

Deterioration of Water in Reservoirs and Conduits.

Some time ago at a meeting of the New Jersey Sanitary Association, Mr. C. B. Brush dealt with the above subject in a paper. He remarked that all water supplies are better at certain periods of the year than at others. In the hot, dry days the water becomes dead and lifeless, and if allowed to remain at rest for any considerable length of time, algæ formations appear on the surface. These, however, are destroyed and disappear as soon as the water is put in motion. If allowed to remain, the water cures itself—the algæ disappearing after a few weeks and leaving the water again in its normal condition. The algæ show themselves more quickly on water that has been filtered, either naturally or artificially. The author also stated that water is delivered in its best condition when taken from a running stream and supplied directly to consumers without coming to rest during its passage. Water discolored by sediment is very often in its best condition, because the sediment is due to the fact that an abnormal volume of water is blown off from the watersheds, and any pollution there may be is so diluted as to be incapable of harm. But there is such a demand for clear water that reservoirs are necessitated, with their attending evils. Water that is stored for twenty or thirty days commences to deteriorate. This is due to stagnation, and the stagnation begins to manifest itself as soon as the oxygen in solution in the water becomes less than 0.3 per cent. The best means of preventing stagnation consists in keeping the water in motion, and there is no better way than forcing air into the bottom of the reservoir, and keeping the water aerated. Mr. Brush gave an interesting account of his experience with a number of reservoirs where the water had become tainted in consequence of lying stagnant, and in every instance he obviated the difficulty by forcing air into the reservoir or the mains.

Electric Lights without Wires.

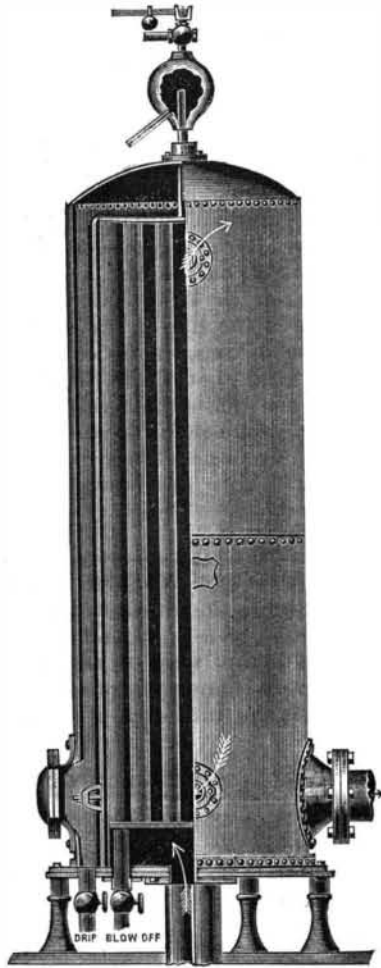
Professor J. J. Thomson has prepared a number of vacuum tubes in which there are no electrodes, but which are surrounded by coils of insulated conductors connected with batteries of Leyden jars. These tubes contain a little gas, of sorts, remaining after they had been exhausted in the ordinary way, and every time the jars are discharged through the surrounding conductors, the insides of the tubes are filled with light, which varies in color with the kind of gas contained therein. A Wimshurst influence machine furnishes the electricity, and the display is an exemplification of the connection between induced electricity and the phenomenon of light.

AN ATTACHMENT TO COOL WATER IN MAINS.

