been given to the world by a man on whose back the sun was still shining. The effective, moving, vitalizing work of the world is done between the ages of twenty-five and forty years—these fifteen golden years of plenty, the anabolic or constructive period, in which there is always a balance in the mental bank and the credit is still good.

"In the science and art of medicine there has not been an advance of the first rank which has not been initiated by young or comparatively young men. Vesalius, Harvey, Hunter, Bichat, Laennec, Virchow, Lister, Koch—the green years were yet on their heads when their epoch-making studies were made. To modify an old saying, a man is sane morally at thirty, rich mentally at forty, wise spiritually at fifty—or never. The young men should be encouraged and afforded every possible chance to show what is in them. If there is one thing more than another upon which the professors of the university are to be congratulated, it is this very sympathy and fellowship with their junior associates, upon whom really in many departments, in mine certainly, has fallen the brunt of the work. And herein lies the chief value of the teacher who has passed his climacteric and is no longer a productive factor; he can play the man midwife, as Socrates did to Thesetetus, and determine whether the thoughts which the young men are bringing to the light are false idols or true and noble births.

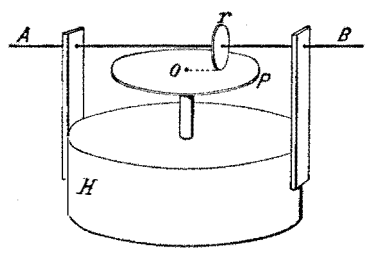
"My second fixed idea is the uselessness of men above sixty years of age, and the incalculable benefit it would be in commercial, political, and in professional life if, as a matter of course, men stopped work at this age. Donne tells us in his 'Biathanatos' that by the laws of certain wise states sexagenarii were precipitated from a bridge, and in Rome men of that age were not admitted to the suffrage, and were called *depontani* because the way to the senate was *per pontem* and they from age were not permitted to come hither. In that charming novel, the 'Fixed Period,' Anthony Trollope discusses the practical advantages in modern life of a return to this ancient usage, and the plot hinges on the admirable scheme of a college into which at sixty men retired for a year of contemplation before a peaceful departure by chloroform. That incalculable benefits might follow such a scheme is apparent to any one who, like myself, is nearing the limit, and who has made a careful study of the calamities which may befall men during the seventh and eighth decades!

"Still more when he contemplates the many evils which they perpetuate unconsciously and with impunity! As it can be maintained that all the great advances have come from men under forty, so the history of the world shows that a very large proportion of the evils may be traced to the sexagenarians—nearly all the great mistakes politically and socially, all of the worst poems, most of the bad pictures, a majority of the bad novels, and not a few of the bad sermons and speeches. It is not to be denied that occasionally there is a sexagenarian whose mind, as Cicero remarks, stands out of reach of the body's decay. Such a one has learned the secret of Hermippus, that ancient Roman, who, feeling that the silver cord was loosening, cut himself clear from all companions of his own age, and betook himself to the company of young men, mingling with their games and studies, and so lived to the age of 153, *puerorum halitu refocillatus et educatus*. And there is truth in the story, since it is only those who live with the young who maintain a fresh outlook on the new problems of the world.

"The teacher's life should have three periods—study until twenty-five, investigation until forty, profession until sixty, at which age I would have him retired on a double allowance. Whether Anthony Trollope's suggestion of a college and chloroform should be carried out or not, I have become a little dubious, as my own time is getting so short."

REGISTERING THERMOMETER.

M. Charles Féry, of Paris, has devised a new form of registering thermometer which gives the mean temperature of a given place by direct reading. This form of instrument will no doubt prove of use in different cases. M. Féry used it at the Observatory in making experiments on chronometers, where it was necessary to have the mean temperature. The instrument is constructed as shown in the accompanying diagram. A light shaft, *A B*, supports a disk or roller, *r*. The shaft can be displaced in either direction by a metallic thermometer which is connected with it (the latter is not shown here). By this displacement, the distance *o r* from the roller to the center of the revolving plate upon which it rests is proportional to the temperature.

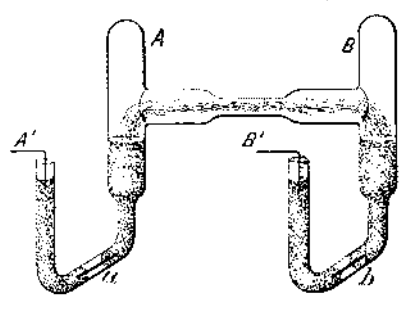


REGISTERING THERMOMETER.

The revolving plate, *P*, is set in rotation by a clockwork movement, *H*. From this disposition it results that the number of revolutions of the roller per unit of time is proportional to the mean temperature. A simple device allows of registering the number of revolutions of the roller, and at regular intervals the revolving plate is caused to drop down for a few seconds so as to allow the roller to take its exact position. This movement eliminates the errors which might arise from the friction of the roller according to the radius *o r*. The apparatus was standardized by the Ostwald regulator, which keeps the temperature constant as long as desired within 1-10 of a degree C. The curve which represents the number of revolutions in function of the temperature is found to be a straight line. It is to be remarked that a very great precision of the clockwork movement is not necessary, seeing that a variation of 15 minutes in a day's run only affects the measurements by one per cent. The mean temperature is registered upon a revolving drum which is divided to 1-30 degree.

A NEW CADMIUM LAMP.

