A TWO THOUSAND HORSE POWER TURBINE.

The hydraulic and electrical installations at Niagara Falls offer some of the most interesting engineering features in the world. We illustrate one of the enormous turbine wheels of the new plant of the Niagara Falls Hydraulic Power and Manufacturing Company, which has been recently completed, the machinery being now in operation. The plant was built for the purpose of supplying the new aluminum factory of the Pittsburg Reduction Company and to supply power to other consumers. The company now furnishes power to the Niagara Falls & Lewiston Railroad and the Lewiston & Youngstown Railroad. The water supply for the plant is taken from the upper Niagara River. The water flows through a canal 4,400 feet long, 70 feet wide and 11 feet deep to a basin 400 feet long and 70 feet wide which runs parallel to the high bank.

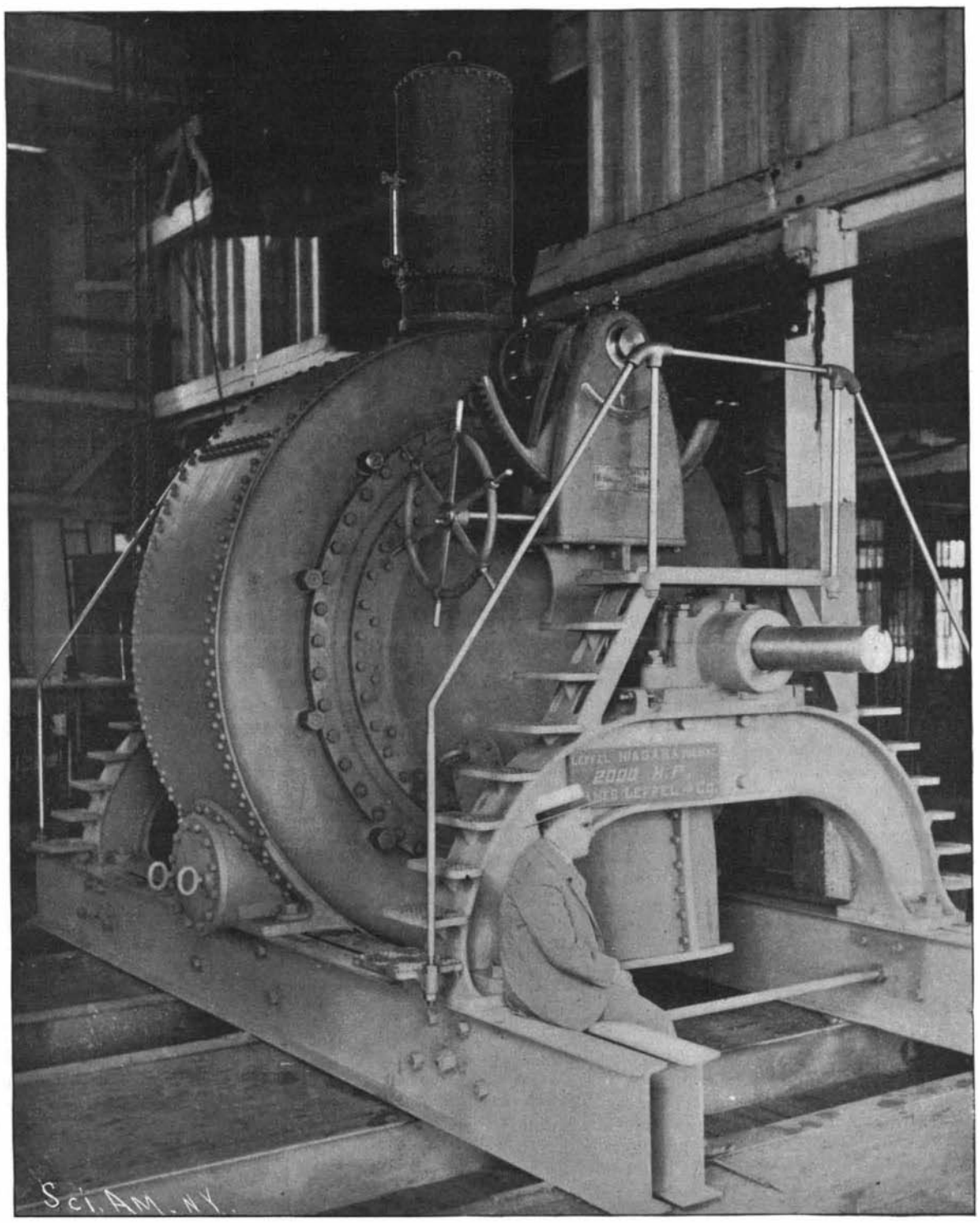
The water for the new power house is taken from a basin to a forebay, 180 feet long, 30 feet wide, and 22 feet deep, located on the extreme edge of the high bank. Over the forebay is built the gate house which covers the gates controlling the admission of water to the penstocks. There are also two waste gates each 20 feet deep by 8 feet wide, by which the canal may be cleaned at any time. The apparatus for handling these gates was devised by Mr. Wallace C. Johnson, chief engineer of the company, under whose immediate supervision the entire plant was erected. Before each pair of gates are two cast iron cylinders about 8 feet high with pistons; the two ends of each cylinder are connected to a pump driven by an electric motor, by which the oil with which the cylinders are filled is pumped into either end at will, forcing the pistons to move accordingly. The piston rods are connected by an iron beam on which are hooks taking hold of pins on the gates. With this apparatus it is said that a pressure of 100,000 pounds may be maintained.

