Science Notes.

Mr. Igi, of the College of Science, says the Japan Weekly Mail, of Yokohama, is assured from data that he collected during a recent tour of investigation in the Sanriku district, that the seismic wave of June was due to a submarine volcanic explosion. He places the center of the disturbance about 200 leagues east off the coast of Yoshihama, Kisen district, corresponding to 39° lat. N., 149° long. E. He thinks that the phenomenon was similar to the Krakatoa disaster, save that instead of the volcano being on land, as in the East Indian catastrophe, in this instance it was far beneath the surface of the sea. He says that the temperature of the sea in the neighborhood has been raised 3° above that prevailing in ordinary years.

The number of students in German universities last summer is reported, says Science, to have been 29,802; in 1895 it was 28,709, so that the numerical increase for the present year is 993, or 3·5 per cent. The distribution of the students among the various universities was as follows: 4,649 in Berlin, 3,777 in Munich, 2,876 in Leipzig, 1,863 in Bonn, 1,425 in Breslau, 1,415 in Halle, 1,379 in Freiburg, 1,339 in Wurzburg, 1,172 in Tübingen, 1,164 in Heidelberg, 1,138 in Erlangen, 1,007 in Göttingen, 965 in Marburg, 948 in Greifswald, 938 in Strassburg, 761 in Jena, 708 in Kiel, 700 in Königsberg, 630 in Giessen, 500 in Rostock, and 420 in Münster. The number of students at Vienna was 2,228, but only 1,370 of these were regular students.

M. Moissan has recently carried on certain new experiments relating to the preparation of the diamond. He says: "A new combustion was made of diamonds prepared in part by means of small cylinders filled with charcoal of sugar, and partly by means of metallic blocks of iron and copper. These two procedures furnished the purest diamonds. They sank in methylene iodide, scratched rubies with ease, and contained no black diamonds. The weight of the diamonds was 5·7 mgrm.; when burnt, they left a trace of ash, the weight of which could not be appreciated with the balance. We collected 20·5 mm. of carbonic acid. Theory requires for 5·7 mgrm. 20·9 mm. This substance responds to the fundamental property of carbon, yielding for 1 grm. of substance 3·666 grm. of carbonic acid."

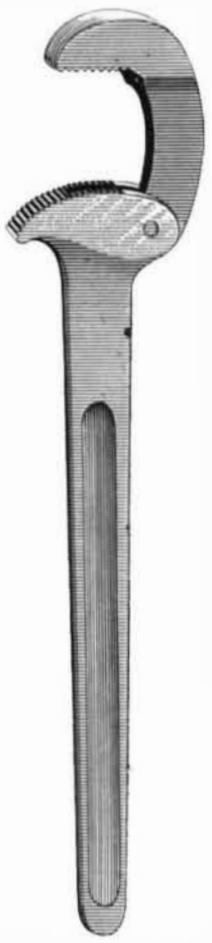
Lieut. De Gerlache, the leader of the projected Belgian Antarctic expedition, says that it will start from Antwerp about July 15 next. The steamer Belgica will carry a three years' supply of provisions, and will probably be absent about two years. During the first year the expedition will go to the east of Graham Land in George IV Sea, and then winter in Australia. The second year they will probably go in the direction of Victoria Land. "We intend," the lieutenant says, "more especially to devote ourselves to geological and zoological research, taking for this purpose specimens from the various sea depths and the submarine deposits. We shall also estimate the sea temperature at different depths, and, in short, make researches similar to those by the Challenger and other Antarctic expeditions."

The ordinary pictures and diagrams of icebergs—even those that occur in standard text books—are impossible and absurd, according to Mr. Goode. He says, in a letter to Science: "When we stop to think that an iceberg is merely a floating piece of ice, free to move in the mobile liquid water, we shall see at a glance that, to be in stable equilibrium, the shortest dimension must be vertical. A berg as large as shown in some of these amusing cuts could not be kept in position by a whole fleet of great ships with grappling hooks and cables. It is true that in some cases the artist has fitted blocks of stone into the ice near the bottom. But this has been done, very probably, to show the ice as an agent in transportation, and not in any case has he put ballast enough there to hold the berg down." The writer gives a list of some standard works that contain these false and misleading pictures.