An improvement by means of which the water carried in main service pipes, for use in cities or towns, may be cooled during its passage to be fit for drinking in warm weather, without the addition of ice, forms the subject of the accompanying illustration. It has been patented by Mr. Arthur B. Wood, of Port Byron, N. Y. As shown in Fig. 1, the water main is supported upon a suitable foundation, and lying close to its top are cooling coils connected by a coupling to suitable nipples extending out from a heading, which is divided into a series of valve chambers having channels communicating with each other, and right angle channels leading into the coils. Fig. 2 is a detail view of one of the valves, a three-way valve having a bottom fitting on the base of the heading, and an outwardly extending stem with squared end and screw-threaded portion on which is a binding nut. The valves are opposite the ends of each pipe, to turn on or cut off the refrigerating material, Fig. 3 being a section through the end of two pipes and the valves, and Fig. 4 being a similar view showing the valves turned to cut off the sections. The inlet pipe through which the refrigerating material is forced from any suitable source of supply is connected with the heading opposite the top coils, the discharge pipe leading therefrom at its lowest portion. The coils are held in position by a top casing, made in flanged segments which can be readily placed in position or removed, the inclosed chamber formed by the casing and the water main to be filled with brine or cold air introduced by a pipe at one side and discharged by a pipe leading from the opposite side. The chambers are preferably covered with asbestos, sawdust or other non-conductor of heat. The sectional construction permits the ready removal of any coil, should it become rusted or stopped up, without interfering with the working of the system, the valves being turned to admit the refrigerating material only to the coils desired. In operation, it is designed to force anhydrous ammonia or other suitable refrigerating material into the heading and through the cooling coils, surrounding the top of the main for a short distance only at a convenient point for cooling the water for a certain district or town, the apparatus being duplicated as required when an extended territory is to be covered.

A FEED WATER HEATER AND PURIFIER.

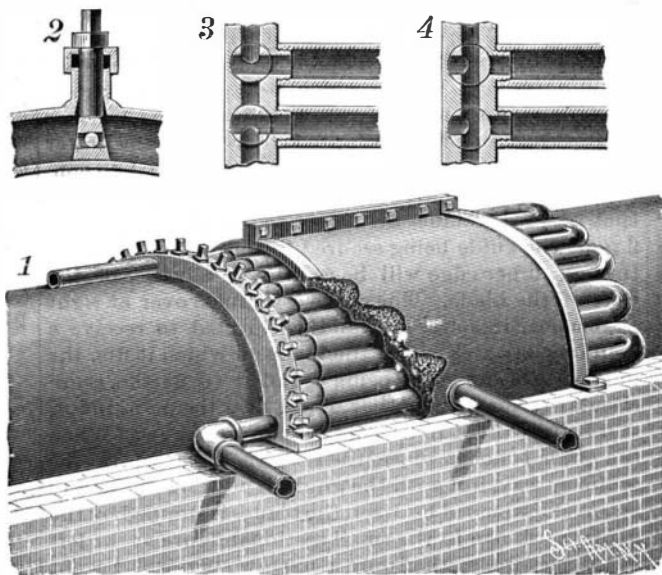
The accompanying illustration represents a feed water heater which is itself practically a boiler, and is designed to heat the feed water to or above the boiling point. It is a plain tubular heater, the whole of the shell of which is surrounded by a steam jacket. The steam enters a central compartment at the bottom, passing up through the tubes, around which the feed water circulates, and thence down on the outside of the shell, thus entirely preventing the radiation of



THE BARAGWANATH FEED WATER HEATER.

heat from the water. The feed water is fed in at the lower end of the shell and drawn off at the upper end. A hollow cast iron ball or scum chamber is arranged at the top for the purpose of collecting the impurities which rise when the water is boiled, this chamber being ordinarily blown out four or five times a day. A blow-off and drip is also provided at the bottom, as well as a suitable hand hole through which sediment may be removed.

This form of feed water heater and purifier has had such extended practical use that its merits have become well known. It is strong and safe, and cannot cause any back pressure, but rather, acting as a surface condenser, is designed to reduce any back pressure that may exist. The heating surface is very large in proportion to the size of the heaters, which are rated at 1 H. P. per sq. ft. of heating surface, so that it heats the feed



WOOD'S REFRIGERATOR FOR WATER MAINS.

water to or above the boiling point, keeps the boilers clean in ordinary water. This, it is claimed, is the special merit of the Baragwanath boiler, that the feed water is more effectually purified by being boiled before it is fed to the steam boiler, while the destructive practice of feeding cold or merely lukewarm water is avoided.

In this heater the tubes are of heavy brass, and the slight variation in the degree of expansion between the brass tubes and the iron shell is provided for by spring tube sheets, which are made slightly concave. Both

the shell and tubes are in contact with the hot steam and not exposed to the air. The heater is also made in inverted form for use in locations where it is more convenient to have the exhaust enter and leave at the top, and a horizontal heater is provided for use in cramped engine rooms. The latter is adapted to be set on top of the boilers in saddles, or hung from the roof. It has also been found particularly convenient for marine use, as it is not top heavy and can be suspended from the deck.