The power house is 180 feet long and is arranged to eventually contain sixteen wheels of about 2,000 horse power each. The wheels work under a maximum head of 218 feet, the highest head thus far used for such a large power. Owing to the fluctuation of the height of the water in the lower river the generator floor of the station was built some 20 feet above the normal water level, and in order to connect the water wheels directly to the generator shafts it was necessary to have them also at the same elevation. It was found necessary to use turbine wheels mounted on horizontal axes to give the necessary speed regulation requisite in a direct connected plant. The penstock runs down vertically 135 feet and is 8 feet in diameter, being built of steel plates. After reaching the bottom of the vertical fall the penstock runs at an angle of 45° and then runs horizontally under the floor for a distance of 70 feet; the size of the penstock is here increased to 10 feet in diameter.

The water is supplied to the turbines from underneath. Valves are provided so that each turbine can be cut off from service if desired. There are at present four turbine wheels installed. They are each of 2,000 horse power and run at 280 revolutions per minute.

The turbines were built by James Leffel & Company, of Springfield, O. Each turbine takes water from a separate 5 foot pipe leading from the penstock. Each wheel weighs about 50 tons and stands on heavy double steel beams spanning the tailrace. The water pressure is 100 pounds to the square inch. The Leffel Company call this wheel their "Niagara type." The turbine shown in our engraving is a double discharge turbine and consists of a large flattened vertical circular casing containing the guide case of the wheel proper. The cylindrical case is 11 feet in diameter and 4 feet long. On the side of this case elbows are fitted through which the discharge water is conducted from the wheels. The shaft passes through these elbows, which are provided with stuffing boxes. On the inside of the elbows lignum-vitæ steps are fastened, against which are concaved rings on the shaft to prevent end motion on the shaft. The wheels are so designed as to prevent end thrust of shaft. The heads of the casing are made of 3½ inch iron castings. The straight or cylindrical part of the casing is made of steel plates ¾ of an inch thick, double riveted to the cast heads.

The runner is made of bronze and iron and is 74 inches in diameter. The rim of the runner is the bucket rim and is cast solid from gun metal bronze. On this rim are two sets of buckets taking water on the face and discharging it at each side of the rim. The bucket ring is bolted to the spokes of the cast iron center, the hub of which is keyed to the shaft of hammered iron, which is 20 feet in length. Surrounding the outside of the runner is a cylinder in which the gates are fitted.



A TWO THOUSAND HORSE POWER TURBINE.

The gates are about 20 per cent less in number than the buckets; they are hung on steel pins and open by lifting one edge, so that the direction in which the water enters the wheel is nearly tangential to the runner. Each gate has two arms, which are connected to the ring by means of which they are opened and closed. The wheels operate under a variable head of 210 feet to 218 feet and run at a speed of 280 revolutions per minute. To each end of the water wheel shaft is rigidly coupled a direct current generator capable of generating 560 kilowatts of electrical energy.

The power company have also four turbines of the same type and make. Two of these turbines are of 2,400 horse power, and connect with eight powerful pulp grinders, situated on each side of the wheels and connected directly with them in a manner similar to the generator connections above mentioned.

Two patents have recently been granted to "George Washington," of Brussels, Belgium, for a system of lighting with incandescent burners.

Manufacture of Celluloid.