The republic of Venezuela has granted a concession to the National Association of American Manufacturers, whereby the latter, on behalf of the manufacturers of this country, are authorized to erect in the cities of Caracas, Valencia, Maracaibo, and Ciudad Bolivar, buildings or museums for the permanent exposition of all goods from American manufacturers. The purpose of these expositions is to give the Venezuelans an opportunity of formally inspecting and comparing our goods with those of the old world. Consul Plumacher, United States consul at Maracaibo, says that England, France, and Germany overrun South America with commercial traveling agents, mostly energetic young men, well versed in the Spanish language and customs of South American people, but that a commercial traveler for an American house is seldom seen in the country. The American association very properly argued that permanent expositions are far cheaper than employing traveling agents, and it is expected that the arrangement which has just been consummated will be of great benefit to manufacturers of this country. In order to facilitate these expositions, the Venezuelan government has agreed that all goods from this country for either of said expositions shall be admitted free through the custom houses, the regular duties upon importations to be paid only upon the sale of the goods imported.

AN IMPROVED PIPE WRENCH.

The simple, strong, self-adjustable tool shown in the illustration forms the subject of a design patent recently issued to W. T. Johnston, and manufactured by W. T. Johnston & Company, of No. 32 Cortlandt Street, New York City. It is a strictly high-grade tool, made of the best drop forged steel. There are only three pieces or parts in the tool, all strong and well proportioned, and the facility with which, from the special formation of the jaws, it may be made to engage and firmly grasp any size of pipe within its capacity is apparent at a glance. There are two sizes of teeth in the fixed jaw, the coarser outer and the finer inner teeth of which also aid in enlarging the usefulness of the tool. The wrench is made in various sizes, and size No. 16 takes from one-quarter inch pipe to one and a quarter inch pipe, a wide range of duty for a tool so readily applied.



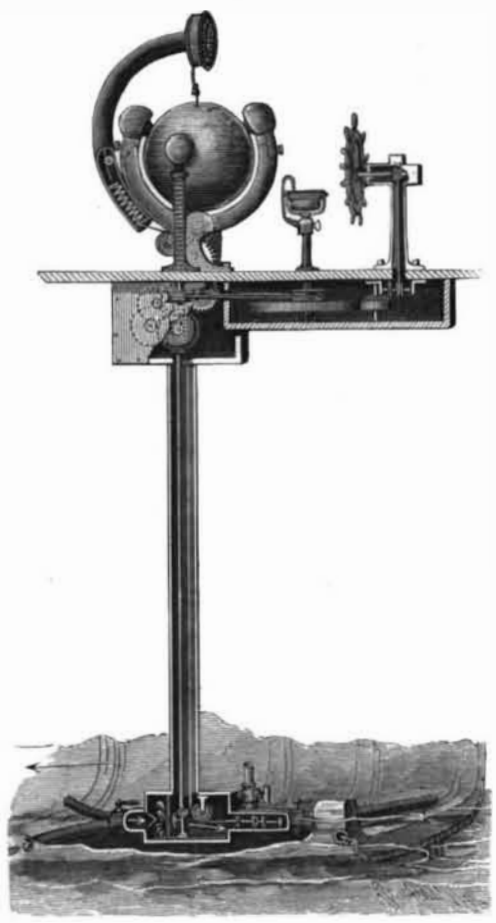
THE JOHNSTON PIPE WRENCH.

Neglected Drugs.

On the analysis of 27,000 prescriptions recently made by Prof. Patch, President of the American Pharmaceutical Association, it was shown that the pharmacopœia was sadly neglected by physicians. Only seventeen vegetable drugs were prescribed, and more than 100 drugs of vegetable origin neglected. Ten metals were honored, but more than ten were left out in the cold. In the study of 217,000 prescriptions from nineteen drug stores distributed in Chicago, Philadelphia, Bayonne, New York, Boston, Washington, Baltimore, Denver, San Francisco, New Orleans, Cincinnati, and St. Louis, 11·25 per cent were proprietary articles, not including many elixirs, pills, tablets, fluid extracts, etc. which were of specified manufacture.

