WILSON'S "HOROGRAPH," OR CLOCKWORK PEN.

Mr. Edison's remarkable electric pen has brought to mind a stillborn effort of like character dating back eighteen years. Mr. Wilson, of the firm of Messrs. Newton, Wilson & Co., London, then conceived and worked out the idea of a pen that was operated like a fretwork machine, for marking designs on work for the sewing machine. For some reason or other, but chiefly, no doubt, because of the requirement that the work had to be passed under the pen, in sewing machine fashion, nothing came of the Wilson pen invention. It passed into oblivion, to be immediately revived, however, on the mention of the discovery of Mr. Edison. Mr. Wilson now set himself to the easy task of importing into his previous pen (which, technically speaking, would be the original patent pen) the portability of the Edison electric pen. The Wilson pen is wound up by a sort of watch movement, and its running down action may be utilized on a sheet of paper anywhere. When it is wound up it does not act at all, unless there is a slight pressure of the thumb on the controlling key. It needs no battery to keep it going. The Wilson and the Edison pen have a similar needle, perforating sheets of paper with minute holes, instead of lines; the holes thus made forming writing, or drawing, or design, at the pleasure of the writer. The perforated sheet is called a stencil, and this is put upon a blank sheet of paper. It now only remains to pass an inked roller over the stencil, when a beautiful impression will be made upon the blank sheet beneath, and upon any number of blank sheets that afterward may be submitted to the process. It is said that as many as 300 perfect impressions may be printed from a single stencil in an hour, and that a single stencil will readily yield 10,000 copies.

The Pneumatic Clock.

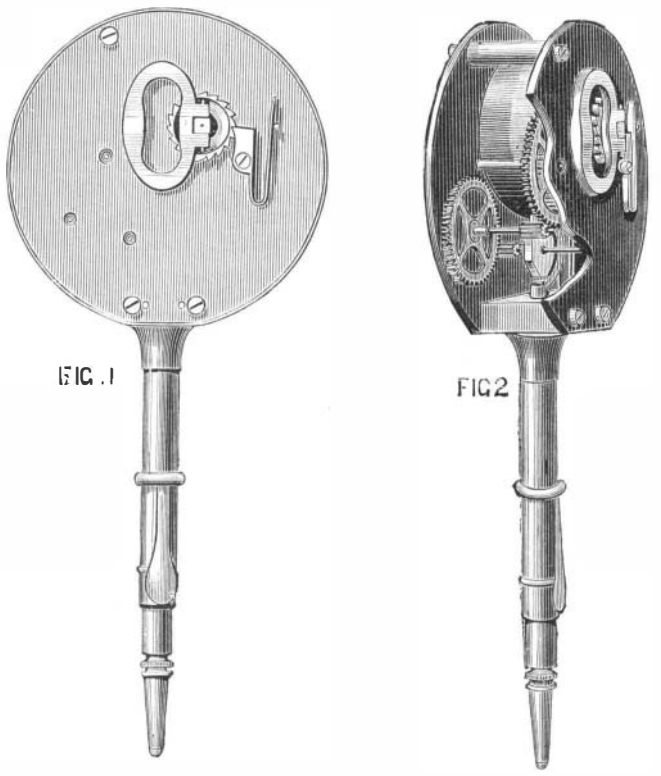
In describing the pneumatic clocks at the Paris Exhibition the SCIENTIFIC AMERICAN gave the credit of their invention to Mr. Mayerhofer, an Austrian engineer, and the merit of perfecting them to Mr. Victor Popp. In a letter, dated March 22, Mr. Mayerhofer begs to have the entire credit restored to himself. He says that the invention was made by him in 1864, but not publicly exhibited until 1875. After many delays and disappointments he succeeded in getting from the City Council of Vienna permission to set up the system in that city, on trial for one year. The cost of this experiment made it necessary for Mr. Mayerhofer to seek financial assistance, which was gained by association with Messrs. Resh & Popp, who undertook the business part of the enterprise. The construction and management of the clocks, however, fell entirely to Mr. Mayerhofer, to whom the perfection of the system is wholly due.