Celluloid is made by the combined action of pressure and heat, or with the aid of solvents, in that case in the cold, says the Trade Journals' Review. The camphor is dissolved in alcohol, as little as possible, and the solution sprayed through a rose on to the pyroxyline, which must be perfectly dry. A second layer of pyroxyline is added, moistened again with camphor solution, and so on. The gelatinous lump is worked between iron rollers to which it adheres; the layer is slit longitudinally and rolled again. The cakes, 0·4 inch thick, are cut into plates, about 2 feet by 1 foot, which pass for twenty-four hours into hydraulic presses, which are doubly steam-jacketed. The mass is now sawn into plates, which are dried at about 95° Fah. for a week or two, and finally cut into smaller pieces, from which the articles are stamped. Further particulars are difficult to obtain. The writer in the Gummi Zeitung believes, however, that Magnus & Co., of Berlin, pour 100 parts of ether on 50 of collodion wool and 25 of camphor, and stir the covered mass in earthenware vessels with rubber sticks until a homogeneous gelatinous mass is obtained, which is then rolled. At St. Denis ethyl alcohol is said to be used. Apart from dyestuff and other additions the celluloid consists on an average of two-thirds of pyroxyline and one-third of camphor; more camphor imparts an unpleasant smell and impairs the strength of the product. The chemical constitution of celluloid is still doubtful.

The celluloid is generally supplied in rods of 3 feet length, or in plates of 30 inches by 12 inches, of a yellowish color, unless dyed. It cannot be exploded by heat, blows, nor friction. It burns, but the flame can easily be blown out; it leaves an ash skeleton, which continues to sparkle faintly for some time. It is soluble in ether-alcohol, while either of the ingredients alone only attacks the camphor. Concentrated acids and caustic alkalies decompose or carbonize the celluloid. While the finished article is not dangerous, the manufacture is highly so. Various additions to render the celluloid less inflammable are hardly required. The smaller articles are cut ready in the cold, dipped into hot water, bent and shaped, and plunged into cold water again to retain their shape. Larger articles are pressed in heated moulds. If reheated during further operations, the articles lose their shape. The comb manufacture is simpler than with hard rubber. The teeth are stamped with dies, by hand or machinery, and then polished with pumice stone and cold water. The dyes are generally added at the time when the pyroxyline and camphor are mixed. Striped articles are obtained by superposition of plates of different colors and cross cutting of the compressed blocks. Surface dyes may be dissolved in acetic acid or acetic ethers, which slightly attack the celluloid.

Dr. Koch Discovers a New Serum.

Dr. Koch, the eminent German bacteriologist, has telegraphed to Berlin from Cape Town that he is returning home with a newly discovered serum which will lessen the force of rinderpest. In the mean time, he says, he is unable to say whether or not he will be able to prevent animals from being infected with the disease. He has demonstrated that sheep and horned cattle are the most liable of all animals to contract the disease, and that dogs, monkeys, and rodents enjoy complete immunity from it. Dr. Koch telegraphs that he is not going to Bombay to study the bubonic plague which is raging there, despite the fact that he has been asked to head the commission which is to be sent to Bombay for that purpose.

Portland Cement Industry in Belgium.

The most important center for the production of Portland cement in Belgium is the calcareous district of Tournia. Some of the quarries in this district date back several centuries, when they were principally worked for building stones, and for the manufacture of hydraulic lime. The calcareous stone of these quarries, which, according to the United States consul at Brussels, originated the now extensive and important industry of cement manufacture, extends for many miles in length in apparently inexhaustible quantity. Ordinary lime, best hydraulic lime, slow setting (Portland) cement, and quick setting (Roman) are especially products of these immense quarries. Consul Roosevelt says that natural Portland cement is obtained from calcareous stone which is carefully analyzed and dosed, treated in coke heated kilns, and after burning, finely pulverized. Analyses of the calcareous stone found at Tournai show the following result: Silicic acid, 15·75 per cent; oxide of iron, 1; alumina, 3·95; lime, 43·1; magnesia, 0·49; sulphuric acid, 0·5; loss in firing, 35·21 per cent. Before burning the stone presents a fine close grain, and is of a peculiar pasty appearance. Prior to calcination the stone is carefully analyzed to ascertain the exact quantity of lime as well as other chemical properties it may contain. The stone loses about one-third of its weight during the process of burning, which also changes it to a brown tinge. When withdrawn from the kiln, the cement is placed under sheds to thoroughly cool before being ground. After grinding, and before being packed into barrels, it is put into pits and left undisturbed for two months. Natural Portland cement was first produced in Belgium in 1882, and the establishments now engaged in the enterprise have formed a syndicate under the name of "Mutualité Commerciale des Ciments Belges," with headquarters at Tournai. The company sells about 1,200,000 barrels of cement annually. The syndicate has adopted as a trade mark the figure of a hammer. Any firm, however, of the syndicate having a trade mark is privileged to use it. For instance, those firms having the well known "rhinoceros," "trowel," "sword," etc., use them in conjunction with the syndicate trade mark.