A NOVEL NAUTICAL REGISTERING APPARATUS.

For registering the course of a vessel on a globe or map, and also indicating its course, the apparatus shown herewith has been devised and patented by Pedro Samohod, of Lima, Peru (Nazarenus 145). Tubes with outwardly projecting branches extend



SAMOHOD'S NAUTICAL REGISTERING APPARATUS.

toward the bow and stern, at the bottom of the vessel, and in the main rear tube slides a rod carrying a small piston, which does not engage the walls of the tube. The two tubes are connected with a central casing from which a pipe runs upward in the vessel, and a cord attached to the inner end of the rod carrying the piston extends over pulleys and up through this pipe to a connection with the hand of a speed indicator on a dial. The cord passes through and is connected with a spring-held disk in a semicircular sleeve, the spring drawing the piston forward against the action of the water flowing through the apparatus, and the piston and the indicator hand, accordingly, assuming different positions according to the speed of the vessel. Where the main forward or inlet tube enters the casing is journaled a small turbine wheel which, by means of bevel gears, drives a shaft which extends up through the pipe and operates a transmission gear connected to a ball adapted to rotate about a horizontal axis, and which supports a globe, other balls in sockets at the sides holding the globe steady.

By this means the globe is rotated as the vessel advances, and the course is indicated by a pencil or marker attached to the under side of the speed dial, but for other than a straight course the globe must be correspondingly rotated about a vertical axis, which is effected by balls engaging its sides and secured to vertical shafts adapted to be turned through a cord and pulley connection with a hand wheel, a portion of this mechanism being also connected with an adjustable pointer adjacent to the ship's compass. As an attendant turns the hand wheel, so that the pointer will remain in registry with the needle of the compass, the globe is also turned about its vertical axis, and a correct record is thus made of the voyage. To clean the casing and tubes at the bottom of the vessel, end valves in the tubes are closed and the casing is connected to a pump by which its contents are discharged. The position of the globe in relation to the marker is adjusted at the beginning of each voyage, and the record on the globe is always in view.

Speeding a Locomotive.

At sixty miles an hour the resistance of a train is four times as great as it is at thirty miles—that is, the fuel must be four times as great in the one case as it is in the other. But at sixty miles an hour this fuel must be exerted for a given distance in half the time that it is at thirty miles, so that the amount of power exerted and steam generated in a given period of time must be eight times as great at the faster speed. This means, says a contemporary, that the capacity of the boiler, cylinders, and the other parts must be greater with a corresponding addition to the weight of the machine. Obviously, therefore, if the weight per wheel, on account of the limit of weight that the rails will carry, is limited, we soon reach a point when the driving wheels and other parts cannot be further enlarged, and then we reach the maximum of speed. The nice adjustment necessary of the various parts of these immense engines may be indicated by some figures as to the work performed by these parts when the locomotive is working at high speed. Take a passenger engine on any of the big railroads. At sixty miles an hour a driving wheel five and one-half feet in diameter revolves five times every second; now, the reciprocating parts of each cylinder, including one piston rod, crosshead and connecting rod, weighing about 650 pounds, must move back and forth a distance equal to the stroke, usually two feet, every time the wheel revolves, or in a fifth of a second. It starts from a state of rest at the end of each stroke of the piston, and must acquire a velocity of thirty-two feet per second in one-twentieth of a second, and must be brought to a state of rest in the same period of time. A piston eighteen inches in diameter has an area of 254½ square inches. Steam of 150 pounds pressure per square inch would, therefore, exert a force on the piston equal to 38,175 pounds. This force is applied alternately on each side of the piston ten times in a second.—Boston Journal of Commerce.

Recent Archæological News.