RECENT DISCOVERIES IN ASSYRIA.

In the course of the last summer Mr. Hormud Rassam, a Syrian scholar, made some very interesting discoveries at Balawat (nine miles from Nimroud), on the site of the ancient Nineveh. Mr. Rassam set out last year on the joint expense of the British Museum and the *Daily Telegraph*, and brought back with him most interesting collections.

Balawat was formerly a fortified Assyrian town, but now little more than the ruins of the walls remain. This city has had different names during the reign of Assur-nasir-pal, the father of Shalmanezar II. Although situated but a short distance from Nineveh, it was conquered by the Babylonians before the fall of the Syrians. But when Assur-nasir-pal succeeded to the throne he rebuilt the town and called it Inigur-Beli. The great soldier built a temple for the god of war in the town. These facts are inscribed on some alabaster tables found by Mr. Rassam in a chest of like material, near the portico of the destroyed temple. The inscriptions describe some special event of the obscure periods of Assyrian history.

The ruins of the temple are situated in the north of the ancient village near the ramparts. By making excavations on this spot, Mr. Rassam brought to light two large bronze plates which have singular forms engraved on them. These bronzes were immediately sent to London, where they were received with the greatest enthusiasm by the Director of the British Museum. The rust and earth which thickly covered the same were then removed, and a trial was made to discover that which had been well preserved. It was soon found that they were remnants of a rectangular door which turned on pivots. Judging from the nails that have been found, the body of the door must have been of wood, about ten centimeters thick. The designs are in high relief, and represent the combats of Shalmanezar, his victories and his triumphs, the tortures inflicted upon the prisoners, and his adoration of the gods. These new documents relate of his campaign against Babylon, and also his expedition to the Mount Araval and his triumph over Akhuni, King of Borsipa.