Independently of the trade marks of the manufacturers, important buyers of the Mutualité who have labels enjoying a certain reputation are permitted to affix them on the barrels. It is stated that the principal object of this arrangement by the Belgian manufacturers is to warn and protect persons who purchase Roman cement for export without mark or label, and unknown and unauthorized by the manufacturers have Portland cement labels affixed to the barrels at the port of shipment. Roman cement is also made in the Tournai district. It is much cheaper than Portland cement, the selling price being about 50 per cent less than the Portland. It is much employed in Belgium, replacing advantageously a good hydraulic lime. Manufacturers, however, will not guarantee it, as it is made of refuse stone not suitable for the manufacture of Portland cement. It has a natural light yellow color. Cinders are very often added, changing it to a grayish color resembling Portland cement, and also increasing its resistance in a slight degree. This is the product which is purchased by unscrupulous exporters and sold by them marked as Portland cement. This fact is significant and should attract the attention of builders, to avoid disasters such as the unexpected collapse of buildings where first class cement has been supposed to have been employed. Artificial Portland cement was first manufactured in 1872 by a Belgian firm—Messrs. Duffossez and Henry. There are now several important works engaged in its manufacture. Artificial Portland cement is the result of burning a thorough admixture of clay and carbonate of lime in constant proportions, and when dry reducing to finest powder.

Several cements are manufactured by burning natural argillaceous limestone containing varying proportions of clay and carbonate of lime. Some manufacturers rectify the composition of these cements after burning by adding, as required, limestone, slag, etc. Cements are thus produced resembling in chemical constitution Portland cement, but which do not possess its properties, on account of the constituent elements not having been forced into combination by calcination and semi-fusion of the mass. These cements are sold under the name of artificial Portland cements, though in reality they are mixed cements, composed of limestone or slag, possessing none of the qualities or properties belonging to real Portland cement. Artificial Portland cement having an invariable chemical composition must necessarily present a constant character and behavior, and the small differences shown by the assays arise generally from more or less perfection in the burning and grinding, but also exhibit radical changes in their physical and chemical constitution on account of the varying proportions of their component parts. Cement may be submitted to a large number of tests for the purpose of ascertaining its qualities. The tests relate to (1) regularity of composition; (2) fineness of grain; (3) gravimetric weight; (4) specific gravity; (5) time of setting; (6) resistance to tensile, compressive or shearing strains and cohesive strength, either when pure or mixed with sand; (7) uniformity of volume or expansion; (8) resistance to frictional wear; (9) expansion; (10) impermeability, etc. To be considered of good quality, the cement must give a satisfactory result to the group of tests to which it is submitted. Thus, if properly proportioned, it should, for a given fineness of grain, have a maximum of weight and specific gravity, fulfill the required conditions of setting, and show the minimum of resistance to strain required within a given time.—Journal of the Society of Arts.

The Clay Eaters.

Yellow clay as a daily food is what many of the people of Winston County, Ala., live and thrive on, says the Atlanta Constitution. The county of Winston is in the northwestern portion of the State and is sparsely settled, its population being poor and appearing to be eking out a mere existence. It is only within the past few years that the amount of taxes collected from the entire county amounted to $1,000. Until 1888 Winston was forty miles from the nearest railroad and the county court house twenty miles further. Houses of worship and those for eductional purposes are few and far between. A majority of Winston's population live in small log cabins of the rudest kind and eke out a miserable existence by farming, hunting, and fishing.

Their farms, or patches, as they call them, are small clearings around their cabins, and are seldom more than a few acres in extent. Their crap (as they invariably say) consists of corn, pease and potatoes, and a few who are fortunate enough to own a horse attempt to raise a little cotton. The land is very poor, and as the crops receive little work, the yield is always small. A few hogs are raised, but the majority depend on the country stores for the few strips of bacon they eat during the year. Here in this county, though, the moonshine stills flourish as the green bay tree. In almost every cave and on every little brook among the hills may be found a still whose undertaker's delight is produced by the soft light of the moon and where Uncle Sam fails to get his pull-down of 90 cents on the gallon. These people are too far from market to sell their corn for money, but they can convert it into good, straight liquor, carry it in kegs or jugs to the more thickly settled neighborhoods a few miles away and obtain a few dollars in money, some tobacco, coffee, and snuff for the women folks. Men, women, and children are all slaves to the tobacco habit. The women chew, smoke, and dip snuff, but "dipping" is generally a Sunday luxury, as snuff is hard for them to get.