Recent excavations made by the trustees of the British Museum in Cyprus give an acquaintance with what was the site of Curium, which was built on the summit of a rocky elevation "some 300 feet above the sea, and was almost inaccessible on three sides." The special feature has been the discovery of a necropolis dating from what is called the Mycenean period. In the Mycenean tombs were found primitive races of the pre-Phenician time. But other and more valuable objects have been discovered, as a sard scarab bearing the name of Khonsu—which would make its date somewhere between the years 660 and 527 B. C.; also, there was a Phenician cylinder, the date of which cannot be earlier than 600 B. C. The choicest object was a steatite scaraboid of masterly execution. Finger rings, earrings, bronze bracelets, plated with gold, a necklace of delicate workmanship, have also come to light. Some of the vases are believed to be of Grecian make.

An explorer recently found in Egypt a bronze bowl and a series of iron tools of forms quite unlike any known in Egypt, and they are thought to belong to an Assyrian armorer about 670 B. C. These tools, comprising three saws made for pulling, not pushing, one rasp, one file, several chisels and ferrules, a scoop-edged drill, two center bits, and others, are of the greatest value in the history of tools, as showing several forms of an earlier date than was thought possible. They are probably of Assyrian origin.

Recent Patent and Trade Mark Decisions.

Richardson v. Lidgen (Commissioner's Decision), 77 O. G., 153.

Abandonment.—Where a part of an application was separated from the remainder and an application was made for such part and applied for more than two years after the separation of the two, but while the first application was still pending, it is held that there was no abandonment.

Ex parte Flomerfelt (Commissioner's Decision), 76 O. G., 2,007.

Effect of Extensive Sales on Patentability.—Where the patentability of a device is not clear, extensive sales may resolve the doubt of patentability in favor of an application, but it is an unsafe criterion and must be carefully applied.

Cook v. Stover (Commissioner's Decision), 76 O. G., 2,007.

Disclaimer in Interference Proceedings.—Where a party to an interference proceeding desires to disclaim, he must enter the disclaimer in his specification.

Ex parte Bryant (Commissioner's Decision), 77 O. G., 451.

Reissue to Broaden Claims.—Where an applicant acquiesces in the limited construction put on his invention and at no time during the prosecution of his original application intimated that the invention resided in the broad device sought to be claimed in the reissue application, it is clear that the failure to make the claim in the original patent did not arise through inadvertence, accident or mistake, and the reissue must be refused.

Phelps v. Hardy v. Gotman & Stern (Commissioner's Decision), 77 O. G., 531.

Amending a Divisional Application.—In a divisional application the addition of mere details, such as braces for frame, is not objectionable, especially when such details were shown in figures of the original that were not shown in the divisional application.

Who Shall First Take Testimony in an Interference Case.—Where a party divided an application and filed a divisional application on a part thereof later, and in the meantime an interfering application was filed, the party who filed the divisional application is entitled to carry his date back to the time when he filed his original application, thus making the other party take his testimony first.

Constructive Reduction to Practice.—The filing of a complete allowable application was regarded as a constructive reduction to practice, but neither an executed application merely nor a complete application is so considered.

Loewer v. Ross (Commissioner's Decision), 76 O. G., 1,711.

Actual Reduction to Practice.—A device which showed every feature of an invention in controversy and was adapted to perform the work for which it was intended and actually did such work, although it was not commercially perfected and did not work as efficiently as later devices, is held to have been a reduction to practice.

Reissue After Intervening Rights Arise.—If it appeared that other parties were using the subject matter not claimed in a patent, a reissue to recover such matter cannot thereafter be obtained.

Sievert v. Shuman (Commissioner's Decision), 76 O. G., 1,715.

Binding Effect of a Preliminary Statement.—A preliminary statement made in an interference proceeding binds the party only in proceedings in which the same parties are involved.

Motion to Dissolve an Interference.—A motion to dissolve an interference can only be made after the declaration of interference and not while such declaration is being considered.

Ex parte Weaver (Commissioner's Decision), 76 O. G., 1,715.

Reissue to Cure a Mistake of the Patent Office.—Where an application is filed for a reissue to cure a mistake of the Patent Office, a full re-examination of the case may be made, as it would not be proper to reissue a patent when it is known that a statutory bar exists.

Jenkins v. Burke (Commissioner's Decision), 77 O. G., 972.