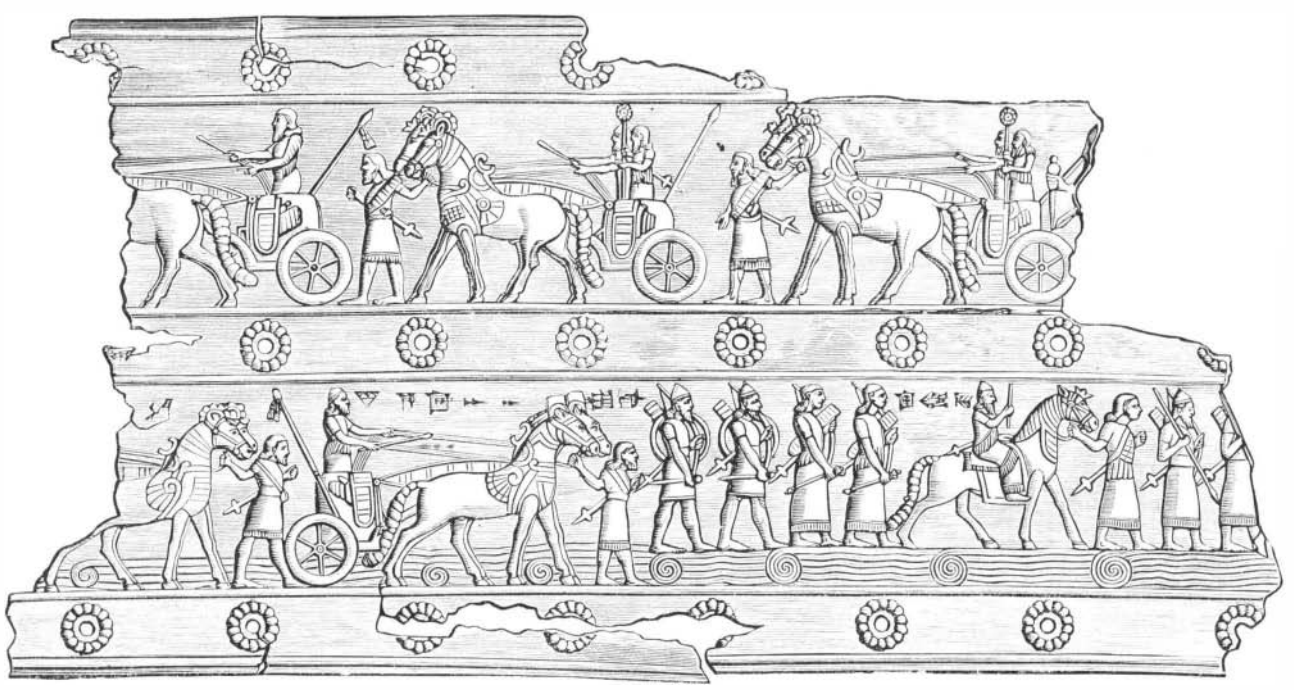


FRONT AND SECTIONAL VIEWS OF THE WILSON CLOCK PEN.

Our engraving represents one of these plates. The king is seen on the march with his army. The warriors stand on war chariots similar to those of the Homeric heroes during the siege of Troy. The horses are led by valets, and the king is represented on horseback, and wears a flowing robe and a cape. He is preceded and followed by his eunuchs. The men carrying the bows and arrows are crossing the Tigris. The other panel shows the king sacrificing before an altar. The captain of the guards is standing behind him, and the soldiers carry an ox and a ram which are to be sacrificed. The chest found by Mr. Rassam contains tablets having hieroglyphic engravings, from which the whole history of the reign of Assur-nasir-pal can be read.—*From Le Monde de la Science et de l'Industrie.*

The Latest Telephone.

At a recent meeting of the Society of Telegraph Engineers in London, an interesting feature was the disclosure made by Major Webber, R.E., to the effect that he had recently experimented with a remarkable new carbon telephone from America, which owed its power to a diaphragm of animal tissue. With this instrument, which was not further described, Major Webber was able to speak in a low tone over 70 miles of wire with perfect clearness. A part of this line consisted of underground cable, in which from 20 to 30 other circuits were busily at work without interfering with the telephonic message. The voice of this instrument was singularly full and life-like, whereas that of magneto-telephones is peculiarly thin and parroty.



RECENT DISCOVERIES IN ASSYRIA.

Clarification of Water.

Well waters sometimes contain vegetable substances also of a peculiar kind, which render them unwholesome, even over large tracts of country. In sundry districts the decaying vegetable matters of the surface soil are observed to sink down and form an ochreous pan, or thin yellow layer, in the subsoil, which is impervious to water, and through which, therefore, the rain cannot pass. Being arrested by this pan, the rain water, while it rests upon it, dissolves a certain portion of the vegetable matter, and when collected into wells, is often dark colored, marshy in taste and smell, and unwholesome to drink. When boiled, the organic matter coagulates, and when the water cools, separates in blocks, leaving the water wholesome and nearly free from taste or smell. The same purification takes place when the water is filtered through charcoal, or when chips of oak wood are put into it. These properties of being coagulated by boiling, and by the tannin of oak wood, show that the organic matter contained in the water is of an albuminous character, or resembles white of egg. As it coagulates, it not only falls itself, but it carries other impurities along with it, and thus purifies the water—in the same way as the white of egg clarifies wines and other liquors to which it is added.

Such is the character of the waters in common use in the Landes of the Gironde around Bordeaux, and in many other sandy districts. The waters of rivers and of marshy and swampy places often contain a similar coagulable substance. Hence the waters of the Seine at Paris are clarified by introducing a morsel of alum, and the river and marshy waters of India by the use of the nuts of the *Strychnos potatorum*, of which travelers often carry a supply. One of these nuts, rubbed to powder on the side of the earthen vessel into which the water is to be poured, soon causes the impurities to subside. In Egypt the muddy water of the Nile is clarified by rubbing bitter almonds on the sides of the water vessel in the same way.