The interior of the cabin of the clay eater is rude in the extreme. It is usually built of small pine logs, from which the bark is sometimes removed. There are no windows, and sometimes only one door. In winter the cracks between the logs are filled with rags and clay or thin boards nailed over them from the outside. In summer these cracks are opened, in order to allow plenty of fresh air to enter. There are no pictures on the walls, no ornaments of any kind, and often no furniture worthy of the name. Of these are bedsteads, and they are of the crudest kind, made by the head of the family, with no other tools than a saw, ax, and hammer. Usually the cabin is too small for bedsteads if the family is large, and they sleep on quilts and mattresses spread on the floor, often the ground. The entire family, often ten or more persons, eat and sleep in the same room, and the cooking is done on one fireplace, the utensils consisting of a frying pan, kettle, oven, and a pot. All modern conveniences are almost unknown. Few families ever see a newspaper, and there are but few of the people who can read. Their parents before them could not, and their children are growing up equally ignorant. Strange to say they do not believe in "book learning." If the head of the family is a member of the church, probably a cheap Bible may be found in the house, but they never hear it read except when a traveling preacher comes along and stops for dinner or stays all night. When the writer was in Winston County last year he heard a man of God read from the Great Book, and when he read "Jesus Christ died to save sinners," the good old motherly woman moved the cob pipe from her mouth and in utter astonishment remarked: "Is that so? I allus told Bill we'ud never know nuthin' 'less we tuck the paper."

The clay eaten by these people is found along the banks of the small mountain stream in inexhaustible quantities, and is of a dirty white color usually, sometimes a pale yellow. It has a peculiar oily appearance, and the oil keeps it from sticking to the hands or mouth. When dry it does not crumble, and a few drops of water will easily soften it until it can be rolled into any shape desired. The clay is almost without taste, but evidently possesses some nourishment, as these people declare they can subsist on it for days without any other food whatever. They place a small piece in the mouth and hold it there until it dissolves, and is swallowed in small quantities at a time. The quantity eaten at one time varies from a lump as large as a pea for a child or beginner to a lump as large as a man's fist for those who have eaten it for years. These people eat the clay with a ravenous relish, and the only bad effect seems to be the peculiar appearance it gives the skin of those who become addicted to the habit. The skin turns pale, so pale, in fact, as to give the face the pallor of death, and then later on it turns a sickly pale yellow, a color closely resembling some of the clay eaten. Children who become addicted to clay eating grow old, at least in appearance, prematurely, and their faces lose forever the bright glow of youth and health. Strange as it may appear, there is little sickness among the clay eaters, and they live as long as the average mankind, this proving that clay eating is not fatal in its effect.

It may or may not be the result of clay eating, but these people are as superstitious as the followers of a voudoo. They have signs for everything, and almost worship the moon. Corn is planted when the moon is full, and potatoes on the dark of the moon. They will not start on a journey or begin a job unless the moon is right, and they foretell storm and disaster by the appearance of the moon. If one end of the new moon is lower than the other, it will rain before the moon changes again, and if the new moon is level, there will be no rain until another change occurs. It might be remarked that the clay eaters are often as successful in their prognostications as the average manipulator of the weather bureau. For an owl the eater has a holy dread. The hooting of an owl at any hour after 8 o'clock in the evening and until nightfall the following day is an omen of bad luck. If heard in the quiet hours of night and answered by the howl of a sleepless canine, it is a sign that one of the family will die before many moons. As soon as the hoot of an owl is heard a chair is overturned. If the hooting ceases at once, the threatened danger has been warded off for a time, but if it continues there is weeping and wailing in the home of the clay eater. The howling of a dog at night is also an omen of ill luck, but it is not a sign of approaching fatality unless it is in answer to the hoot of an owl. When a screech owl lets forth one of its horrible and blood-chilling sounds, the women folks reach their hands up the chimney and get a handful of soot. A screech owl near the house is a sure sign of death.

With the tenacity of ignorance these people cling to their filthy habits, traditions, and superstitions; of modern inventions and customs they have never dreamed, and they would ridicule the man who told them the world is round. Perhaps in time they will disappear with the onward march of civilization and enterprise.

The Brambel Engine.