Impertinent Testimony in Interference Case.—Testimony relating to the character of the parties is not evidence regarding the priority of invention and it should therefore be stricken from the record.

Recalling Witness.—There is no rule against recalling a witness in a case, although it is a circumstance that may touch his credibility.

J. G. Brill Company v. Wilson (U. S. C. C., Pa.), 75 Fed., 1,002.

Street Railway Summer Cars.—The Brill patent No. 315,898, consisting mainly in the use of metal instead of wooden panels for the ends or sides in car seats has been declared void for lack of invention.

Union Switch and Signal Company v. Pennsylvania Railway Company (U. S. C. C., Pa.), 75 Fed., 1,004.

Preliminary Injunction.—Preliminary injunction should not be granted where the patents in suit have not been judicially considered and involve complicated apparatus about which experts differ radically both in matters of opinion and matters of fact, and where the question of infringement depends largely upon the construction to be given to the claims in view of the prior art.

Thomson-Houston Electric Company v. Kelsey Electric Railway Specialty Company (U. S. C. C. A., 2d), 75 Fed., 1,005.

Contributory Infringement.—An injunction against one who, by his advertisements and course of business, shows a willingness to co-operate with an infringer who may present himself, by making and selling to him a device or element of a patented combination to be used in connection with other parts obtained from a different source.

Electric Railway Trolleys.—The Vandepoele patent, No. 495,443, for an improvement in traveling contacts for electric railways, to furnish to the user of the invention a trolley stand, which is one of the elements of the combination to replace the original stand which has become broken or otherwise useless, does not constitute an infringement of the patent.

Infringement.—One who purchases the apparatus covered by the Vandepoele patent, No. 495,443, has a right, immediately thereafter, to discard the element known as the trolley stand, and purchase from another a different stand which he thinks is better suited to his purpose.

Cassidy v. Hunt (U. S. C. C., Cal.), 75 Fed., 1,012.

Fruit Drying Apparatus.—The Cassidy patent, No. 172,608, has been held valid.

Damages for Infringement in Actions at Law.—In actions at law the plaintiff can recover only for the damages he has sustained, and not defendant's profits. If the royalty is shown to have been established, it is usually taken as the measure of damages, but in the absence of an established royalty what would be a reasonable royalty must be determined, and in determining this it is proper to consider the utility and advantage of the invention over the prior art, and the profits made by the defendants may be considered in arriving at a just conclusion.

Clarke v. Pellengill v. Crancer (Commissioner's Decision), 77 O. G., 1,271.

Petition for Rehearing.—A petition presented to the commissioner asking that the examiner of interference be directed to reconsider his decision relating to priority, because such decision is a travesty on equity practice, a gross injustice, in direct contradiction of the evidence, and in excess of the powers of the examiner, is wholly unjustifiable, specially when the record discloses that the examiner acted with deliberation and apparent fairness.

The Heavens for January.

BY WILLIAM R. BROOKS, M.A., F.R.A.S.

THE SUN.

On January 1 the sun's right ascension is 18 h. 50 m. 32 s.; and its declination south of the celestial equator is 22 deg. 56 m. 45 s.

On the last day of the month its right ascension is 20 h. 58 m. 28 s.; and its declination south 17 deg. 9 m. 43 s. So, as will be seen, the sun is well started on its northward journey, being six degrees farther north than on December 21.

MERCURY.

Mercury is evening star during the early portion of the month, but its extreme southern declination renders it a somewhat difficult object to pick up with the naked eye. The most favorable time to see this shy little world, always so closely embraced by the great central orb, is on January 6. It will be on that date at its greatest elongation eastward from the sun, viz., 19 deg. 9 m. From thence Mercury sweeps rapidly toward the sun, with which it is in inferior conjunction on the morning of January 22, at 10 o'clock, when it changes to morning star.

Mercury is in conjunction with the moon on the fourth of the month at 34 minutes past noon, when the planet is only 8 minutes of arc south of the moon. It is again in conjunction with the moon on the last day of the month at 3 A. M., when Mercury will be 5 deg. 11 m. north of the moon.