In these instances the clarification results from the iron compounds or the albuminous matter being coagulated by what is added to the water, and in coagulating, it embraces the other impurities of the water, and carries them down along with it. Salt and many saline matters have likewise the power of clearing many kinds of thick and muddy water. So long as the water contains but little dissolved matter, all its particles of mud remain a long time suspended. But the addition of almost any soluble salt, even in small proportion, will, as it were, curdle the impurities, causing them to collect together and settle. These cases, and especially that of the sandy Landes of Bordeaux, and elsewhere, throw an interesting light upon the history of the waters of Marah, as given in the fifteenth chapter of Exodus:

"So Moses brought Israel from the Red Sea, and they went out into the wilderness of Shur; and they went three days in the wilderness, and found no water. And when they came to Marah, they could not drink of the waters of Marah, for they were bitter; therefore the name of it was called Marah. And the people murmured against Moses, saying, What shall we drink? And he cried unto the Lord, and the Lord showed him a tree, which when he had cast into the waters, the waters were made sweet."—*Chemistry of Common Life, Church.*

Southern Alaska.

William H. Dall, explorer and naturalist, describes that portion of Alaska lying east and southeast of Mount St. Elias as a region covered with dense forest, canal like arms of the sea penetrating everywhere and teeming with fish as the islands do with game. The mean annual temperature is about that of Central New York, with a wetter and cooler summer and a very mild winter, the thermometer reaching zero only once in ten years. It is a paradise compared with the alkali flats of Utah, the burning sands of Yuma, or the monotonous and dreary prairies of the Rocky Mountain cattle region. Nor are its advantages solely relative. It has long been proved by actual experiment that potatoes and many other vegetables do well there, and grasses (if not grain) come to great perfection. In that region one never need lack food, and a small investment of capital is all that is needed to make a really comfortable home, were communication kept up regularly with the rest of the world, and protection against violence in-

sured. That it is a far better country than nine tenths of Norway and half of Prussia, Mr. Dall knows from personal experience and observation.

The mineral wealth of the region is largely problematical. That gold, silver, iron, and manganese, as well as white marble exist, there is no doubt. How well they may pay for working is to be determined hereafter. If a man knows of a good "lead" he keeps it to himself until the time shall come, if ever, when he can work it in peace of mind because the United States government has decided to protect its citizens in Alaska as well as in New York, notwithstanding the fact that both speculate in mines and form associations for developing different parts of our common country.

Precious Coral.

The precious coral of commerce is, after pearls, the handsomest and most valuable production obtained from the ocean depths. Corals are ranged by naturalists in the animal kingdom at the head of zoophites or "animal plants." They are of two kinds—those deposited within the tissues of the animal (*sclerodermic*), and those secreted by the outer surface at the foot of the polyp (*sclerobasic*). Among the sclerodermic species we find such familiar forms as the "star coral" (*Astræa*); "brain coral," or "brain stone" (*Meandrina*); the "mushroom coral" (*Ctenactis*), differing from other kinds in being the secretion of a single gigantic polyp, and in not being fixed; the "madrepore" (*Madrepora*), a neatly branched kind with pointed extremities, each ending in a small cell; "sponge coral" (*Porites*), also branching, but with blunt ends and smooth surface; "organ-pipe coral" (*Tubipora*), consisting of smooth red tubes lying nearly parallel and connected by cross plates; and many others. Most of these, with other so-called corals, are to be seen in the shop of nearly every dealer in shells and natural history specimens, and are used for ornamenting chimney-pieces, drawing-room tables, cabinets, and for museum purposes. The organ-pipe coral being much cheaper in price than the more costly article, presently to be spoken of, is frequently used as its representative in cabinets of economic products. The majority of the calcareous frameworks that we designate as "coral" are white, or nearly so. At a recent meeting of the New York Academy of Sciences Dr. Newberry exhibited a beautiful specimen of a sclerodermic coral—a species of *Oculina*—which had a pale green tint, a color hitherto unknown in connection with the calcareous skeleton, although common with the animals themselves.