In our issue of January 30, we published an article on the Brambel rotary engine, in which article we reproduced the claim of the patent and its drawings. As we failed to see anything startling in the invention, as its claim, from the multiplicity of its elements, was of limited scope, and as the engine involved no discernible principle that would make it an operative device, we formed a most unfavorable opinion of the widely exploited device and of the methods used for giving it the publicity which it has attained. Since that paper was published other accounts have appeared in the press, and all go to verify our original opinion. Some pains have been taken to verify the published personnel of the capitalists and of their representatives without success. The transfer of any money from the capitalists to the inventor has not been proved, in spite of the fact that a facsimile of a check made out to Brambel, covering several millions of dollars, was published in one of the exemplars of the new journalism. The story is what we pronounced it nearly a month ago—a hoax.

The name of the town where the story originated is a curious and suggestive feature of it. Sleepy Eye would seem well adapted to express the status and nature of the credulous individuals who put trust in the story. But no such person, we are confident, has yet been proved to have invested very deeply in what may be termed the Sleepy Eye engine. If so, we fear that the Brambel with which such invention will have come in contact may treat them as the bramble bush in Mother Goose treated the man who was wondrous wise—the Minnesota Brambel may put out his Sleepy Eye.

The attempt to boom this invention indicates a system of operations greatly to be deprecated in the interest of meritorious inventions. Good wine needs no bush, a good invention needs no Brambel. Capital is ready and willing to take up a good invention, but millions of dollars are not invested in things of the type of the curious invention from the curiously named western town.

SINCE the completion of the great locks at the Cascades in Oregon, a few weeks ago, boats can pass from the mouth of the Columbia River to the Dalles, 230 miles. In a short time the boat railroad from the Dalles to above the Celilo Falls, nine miles, will be finished, and boats will be able to go up the river 560 miles without change. Heretofore it has been necessary to transfer cargoes at the Cascades and at the Dalles.

Science Notes.

Governor MacGregor discovered on his recent tour through British New Guinea several new varieties of birds, including a new kind of bird of paradise. On Mount Scratchley, 11,000 feet above the sea, larks were found, and vegetation corresponding to that of a temperate zone.

Prof. Galileo Ferraris died at Rome February 7, 1897, aged fifty years. He was principal and also professor of applied physics of the Museo Industriale of Turin, and was a member of the Italian Senate. He made important contributions to electricity, studying especially the phenomena of alternating currents.

The results of the quinquennial census of France, taken on March 29, 1896, show a population of 38,518,975, an increase of 125,027 during the five years. The towns having more than 30,000 inhabitants show an increase of 320,000. Most of the agricultural districts, with the exception of Brittany, show a decrease.

A French chemist has discovered a purely chemical standard for determining the bread-making properties of flour. In a paper presented to the Académie des Sciences he asserts that flour containing one part of glutenine to three parts of gliadine produces the best results for digestion of the bread and for bakers' purposes.

In an infringement of patent case recently heard in the courts at Trenton, N. J., in which the complainant company are makers of a water nozzle, the defendant answers that the essential and substantial features on which the patents are based were known, among others, to "One Heron, now deceased, but formerly of Alexandria, Egypt, living at said Alexandria and elsewhere, 1,000 B. C."

Four essays presented in competition for prizes under the Hodgkins Fund of the Smithsonian Institution are now published and distributed: Argon, a New Constituent of the Atmosphere, by Lord Rayleigh and Prof. Ramsay; Atmospheric Actinometry, by Prof. Duclaux; The Atmosphere in Relation to Human Life and Health, by F. A. R. Russell; and Air and Life, by H. De Varigny. The first essay justly received the great Hodgkins prize of $10,000. All the authors are Europeans.

Lord Lister, in a communication to the British Medical Journal, announces that he has the profound satisfaction of being able to state, on the authority of the India Office, that the Bombay government intend to make use of the services of M. Yersin in the treatment of persons suffering from plague. M. Yersin is now on his way to the stricken region to give a full trial to his method, and Lord Lister has learned through another channel that before the middle of February the serum treatment will probably have begun in Bombay.

The French maneuvers in the Alps had some unexpected results, says the Army and Navy Journal. It was the fixed opinion of the French staff that the Alps were impassable, but on two occasions the corps representing the invader outmaneuvered the defending force and forced its way inland by some of the minor passes. These points were first near the Tenda pass and the Authion peak between the two parallel basins of the Roya and Vesubja. The second instance was the more glaring, for it was found that a hostile force could advance, entirely evading the strong fortresses of Briançon and Tournoux. Orders have been given to strengthen all these weak points, but this will necessarily be a work of time, and some of the work cannot be commenced before next spring.