On the first of the month Mercury crosses the meridian at 1 h. 23 m. in the afternon. On the last of the month at 10:58 A. M.

VENUS.

Venus is evening star, and a most glorious object it is in the southwestern heavens, soon after sunset. It is still increasing its apparent distance from the sun, as seen from the earth, and its splendor increases also throughout the month.

Venus is in conjunction with the moon on the sixth of the month at 2 h. 14 m. in the afternoon, when the planet will be 3 deg. 7 m. south of the moon.

On January 1 Venus crosses the meridian at 3 h. 0 m. in the afternoon, and on the last day of the month at 3 h. 8 m. P. M. The right ascension of Venus on the first of the month is 21 h. 47 m. 23 s.; declination south 15 deg. 10 m. 37 s.

On January 31 its right ascension is 23 h. 53 m. 27 s. and its declination south 0 deg. 34 m. 58 s. On the succeeding day Venus crosses the celestial equator. It sets on the first at 8 h. 5 m. P. M. and on the last day of the month at 9 h. 6 m. P. M.

MARS.

Mars is evening star and is at a good elevation in the eastern sky as soon as it is dark. By eight or nine o'clock good telescopic work may be done upon this interesting celestial neighbor. Although Mars passed opposition in December, when it was at its nearest approach to the earth, practically as good views may be obtained of this planet during the next few weeks as at opposition. Much remarkable detail has been detected upon Mars by the writer during the past ten days, with the 10 inch telescope of this observatory.

Mars is in conjunction with the moon on the fourteenth at 10 h. 21 m. P. M., when the planet will be 1 deg. 42 m. south of the moon. The apparent motion of Mars has been retrograde for some time, but on January 16 the planet is stationary to the west of the horns of Taurus.

On the first of the month Mars crosses the meridian at 9 h. 56 m. P. M., and sets at 5 h. 35 m. the following morning. On the last of the month it sets at half past three A. M. The right ascension of Mars on January 15 is 4 h. 38 m. 19 s. and its declination north 25 deg. 9 m. 51 s.

JUPITER.

Jupiter is morning star, but it rises so early that it may be well observed by midnight. It is improving in position for telescopic study, and will be an attractive object during the early months of the year.

The following are some of the interesting phenomena of the satellites. All are observable in small telescopes. On January 1, at 11 h. 33 m. 42 s. P. M. the I satellite will disappear in eclipse. At 12 h. 1 m. 56 s. the II satellite will also disappear in eclipse. At 2 h. 54 m. morning following, the I satellite will reappear from an occultation; and at 5 h. 1 m. the II satellite will reappear from an occultation. On the morning of January 9 at 1 h. 26 m. 44 s. the I satellite will disappear in eclipse. At 2 h. 38 m. 6 s. the II satellite will disappear in eclipse. At 4 h. 41 m. the I satellite will reappear from an occultation. On January 14 at 9 h. 6 m. P. M. the III satellite will reappear from an occultation. At 10 h. 33 m. the shadow of the IV satellite will enter upon the disk of the planet, and at 3 h. 15 m. the next morning the shadow of satellite IV will pass off the disk. On January 18 at 9 h. 22 m. P. M. the shadow of the I satellite will egress; and at 10 h. 9 m. the satellite I will pass off the disk. On January 25, at 8 h. 56 m. P. M., the shadow of the I satellite will ingress; at 9 h. 36 m. the satellite I will enter in transit. At 11 h. 16 m. the shadow will egress; and at 11 h. 54 m. the satellite I itself will leave the disk of Jupiter.

On January 31, at 9 h. 10 m. the shadow of satellite IV will leave the disk. At 9 h. 42 m. the satellite IV will enter on the disk. At 1 h. 34 m. 44 s. morning following the I satellite will disappear in eclipse. At 1 h. 55 m. the egress of the IV satellite will occur. At 4 h. 23 m. the I satellite will reappear from an occultation. At 4 h. 48 m. the shadow of satellite II will ingress and at 5 h. 53 m. the II satellite itself will enter on the disk in transit.