The coral which is alone used for articles of personal adornment and works of art is known as "precious coral" (*Corallium rubrum*), and is an example of the sclerobasic division. A sclerobasic coral is a true exoskeleton, and is distinguished by being smooth and solid. The polyps, having light fringed tentacles, are situated on the outside of this as a common axis, and are connected together by the fleshy *cœnosarc* covering the coral. The precious coral is mostly obtained in the Mediterranean, and occurs of different shades of color, the Barbary coast furnishing the dark red, Sardinia the yellow or salmon color, and the coast of Italy the rose-pink. In Europe the latter color is the most valued, while in the East the dark red is preferred. Occasionally the red coral is found white or without any coloring matter. At the Naples Maritime International Exhibition a magnificent branch of black coral from Trapani was shown, which formed a finish to the trophy of aboriginal arms and weapons exhibited from the Pacific. At Yeddo there is a black coral fishery which extends fifty miles north and south. From taking a fine polish the black is fashioned into beads and mouth-pieces for cigars. The dull white is not quite so hard, and from not polishing well is sold cheaper.

Coral presents to the fisherman the appearance of a branching shrub, of a red or rose color, compact and solid. The material has the hardness and brilliancy of agate; it polishes like gems and shines like garnet, with the tints of the ruby. The large branches are used for carving, and, as the material is durable and is well suited to give definite outlines to the sculptor's work, great labor and ingenuity are frequently expended on objects of art wrought in this material. The Chinese, Hindoos, and Cingalese have all tried their skill in carving coral, but the finest and most artistic work emanates from the Italian workshops of Naples, Genoa, and Leghorn. Much of the manufacturing process, grinding, drilling, and polishing is carried on by women. The working of beads is principally executed by the females of the Val du Bisagno, in Italy. All the operatives employed in cutting belong to about 100 families in the commune of Assio; those in piercing and rounding to about 60 families living in other parts of the valley. Every village works exclusively at beads of a fixed size.

In Genoa each manufacturer employs from ten to twenty or more women, who submit the coral to a preparatory process before it is given to the workers of Bisagno. Thirty or forty men and women are employed in their own homes in cutting coral into facets. There are also about thirty engravers of cameos and coral. In all from 5,000 to 6,000 persons gain their livelihood in the province of Genoa either by fishing for, working on, or selling coral, and this craft produces a revenue of $400,000 per annum. Exports of coral are made from Genoa to Austria, Hungary, Poland, England, America, Aleppo, Madras, and Calcutta. Large, perfect, well-shaped beads are by far the most valuable form of coral, and these have greatly increased in estimation of late years. Many of the finest are sent to China, where they are in demand for the Mandarin's red button of rank worn on the cap. Some of the natives of India have a preference for what may be called worm-eaten beads, and tons of these, which would not find a sale in Europe, go to the East, where they are esteemed from a superstitious belief that gods dwell in the little recesses or cavities of this coral.

Connoisseurs know that of late years coral has risen considerably in the estimation of the fair sex. A somewhat arbitrary standard of beauty has, however, been established in regard to the color. Coral, to be rare and valuable, must now be of a delicate pinkish, flesh-like hue, uniform in tint throughout, and in large pieces. The principal commercial varieties distinguished are red, sub-divided into deep crimson red, pale red, and vermilion (the latter rare), black, clear white, and dull white (the latter common). The delicate rose or flesh-colored, which is most prized, is sold at very high prices, as it is entirely a fancy article. In some countries red coral is classified by dealers into five grades: 1, froth of blood; 2, flower of blood; 3, 4, 5, blood of first, second, and third qualities. Dealers and workers in the material recognize rough tips and polished tips, fragments, roots of branches suitable for making earrings, and coral tulips for shaping into ornaments. Coral branches assume the espalier shape and other forms.

Coral is valued, in addition to its color, according to its bulk, soundness, and freedom from flaws. Certain rare kinds, of pale tints, are worth twenty times their weight in pure gold. The fact, too, that a large part of the material is wasted in the process of manufacture adds greatly to its cost. The value of ordinary red coral is apt to fluctuate greatly at the seat of the fisheries. In 1867 it was worth only $4 per pound, but it occasionally brings $10 per pound. This variation arises not only from differences in quality of the gathering, but also from special circumstances connected with the markets of distant countries, the sale of the article being much smaller in Europe than elsewhere.