A new cadmium lamp has been recently invented in Germany, and offers considerable interest, at least from a theoretical standpoint. Some seven years ago, Gumlich made a lamp using cadmium and mercury, and the light contained the very brilliant rays of the cadmium spectrum superposed upon the mercury rays. The lamp did not last long, however, as the globe broke very soon. At present two experimenters, O. Lumnur and E. Gehrcke, have taken up the question. Their new lamp is shown in the diagram. It is formed of two vertical tubes, *A B*, joined by a horizontal tube. The lower ends of the tubes are made narrower and are bent twice at an angle. At *a* and *b* is an iridium wire which runs through a solid glass part. The tubes are filled to a certain height with mercury and then sealed at *A* and *B*. Current is brought by wires dipping into mercury at *A'* and *B'*, which are fixed in cement. The experimenters use an amalgam of 14 parts cadmium and 100 mercury in this case. It is soft at the ordinary temperature and becomes fluid when it is slightly heated. To start the lamp it is connected in parallel with an induction coil and the current is suddenly broken, which causes a momentary high potential for starting the arc from *A* to *B*. The lamp continues to work regularly and takes a current of 1 or 2 amperes. It is generally necessary to warm up the lamp before using it, with a Bunsen burner.



CADMIUM LAMP.

The Times correspondent at Colombo states that Sir H. A. Blake, governor of Ceylon, announced at the last meeting of the Asiatic Society that Sinhalese medical books of the sixth century described 67 varieties of mosquitoes and 424 kinds of malarial fever caused by mosquitoes.

Correspondence.

Electrolytic Theory of Dissociation and Digestion.

To the Editor of the SCIENTIFIC AMERICAN:

My attention was recently called to an article published in Vol. xcii, No. 9, of March 4, of the SCIENTIFIC AMERICAN, containing a rather remarkable statement from Prof. R. E. Hirsch, of Ohio State University, to the effect that the theory of electrolytic dissociation could be used to explain some results obtained by him in his experiments upon digestion. The experiments indicated that, when animals were kept on a diet, constant except for the amount of fluid ingested, digestion took place more completely when water was freely used, than when the amount was reduced considerably. The criterion for digestive efficiency was the amount of excretion recovered during the test periods. Prof. Hirsch explains this rather simple and well-known physiological phenomenon on the ground that as the food is more and more diluted, it is correspondingly dissociated, and absorption and assimilation of the food goes on more effectively when it is in the ionic condition than when it exists in molecular form. Such a theory sounds very well indeed, and would doubtless apply to the case in question, were it not true that foods are not electrolytes, and are not dissociated when in solution. In fact, the only parts of our diet which it is possible to convert into the ionic condition in normal digestion are the various metallic salts and the like, introduced as seasoning or present originally in the food material. Our ordinary food stuffs are the fats, the carbohydrates, such as starch and sugar, and the proteids, such as meat and eggs. None of these food stuffs are electrolytes themselves, nor are they converted into electrolytes during the process of digestion, so that the application of the ionic theory to materials which are not ionizable seems rather fantastic.

H. C. BRADLEY.

New Haven, Conn.

[The letter referred to by Mr. Bradley was received by the Editor and published in the correspondence column of March 4, which department of the paper is devoted to miscellaneous correspondence, for which the Editor does not hold himself in any way responsible. It appears that the theory advanced over Prof. Hirsch's name was a forgery, and the following letter from Prof. Hirsch explains the fact that not only does he not hold himself responsible in any way for the statements contained therein, but that he had never seen the letter until it appeared in the columns of the SCIENTIFIC AMERICAN. The Editor is co-operating with Prof. Hirsch in an effort to find out who is the perpetrator of this imposition upon Prof. Hirsch and upon the SCIENTIFIC AMERICAN.—EDITOR.]

A Denial from Prof. Hirsch.

To the Editor of the SCIENTIFIC AMERICAN:

I am this day in receipt of your favor of the 9th instant calling attention to an article published in your journal of March 4, 1905, entitled "Electrolytic Theory of Dissociation," and signed "R. E. Hirsch, Assistant Professor of Chemistry, Ohio State University."

As I am the only person connected with the Ohio State University bearing a name in any way similar to the one suffixed to above-mentioned article, I take it upon myself to inform you that I had never seen the article until my attention was called to it by your letter. I deny any knowledge of it, and would be greatly pleased to have you aid me in any way possible to discover the author of it.

As this is a matter of more than passing seriousness, I hope you will give it due mention in your columns.

RUDOLPH HIRSCH,
Instructor in Agricultural Chemistry, Ohio State University.
Columbus, Ohio, March 13, 1905.

A system of electric road locomotive is now running very successfully at Monheim, Germany. This locality is situated between Mülheim and Düsseldorf on the right bank of the Rhine, and the new line is intended to connect it with the railroad station on the Cologne-Düsseldorf-Berlin line, which lies 2.4 miles distant. A hydraulic station at Solingen furnishes the current. The Schiemann system of track locomotive and car is employed in this case. The locomotive travels upon the main road, without rails, and takes current from two overhead wires. A type of car resembling an omnibus and containing twenty-five places is also used. It carries a 30-horse-power electric motor. A special form of trolley brings the current into the car. The locomotive, which is of large size, is used also for freight, and it takes a train of several freight cars of special construction which are joined by patented couplings. This system is especially useful upon roads where the traffic is not sufficient to warrant the expense of laying a track for the cars. The question of road locomotives and cars has been studied within the last few years, and several systems have been devised which are in successful operation in Europe. Different lines of this kind are now running in Germany and France.