Jupiter rises on the first of the month at 9 h. 30 m. P. M. and is on the meridian at 4 h. 3 m. the following morning. On the last day of the month it rises at 7 h. 15 m. P. M. and crosses the meridian at 1 h. 54 m. past midnight.

The right ascension of Jupiter on January 15 is 10 h. 45 m. 57 s. and its declination north 9 deg. 9 m. 28 s.

SATURN, URANUS AND NEPTUNE.

Saturn is morning star, but is not well placed for observation, especially at the beginning of the month, when it rises at 4 A. M. On the last of the month it rises at 2 h. 10 m. A. M.

Uranus is not in good position for observation. Neptune is in the eastern evening sky, its right ascension on January 15 being 5 h. 8 m. 9 s., declination north 21 deg. 28 m. 57 s.

Smith Observatory, Geneva, N. Y., December 21, 1896.

The First Daily Weather Map.

One of the important dates in meteorology, about which there has been a good deal of dispute lately, is that which marks the issue of the first daily weather map, says R. De C. Ward in Science. The credit of having been the first to publish such a map has been generally given to Le Verrier, who, on September 16, 1863, began the issue of a daily weather map in Paris. It is a fact, however, that twelve years before that, in 1851, a weather map based on observations made on the day of its publication was issued and sold in the great exhibition in England. The data for the map were collected by telegraph, and its publication was continued from August 8 to October 11, 1851, Sundays excepted. This was without doubt the first daily weather map The September number of Symons' Meteorological Magazine contains a reproduction, about one-quarter the size of the original, of the Great Exhibition map of August 8, 1851.

The Production of British Pig Iron.

Many estimable people surveying the statistical evidence of national progress and retrogression appeared to have made up their minds that the industrial prestige of Great Britain was slowly but surely waning, because we seemed to have lost our supremacy as an iron making nation and to have yielded up our priority of position to the United States and to some extent also to Germany. To such persons it may come as an agreeable surprise to learn that the output of pig iron in Great Britain for the first half of 1896, as ascertained by the British Iron Trade Association, places us once more in the front rank as an iron producing country. Our total make of pig iron for the first half of the past year was 4,328,444 tons, which is a larger output than we have ever before attained in six months. This output, however, is not equal to that reached by the United States in the same period. With the commencement of 1896 the output of pig iron in the United States was at the rate of about 11,000,000 tons a year, but since then the output has fallen month by month, until it is estimated that it does not now exceed a rate of 6,500,000 tons a year, while the output for the twelve months, assuming the continuance of the present rate of production, has been estimated at less than 8,500,000 tons, which would, of course, be less than the British output for the same period, assuming the maintenance of the rate of output during the first six months of the year. As for Germany, which is the next largest iron producing country after Great Britain and the United States, the production up to the present time justifies the belief that the total output of pig for the year will be about 6,000,000 tons, or approximately about 2,500,000 tons under the output of the United Kingdom, from all of which it seems reasonable to expect that at the end of 1896 our own country will have fully reasserted its old supremacy.

The most striking features of the progress that has been achieved in the pig iron industry of the United Kingdom during recent years has been the increased productivity of the plant employed owing to improvements of design and methods of working that almost amount to a revolution. A quarter of a century ago there were 915 blast furnaces erected in this country, of which 688 were in operation. These 688 furnaces produced in 1871 an average output of 8,665 tons per furnace and consumed an average of nearly 2¾ tons of coal per ton of pig iron produced. In 1895 the average production of the 344 furnaces in operation in the United Kingdom was 22,700 tons, and the average consumption of coal per ton of iron produced was 1·97 tons, so that in the interval the average output per furnace had increased by about 165 per cent, and the average consumption of coal per ton of pig iron produced had been reduced by about three-quarters of a ton. Even these figures, however, do not represent the full measure of the advance that has been accomplished during this period. In some districts the progress has been much greater than in others, and the maximum of progress achieved in a few individual cases points to what might have been done in the way of still greater progress and indicates what may be expected.—London Times.