A calculation is given in a bulletin of the United States Weather Bureau, says the American Electrician, "showing the immense quantity of energy expended in the formation of clouds. It is estimated, on the basis of the annual fall of water as rain or snow in the United States, that the work done in raising the rainfall to the clouds is equivalent to 1,920,000,000 continuous horse power, or the work of 5,000,000,000 horses toiling ten hours a day—perhaps a thousand times as many horses as there are in the United States." We wonder what the energy expended in America in reckoning out such useless figures is equivalent to, says an English contemporary. Though such computations may be valueless from a practical point of view, still they are interesting, and if accurate give no just occasion for comment.

Mr. Clement Wragge, who organized the twin meteorological observatories on the summit and at the foot of Ben Nevis some years ago, and who is now the government meteorologist of Queensland, aims at the estalishment of similar twin stations at outstanding points in the southern hemisphere, partly with the view of comparing the high level with the low level results at these points, and further with the view of comparing these results with those obtained at corresponding latitudes in the northern hemisphere. There has been for some years a meteorological station on Mount Wellington, in Tasmania, which Mr. Wragge organized, and Mount Wellington is the Ben Nevis of the Antipodes. Its latitude is some degrees lower than that of its northern prototype, but its elevation (4,120 feet) is within 250 feet of being the same. The permanent establishment of twin stations on Mount Wellington is Mr. Wragge's first aim; but he also wishes to have high level stations at several points in the Australian Alps, such as Mount Cork (13,000 feet).

Archæological News.

A Madonna and Child which is believed by many critics to be by Cimabue, the master of Giotto, has been discovered in London. It had been for thirty-five years in the possession of Canon Harford, of Westminster, who had obtained it from the Balgano family in return for his assistance in disposing of their collection. The picture is painted on a panel covered with a chalk preparation and is painted over with oil with the exception of the two figures. Sir E. J. Poynter, the new president of the Royal Academy, believes in its genuineness, but doubts on the subject will not be dispelled until it has been examined and certified to by some critic of the Morellian school. If genuine, the discovery is of the utmost importance, as Cimabues are exceedingly rare.

It is curious that the very oldest business in the world has continued on, of course, in a rapidly diminishing quantity, but still kept on, from the time when man first fashioned a weapon out of flint up to to-day. Where man in the Neolithic age, thousands on thousands of years ago, dug his pit and found his flint, and there fashioned it, in the identical place the same work is carried on to day at Brandon by what is called the flintknapper. Under the chalk lies the flint, and pits are dug and short tunnels constructed. The old workings of the remote past are close to the present ones. The mystery of arrow making, using flint as a material, has been solved long ago. By practical work it is found to be much less difficult than it was at first supposed, and that it can be quickly done. Modern processes only differ inasmuch as we have more efficient tools. The knapper puts a leather pad on his knee and so splits it. What his business is, is to make flints for old muskets and guns, such as are used in the most remote parts of the world. India, China, and South America still use flint-lock guns. Perhaps never will this, the oldest of guilds, give entirely over its flint working. The past ever accompanies the present.

The report of Prof. R. B. Richardson, the director of the American School, shows that the excavations at Corinth in 1896 were of more importance than was supposed. They occupied nearly three months, and at times one hundred men were employed. There was nothing but the ruins of a temple to suggest a place for operations. The first trench disclosed thirty-five Ionic columns used as foundations for a later building, says the Architect. In the second trench were fourteen rock-cut graves, with skeletons in most of them, and many vases of common red ware. Twenty-one trenches were dug altogether; but it was not until the eighteenth was made that five flights of steps, innumerable lines of seat foundations, and two seats in position were found, indicating the Greek theater, upon which had been erected a Roman theater with seats of steeper pitch. In the upper part of the theater were uncovered many terra cotta figurines. Other trenches brought to light a huge drum and the broad pavement with a water channel on each side, these indicating the old agora or a broad passageway into it. The old temple is supposed to have been dedicated to Apollo rather than to Zeus. The chief find in sculpture was a group representing the youthful Dionysus between Pan and a nymph. Nineteen vases grouped about skeletons were also discovered. The vases are unbroken, of interesting shape, and very primitive in appearance. The director suggests laying down a track and dumping cars for next season's work at Corinth, and estimates at $5,000 the cost of next season's excavations.