The Baragwanath feed water heating and purifying apparatus also includes a live steam feed water superheater and purifier, which is not designed to do away with the exhaust steam feed water heater, but rather as an auxiliary to it in certain cases, as where heaters are used which do not boil the water, or where the water contains impurities that cannot be removed by boiling. The latter heater and purifier consists of a heavy boiler iron shell, with removable heads, and containing a series of slightly inclined shelves or pans over which the water flows in direct contact with the live steam from the boiler. When the shelves have become coated with scale they are drawn out and cleaned, the bottom of the superheater and the settling chamber being cleaned at the same time.

This line of steam jacket feed water apparatus is made at the Pacific Boiler Works, Wm. Baragwanath & Son, 40 West Division St., Chicago, Ill.

The Largest Plank in the World.

The *N. W. Lumberman* gives an engraving from a photograph of a redwood plank that is 16 feet 5 inches wide, 12 feet 9 inches long, and 5 inches thick, and is about 90 per cent clear. It was taken from a tree 35 feet in diameter and 300 feet high. According to its rings it was more than 1,500 years old. The tree was cut 28 feet from the ground, and the plank was hewed out of the stump, representing a section taken from near the heart to the bark. After it was displaced it was lowered by block and tackle, with a locomotive for power. In the way of labor its cost represents the time of two men for a month, simply to prepare it in the rough for shipment. To this the cost of transportation must be added, making a total of about \$3,000. It was moved by water to San Francisco.

After being on exhibition some time, a car was specially prepared to transport it to Chicago. This was done by cutting a slot in the center of a flat car, in which stirrups were pendent. The plank was placed on edge in the slot, its lower edge being within about a foot of the ties.

The plank was cut on the lands of the Elk River Mill and Lumber Company, in Humboldt County, Cal., is the property of J. L. Harpster, of Eureka, and B. F. Noyes, of San Francisco, and is on exhibition in Detroit, Mich., whence it may be sent to East Saginaw and elsewhere, to finally bring up in Chicago at the world's fair. The plank shows coarseness of growth, with richness of figure, and a finish such as the highest quality of material and the best efforts of Berry Brothers, the varnish manufacturers, of Detroit, can secure.

Wolfram Mining in New Zealand.

Wolfram, or tungsten, belongs to a group of rare metals, and till a comparatively recent time was known only to the chemist, and its value was only in the laboratory. With the invention of 100 ton guns the demand for tungsten soon made that previously obscure metal well known throughout the mining world. It was soon found that the steel tube lining the bore of these enormous guns could not resist the shock entailed by discharging many shots without becoming fractured, when of course an expensive piece of ordnance became useless. Experiment proved that the addition of a small quantity of tungsten to the fine steel employed in gun making rendered the latter metal wonderfully elastic, so that the steel tube will expand under the tension of firing and contract again to its normal size a great many times before the quality of the metal is in any way impaired. The German gun factories consequently absorb most of the tungsten found in the world, and from being a mere curiosity seen only in the laboratory of the chemist, this rare metal has acquired considerable value. Wolfram (erroneously called tungstate of iron in the cablegram) generally occurs in combination with iron in Europe, but is also found in scheelite, or tungstate of lime. It is in the latter form that it occurs in Otago. The metal itself is of a white color, extremely brittle, and heavy, the specific gravity being 19.1, that of gold being 19.3. It will thus be seen that tungsten is a very heavy metal, being only very slightly lighter than gold.—*Otago Daily News*.

Of the entire human race, 500,000,000 are well clothed, that is, they wear garments of some kind; 250,000,000 habitually go naked, and 700,000,000 only cover parts of the body; 500,000,000 live in houses, 700,000,000 in huts and caves, and 250,000,000 virtually have no shelter.

Nerves and Narcotics.