IN a recent number of the SCIENTIFIC AMERICAN a new element lucium was described. It now appears that this element and its application to incandescent gas lighting have been patented. The patentee claims that lucium exists in monazite sand to the extent of 1·80 per cent. Evidently Berzelius, Davy and others, who gave their discoveries to the world, were not alive to their opportunities.

BLOWN GLASS BRICKS FOR BUILDING PURPOSES.

A feature of the recent Stuttgart exhibition which attracted considerable attention was a display of buildings which were constructed of what is known as the Falconnier's blown glass brick, so named after the inventor, a French gentleman. The bricks are blown hollow in the same way as a bottle, the color

FALCONNIER HOLLOW GLASS BRICK.

which is most commonly used being a very light bottle green, bottle glass being the strongest; though yellow brown or other shades of green may be used if desired. The standard brick is 5 inches wide, 8 inches long, and 4 inches thick, and is formed in the shape shown in the accompanying illustration. When it is used for walls, or such structures as have to carry a quiet load, the bricks are laid as shown in our view of an ornamental pavilion, and cement is used in the joints, which are hollow. But when the bricks are used in roof work, or where the finished work will be subjected to bending strains, the cement is assisted by winding stout wire around the joint grooves in such a way that it will pass under one brick and over the next, the course of the next wire being reversed. A similar set of wires is wound in the cross direction, so that the bricks are really set in a wire network into which they are securely cemented.

When large walls or arched roofs are made of these bricks it is necessary to make allowance for expansion, especially if the work has been done in cold weather. For this purpose the edges of the bricks are covered with a thin layer of glue, which is subsequently destroyed by the cement between the bricks and leaves sufficient space for their expansion in hot weather.

It is claimed that they are permanently translucent, and that they have the advantage over double glass windows that they do not admit damp or dusty particles, and never tarnish. The surfaces, exterior and interior, are so ribbed and curved that while abundance of light is admitted, it is impossible to see through them. On this account they may be used where an ordinary window would be objectionable, as in the case of a window that looks into those of a neighboring house. Perhaps the most valuable feature of these bricks is that the air which they contain is an excellent non-conductor of heat, and tends to keep a house cool in summer and warm in winter, and, of course, damp will find it difficult to pass through a wall built of this material. On account of its non-conductivity this material is admirably adapted to the construction of greenhouses, and it lends itself to some remarkably picturesque effects in this class of construction, the roofs being built in arched or dome-like forms. It is also used to advantage in the construction of pavilions, such as the one shown in our engraving, or of city restaurants and places of public resort, where light shall be admitted, but a view of the interior shall be impossible.

PAVILION CONSTRUCTED OF BLOWN GLASS BRICKS.

Messages by Kite Wires.

William A. Eddy, Dr. William H. Mitchell and Henry L. Allen sent the first kite telephone and telegraph message in the world over a midair wire, sustained by three large kites, on the evening of December 6, 1896, in Bayonne. Morse sounder telegraph signals were also sent by means of a battery.

The wire was carried aloft by the kites beyond three lines of trees, two roadways, one line of fire alarm telegraph wires, one line of regular telegraph wires and a house. A red lantern was attached to an end of wire passing through a pulley, held at a height of about five hundred feet, and paid out upward and beyond the intervening obstacles. When the lantern had been carried over the line of Lexington Avenue it was slowly lowered, carrying the wire with it to the earth, where Dr. Mitchell soon established ground connections at each end of the wire, when the first telephone message was received by Mr. Eddy. Dr. Mitchell's voice was heard with perfect clearness. A telegraph signal by the usual Morse sounder was also successfully transmitted. The telephone messages and telegraph signals were continued about an hour and a half. Those using the telephone were William A. Eddy, Mrs. Eddy, Henry L. Allen, George S. Bogert and F. M. Wilson, all of Bayonne. The kites were sent up at 4:30 p. m., the telephone wire at 8 p. m., and both kites and wire were drawn in by 11:30 p. m. Delay was caused by two of the lowering lanterns falling about five hundred feet, the lowering wire having broken owing to a jam in the pulley, and by the wind, which was so light from the southwest that for a time the lifting force was insufficient. Mr. Eddy says the wire can be carried across the Kill von Kull readily, especially with northerly winds.