Coral fishery is prosecuted at various points in the Mediterranean. The Spanish fishermen collect off the Cape Verde Islands, the product being about 24,760 pounds, of the value of $100,000 annually. Large quantities are also obtained on the south coast of Corsica, by Italians entirely. Coral is also gathered in more or less abundance along the coast of Tunis, Algiers, Morocco, and Barbary. The number of boats engaged in this fishery on the Algerian coast has averaged of late years about 300, more than two thirds of which are Italian. The product is said to amount to about 75,000 pounds. A coral bank of great richness is said to have been discovered on the coast of Japan, but no fishery of any importance has yet been begun there. The largest fisheries are in the vicinity of Sardinia, the exports from there amounting to $300,000 in value. The coral is chiefly found in the shallow waters near Carloforte, Alghero, and the Island of Maddalena. At Alghero about 190 vessels, manned by 1,930 sailors, are employed in the fishery from March to October.

Hitherto the fishing operations have been conducted on the old primitive method of the drag net or rough dredge, formed of a cross of wood with a quantity of hemp attached to tear up the coral. The diving bell has been made use of, but it does not succeed. A few French fishermen use diving apparatus. Torre del Greco, near Naples, is the principal residence of the coral fishers, and the place from which most of the boats are fitted out for the business. The industry is annually acquiring larger importance and the fishing is being prosecuted with increased energy.

As to other corals than the precious kind, madrepores and other showy species are sometimes used for ornamental purposes. The horny axis of black flexible coral (*Plesaura crassa*) is used for canes and whips in the Bermudas, and the axis of fan coral (*Rhipidogorgia*) for skimmers in the same islands. Coral is used for building purposes in the Pacific islands, Mauritius, Seychelles, and other places. Coral rock of recent formation (*Coquina*) is employed in Florida in the manufacture of ornamental vases and earrings.

An Anecdote of Professor Agassiz.

A writer in *Harper's Magazine* tells a characteristic story of Professor Agassiz, cleverly illustrating the difference between the older school of science, which sought simply to discover and record facts, and the modern school, which seeks the law within the law by comparison of observed phenomena.

Some 35 years ago, at a meeting of a literary and scientific club discussion sprang up concerning Dr. Hitchcock's book on "Bird tracks," and plates were exhibited representing his geological discoveries. After much time had been consumed in describing the bird tracks as isolated phenomena, and in lavishing compliments on Dr. Hitchcock, a man suddenly rose who in five minutes dominated the whole assembly. He was, he said, much interested in the specimens before them, and he would add that he thought highly of Dr. Hitchcock's book as far as it accurately described the curious and interesting facts he had unearthed; but, he added, the defect in Dr. Hitchcock's volume "is this: it is dees-creep-teeve, and not com-par-a-teeve." It was evident throughout that the native language of the critic was French, and that he found some difficulty in forcing his thoughts into English words; but the writer never can forget the intense emphasis he put on the words "descriptive" and "comparative," and by this emphasis flashing into the minds of the whole company the difference between an enumeration of strange, unexplained facts, and the same facts as interpreted and put into relation with other facts more generally known. The moment he contrasted "dees creep-teeve" with "com-par-a-teeve" one felt the vast gulf that yawned between mere scientific observation and scientific intelligence, between eyesight and insight, between minds that doggedly perceive and describe and minds that instinctively compare and combine. The speaker vehemently expressed his astonishment that a scientist could observe such phenomena, yet feel no impulse to bring them into relation to other facts and laws scientifically established. The critic was, of course, Agassiz, then in the full possession of all his exceptional powers of body and mind.

Photography by Gas Light.