In the May number of the Breslau *Deutsche Revue*, reproduced in the *American Analyst*, Dr. Adolph Seeligmüller discusses the universal subject of nerve troubles as follows: Excessive, exhausting, and too long-continued work, insufficient or irrational recreation, and deprivation of the right amount of sleep are some of the main causes for the increase of nerve troubles in our day. The competition in all the professions and callings is so great that for every person whose powers fail, ten are ready with fresh strength to perform the same or greater labor for the same or even a smaller remuneration. All exciting and weakening amusements should be done away with, and the quiet joys of family intercourse, the conversation of intimate friends, and sociable walks in the fields and woods should take the place of brilliant evening assemblies. Then every person should pursue some agreeable occupation besides his regular profession, and in the latter he ought to have frequent hours of relaxation to relieve the strain. Mental application, even for healthy adult persons, ought not to be continued for more than three or four hours at a time, and night work it would be best to avoid altogether, as the excitement is apt to interfere with sleep.

All who follow intellectual pursuits ought to have several weeks of complete rest at least once a year. Sleep is, however, the principal agent of recuperation. The amount of sleep needed is different for different persons. For the ordinary worker from six to eight hours is absolutely necessary; yet how often, in the battle for existence in our time, is the desire for sleep forcibly suppressed and the night's rest improperly shortened. Sooner or later insomnia wreaks its vengeance on the offender. Many a person who once robbed himself of the necessary amount of sleep would gladly sleep now, but cannot. I do not hesitate to say that nerve troubles first develop into disease when joined with sleeplessness. It appears as a latter symptom of a long-standing nervous disturbance, but to the lay mind it appears as the first sign of disorder, and is frequently taken to be the cause. The worker of the nineteenth century works beyond his strength, and in order to keep it up he resorts to stimulants—coffee, tea, spices, alcohol, tobacco. These produce a super-excitation of the nerves, which brings in its train insomnia; and to overcome this he resorts to narcotics. The life of many of our contemporaries consists in taking artificial stimulants to enable them to perform their work, and then resorting to powerful narcotics that can counteract the artificial stimulation and produce rest and sleep.

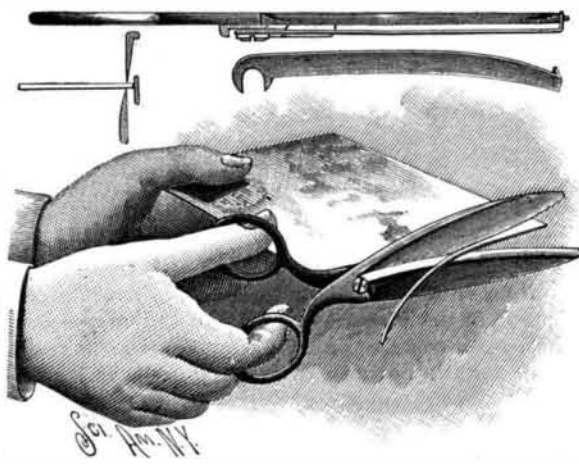
Any one can see that this alternation of stimulation and depression at least once every twenty-four hours must weaken the nervous system. Coffee is a powerful stimulant for the heart, and, therefore, those who suffer from palpitation, from hysterical conditions, or from insomnia should avoid its use. Tea in day time acts more mildly on most people; but taken evenings it drives away sleep. The spices are less active nerve stimulants; yet pepper, especially, and some of the others affect the nerves of the digestive organs powerfully, and their liberal use in modern cookery has something to do with the epidemic of insomnia. Of the injurious, the actually destructive effects of alcohol taken in excess little need be said. We physicians are not a little to blame in that we insist on giving large quantities of alcohol in fevers and conditions of exhaustion, not to speak of the methods used to cure the morphine habit, until patients often acquire the drinking habit. The evil results of the abuse of alcohol are not often apparent. Long before *delirium tremens* or other serious brain diseases appear, they are preceded by manifold nervous disturbances, the real cause of which is not often understood. I have frequently found that rheumatic pains that were ascribed to a cold were nothing but alcohol neuritis, a mild form of inflammation of the nerves resulting from the use of alcohol, which disappeared when the practice was given up, only to return with the slightest repetition of the indulgence. Most habitual drinkers, and some of them very early, are subject to changes in the vascular organs, such as fatty degeneration of the heart and arterio-sclerosis, which lead to grave affections of the nervous system, like apoplexy and softening of the brain. Finally, it may be taken as proved that the children of drunkards, if they are not carried off prematurely by brain troubles, are frequently afflicted with serious nervous ailments, such as epilepsy, idiocy, and the like.