Everybody associates Lord Nelson's name with the battle of Trafalgar, says the Churchman. How few associate it with the Elgin marbles! Yet the fruits of Trafalgar are gone, but the Elgin marbles remain. They remain not only the highest works of art, but articles whose mere cost value is at the present moment reckoned in millions. Their possession is due primarily to Lord Nelson, whose victory at the Nile began the ruin of the French rule in Egypt, and the French influence with the Sublime Porte. Turkey seized every opportunity to prove her good will toward England, and at that time Greece was a province of Turkey. Lord Elgin, who was then English ambassador at Constantinople, finding that nothing was refused which was asked, and being an enthusiast in Greek art, obtained permission to rescue from complete destruction and oblivion the noble remains of sculpture and architecture scattered throughout Greece, which the French had been removing to the Louvre at Paris for some years previous. While the French had been removing, the Turks had been destroying, for it was found, on incontestable evidence, that many of the statues from the Parthenon at Athens had been pounded up for mortar and used as cement. However, Lord Elgin worked assiduously for years, and completed the salvation of the statues of Phidias. But Lord Elgin himself owned that he never would have been allowed to remove or even dig for one stone had it not been for the victories of Nelson. Few are aware of this.

The Signs of Longevity.

Every one is interested in the question of long life as applied to himself, and all facts bearing on it are noted with becoming feelings of self-congratulation or otherwise, says the Medical Record. It is the staying power that is in demand, backed by an inherited and reserved vitality of resistance against the usual evils to which all flesh and other perishable things are subject. The law of heredity, which our life insurance companies understand so well, is at the bottom of all calculations as to whether a particular man or woman is wound up for seventy years or will run down at twenty or forty years. Aside from this testimony, there are certain physical qualities which have great weight in determining the result of the struggle against a conspiring environment. An oak has one configuration, and a cedar, pine, or mullein stalk another. It is the proper recognition of such distinctions that aids physicians in their prognosis and turns the balance against apparently desperate chances. At a recent meeting of the Academy of Science, Mr. F. W. Warner, in speaking upon the subject of biometry, offered some very interesting data, which are in the main true. He said:

Every person carries about with him the physical indications of his longevity. A long-lived person may be distinguished from a short-lived person at sight. In many instances a physician may look at the hand of a patient and tell whether he will live or die. In the vegetable as well as in the animal kingdom, each life takes its characteristics from the life from which it sprung. Among these inherited characteristics we find the capacity for continuing its life for a given length of time. This capacity for living we call the inherent or potential longevity. Under favorable conditions and environment, the individual should live out the potential longevity. With unfavorable conditions this longevity may be greatly decreased, but with a favorable environment the longevity of the person, the family, or the race may be increased.

Herein are presented the two leading considerations, always present and always interdependent—the inherited potentiality and the reactionary influences of environment. He continues:

The primary conditions of longevity are that the heart, lungs, and digestive organs, as well as the brain, should be large. If these organs are large, the trunk will be long and the limbs comparatively short. The person will appear tall in sitting and short in standing. The hand will have a long and somewhat heavy palm and short fingers. The brain will be deeply seated, as shown by the orifice of the ear being low. The blue hazel or brown hazel eye, as showing an intermission of temperament, is a favorable indication. The nostrils being large, open, and free indicate large lungs. A pinched and half-closed nostril indicates small or weak lungs.

These are general points of distinction from those of short-lived tendencies, but, of course subject to the usual individual exceptions. Still, it is well acknowledged that the characteristics noted are expressions of inherent potentiality, which have been proved on the basis of abundant statistical evidence. Again, he says truly:

In the case of persons who have short-lived parentage on one side and long-lived on the other side, the question becomes more involved. It is shown in grafting and hybridizing that nature makes a supreme effort to pass the period of the shorter longevity and extend the life to the greater longevity. Any one who understands these weak and dangerous periods of life is forewarned and forearmed. It has been observed that the children of long-lived parents mature much later and are usually backward in their studies.

Such observations are of the highest importance.

Why Physicians Should Shave.

It may be claimed by some, writes Dr. W. A. Hockemeyer to the Medical Brief, December, that "the beard is provided by nature, and should be allowed to remain. So it may be with the layman, but when with the faculty it might prove a serious means of contagion, it were better that no chances should be taken. In listening to the action of the heart, or in making other examinations, the face of the examiner must necessarily come into direct contact with the person or clothing of the patient, and a bearded face would be much more liable to be affected thereby than the cleanly shaven skin. Dr. Marion Sims was under the impression that disease had often been conveyed by this means, and was always a firm believer that the less the face was encumbered, the better it was for both the doctor and patient. There is, beyond all that, this fact which cannot but be generally admitted: the perspiration of summer and the frosted breath of winter, or the dampness from rain in all seasons, are not pleasant things for a doctor to carry into a sick room. In winter he may divest himself of his overcoat and hat in the hall, but the beard, with the effects of the outside atmosphere, cannot be so easily laid aside, and oftentimes, especially if the call be a hurried one, the patient may become nauseatedly aware that the doctor was interrupted in the enjoyment of his pipe.