Among the various forms of artificial light which, during the past winter season, have been competing for the supremacy in photographic portraiture, common gaslight figured but little until quite recently, when Mr. P. M. Laws, of Newcastle-on-Tyne, commenced to try its capabilities. Mr. Laws' efforts in the direction of portraiture by gaslight have been noticed on more than one occasion in our columns, and his specimens have been exhibited at the meetings of the South London Photographic Society and the conditions under which they were produced explained.

It will be remembered that the light used in producing the earlier specimens was Wigham's twenty-eight jet burner, while the last we received from Mr. Laws was obtained by means of the large sized burner of sixty-eight jets, with an exposure of only twenty-five seconds for a cabinet picture, fifteen seconds having been found sufficient for a carte.

The Wigham light is not on the Argand principle, but is composed of a number of distinct jets of the ordinary description, placed so close to one another that their aggregate light forms a cone of intensely luminous white flame. In order to obviate the smoke, which would otherwise arise from the imperfect combustion of the gas issuing from so large a number of burners in so small a space, a chimney of transparent talc receives the upper part of the flame, and creates such a draught that a full and ample supply of oxygen is obtained, to secure perfect combustion as well as a more intense and whiter light. It is to be noticed that no glass chimney is required—hence there is no risk of breakage. The talc "oxidizer" (as it is called) is not liable to fracture, and, at the same time, by its transparency, possesses the advantage of not wasting any appreciable quantity of light.

The burner is made in five different sizes, ranging from twenty-eight to one hundred and eight jets, the sixty-eight jet burner occupying the midway position between those limits. This burner, by which Mr. Laws has been able to produce results with exposures very little more prolonged than with ordinary daylight, gives a light equal to 1,253 standard sperm candles on a consumption of 146 feet of cannel gas per hour. It may be noted that cannel gas and ordinary gas give very different results; if the later be employed with the sixty-eight jet burner the candle power is estimated at about 1,000. The largest size—one hundred and eight jets—gives, with cannel gas, an illuminating power of 2,923 candles on a consumption of 308 feet of gas per hour.

The manner in which the larger burners are constructed for lighthouse purposes, so as to give lights of varying intensity according to the state of the atmosphere, is most ingenious. Starting from the twenty-eight jet burner as a nucleus, the additional jets may be added at pleasure, in concentric rings, each ring being divided into two segments, and each separate segment being supplied from a special pipe fitted with a stopcock, so that even without "unshipping" the outer circle of jets their light may be shut off. The method of connecting the extra segments is most especially ingenious; instead of any screw arrangement, which would occupy time in fixing, besides other inconveniences, the supply pipe of each segment simply dips into a cup of mercury, fitting on to another tube from which the gas supply is obtained, the mercury rendering the joint air tight.

These burners afford the most intensely illuminating and, as far as we can judge from the color, the most actinic gas light we have ever seen. Mr. Laws' experiments prove that for practical photographic purposes the sixty-eight jet burner enables the photographer to, at any rate, eke out the feeble light of some of our winter days, if not to depend solely upon gaslight as his illuminating power. The total cost of the sixty-eight jet burner, fitted up, is but a few pounds.—*British Journal of Photography.*

A New Source of Heptane.

Abietene, a new hydro-carbon obtained by distilling the exudation of the nut pine or digger's pine of California (*Pinus sabiana*), was described six or seven years ago by W. Wenzell. The tree is notched and guttered in the winter season at a suitable distance from the ground, and the resin which comes from the wound is subsequently distilled. In a crude state the oil is sold in San Francisco under various names, and it is used for removing grease spots, etc. It is aromatic, colorless, and very liquid. Mr. T. E. Thorce lately made a pretty thorough chemical and physical examination of this abietene, and found it to consist mainly of pure heptane—a substance the other known natural sources of which are petroleum and fossil fish oil. The occurrence of a paraffine playing the part of oil of turpentine in a tree now living is exceedingly interesting. In ordinary turpentines a paraffine-like substance has been found, but only in very small quantities. The composition of the oil of the *Pinus sabiana* probably varies at different seasons, as sometimes the nuts taste strongly of turpentine, and at other times they have hardly any of that flavor.