Tobacco has come to be in our time a national poison in many countries, and most especially in Germany. As sequels of chronic nicotine intoxication may be noted without fear of contradiction: Palpitation and weakness of the heart; irregularity of the pulse, of which heart pang or *angina pectoris* is an acute symptom; general nervous debility; tremulousness; disturbances of vision, even to the point of blindness; and hypochondriacal depression even to the degree of melancholia. The fear-inspiring intermission of the pulse is a frequent cause of inveterate insomnia. That the children of heavy smokers suffer with uncommon frequency from nervous diseases is an established fact.

And now for the narcotics, at the head of which stands morphine. The great danger of falling into the habitual use of this drug arises from the cowardice and degeneracy of our times. No one will suffer pain, no matter how slight or transitory. Not a tooth can be drawn, not a child born into the world without the use of an anodyne, and when death comes we must have euthanasia. It is said that many physicians lend their hands too willingly and are ready with the injecting needle to check a pain that could easily be borne, not reflecting that it is immoral to encourage effeminacy and a dangerous thing to plant the germ of the morphine habit, a terrible passion that leads inevitably to physical and spiritual debility and to death. The same is true of the constantly increasing cocaineism and hashish intoxication. Our generation demands above everything narcotics to produce the sleep that first we drive from us, and afterward so fondly desire; opium, morphine, chloral, bromide of sodium, paraldehyde, hydrate of amyl, urethan, sulfonal, hypnon, somnal, and whatever are all their names—one would think names would soon give out, so fast are these children born. But how can we sleep without resorting to soporifics? Just as the life of the soul during the day is reflected in dreams, so the conditions of sleep are determined by all that we do when awake. The chief rule is to so act waking that you can sleep. Begin by accustoming yourself to do without excitants. Many a case of sleeplessness I have seen yield, when all other means failed, to restricting or totally abandoning for a time the use of spirituous drinks, coffee, tea, and tobacco.

IMPROVED SCISSORS FOR OPENING LETTERS, ETC.

The scissors shown in the illustration are adapted to do the work of ordinary scissors and shears, and are also so made that letters may be rapidly opened by them without danger of mutilating the contents. The improvement forms the subject of a patent issued to



WHEELER'S IMPROVED SCISSORS.

Mr. Nathan A. Wheeler, of Alpowa, Washington. The cutting blades are curved on their back sides, and one of them is somewhat thinner than the other, to allow it to close beneath a guide carried by the latter. The thinner blade also has, near its pivot point, a semi-circular recess, terminating on the inner side in a shoulder adapted to engage a letter guide and throw it from the pivot pin. The figure at the top in the illustration is a sectional edge view of the scissors, and just below is shown the guide attachment used in opening envelopes. The screw by which the blades are pivoted together has an annular flange or rib below its head, forming a washer which bears upon the upper blade, and an annular recess between the washer and the screw head adapted to receive the letter guide. The latter is thin and flat, and curved to conform with the flanged back side of the thinner blade, so that when the blades are closed together it will fit the flange, the guide being secured to the other blade, so that its inner edge will be a little in advance of the edge of the blade. The guide is doubled over at right angles near its outer end and perforated to receive a stud on the outer end of the blade on which it fits, the inner end of the guide being rounded to fit the semi-circular recess in the other blade, near the pivot point, and being slotted to fit closely upon the screw. When the guide is not in place the scissors are used in the ordinary way, but with the guide in position the end of an envelope passed between the blades is stopped by the guide, as shown in the small sectional figure at the left in the picture, so that only a narrow strip will be cut from the extreme end of the envelope, without danger of cutting anything it may inclose.

New Electric Car Motor.

Mr. Wm. H. Patton's new combination has lately been tried at Pullman with much success. The apparatus consists of a mechanical and electrical combination, as follows: A gas engine, dynamo motor, and storage batteries.

A gas engine is placed in position in the center of the car, resting on the trucks, and is geared direct to the dynamo by means of a friction pulley, no belts whatever being used. The dynamo furnishes the current

for the motor, from which the propelling power of the car is obtained. In going down a grade, running on a level piece of track, or carrying a small load with a car whose generating power is entirely self-contained, there would necessarily be a surplus of current. The storage battery is arranged to take up this surplus current that would otherwise be wasted. A gas engine ordinarily is started by hand power, but here the current of the batteries is thrown on, which starts the engine, after which the batteries are thrown off and the dynamo generates current for the motor.

Treasures of Earth's Interior.

A scientific scheme of much importance has been agitated in Washington recently. During the last two Congresses there have been a number of representatives and two or three senators who have used their influence in favor of an appropriation for boring a hole in the earth several miles in depth. It has long been recognized that an inconceivable amount of value in the shape of precious metals and other mineral substances is locked up out of reach beneath the crust of this planet. All the riches dug out of it represent merely the most superficial and ineffective scratching of the surface. Once render accessible the internal recesses of the sphere, and it is plain that every human being might be a thousand times a Monte Cristo.

Geologists are agreed that the interior of the earth is largely composed of metals. Whereas the surface matter of the planet weighs only about two and one-half times as much as water, it is known as a fact that toward the center the average weight of things is eleven times that of water. This is due to the circumstance that while this sublunary orb was cooling and condensing, the heavier particles sought the middle. Therefore it is probable that the great mass of the sphere is iron. But there are other metals more heavy than iron, and these would naturally form an accumulation immediately about the center of the globe. Among them may be mentioned most importantly gold. Geologist Gilbert, of the Geological Survey, said the other day that he would rather expect to find a vast accumulation of gold at that point than anywhere else, his notion being that such of the yellow metal as is found on the surface of the earth is only an accidental detritus. However, there are two or three substances known even more weighty than gold, and one of them is platinum, which has doubled in market value within the last year or two, owing to the increased cost of production.

So it is not unreasonable that certain members of Congress and other persons of keen judgment should consider the advisability of boring a hole in the earth for the purpose of extracting some of its metallic contents. For scientific purposes a pit has recently been sunk at Speling, in Germany, to the depth of a mile. Unfortunately, water has been struck, and no results which add very materially to human knowledge have thus far been obtained. Another well has been driven at Wheeling, West Va., as far down as three-quarters of a mile. It is dry, and the boring process is proceeding at the rate of about ten feet a day. The management will be disgusted if oil or something is not struck before the hole comes out at the antipodes and somebody tumbles into it at the other end.

No really scientific person has been so foolish as to imagine that possible results, commercially speaking, could be secured without digging much further than this. Estimate is made that at twenty miles from the surface of the earth every known substance—metals, rocks, and all—becomes fused and liquid. Once let this point be reached, and naturally whatever is below must spout up of its own accord, without expense of mining. Immediately the price of metals in the market would be reduced to little or nothing, and a new age would dawn upon civilization. It has been suggested that such an artificial conduit would be, to all intents and purposes, a volcano, but any dangers which it would otherwise threaten might be obviated easily by establishing the works on an open prairie.—*Washington Star*.

Phenacetine in Influenza.

"Dr. Henry, St. Mary Cray, Kent, recommends phenacetine during the first stage of influenza. Its action, he says, is prompt and striking, so that many patients declare they have derived more benefit from the 'powders' than from anything else. It rapidly cures the headache which is such a distressing symptom at first, helps to reduce the temperature, and mitigates, but does not entirely remove, the aching of the limbs, a few doses of salicylate of sodium effecting its final removal. He gives the phenacetine in five-grain powders, repeated every four hours, till the headache and other pains cease. He has used phenacetine largely in a variety of conditions, and considers it is unrivaled as an analgesic. It seldom fails, it is comparatively cheap, tasteless, and, as far as he can see from a tolerably extended experience of it, is totally free from the unpleasant after-effects—depression of heart, etc.—sometimes caused by antipyrine and other drugs of its class. Insolubility is its sole drawback."—*British and Colonial Druggist*.