this gas were commented on; and Sir Humphry Davy was quoted to prove that the "seventh heaven" must have an atmosphere of it.

The time passed rapidly with such information; and the Professor, at the close of his lecture, alluded to the want of facilities in this city for thorough scientific culture, and argued his cause with much eloquence. Judging from the frequent manifestations of approval given by the audience, there is no doubt but that it was "seed sown upon good ground." It is certainly extraordinary that, in a city like New York, this reproach should be uttered with truth. "The first battle of Bull Run" said the Professor, "was lost for want of topographical knowledge, or familiarity with the nature of the country; and the second was like unto it, for, as the authorities remarked, it was not probable another battle would ever be fought there."

The conclusion of this course of lectures is sincerely regretted by many, as the interest taken in them by the public was too marked to escape notice.

THE FARMERS' CLUB.

The regular weekly meeting of the Farmers' Club was held at their room at the Cooper Institute, at 1½ P. M., on Tuesday, February 23d; the President, N. C. Ely, in the chair.

FERMENTING WINE.

The President read a letter making some inquiries in relation to fermenting wine.

Col. Haraszthy—"During its fermentation, wine must be excluded from the atmosphere, otherwise it will become sour. We close the fermenting vats perfectly tight, and carry off the gases produced by fermentation by means of a siphon, which terminates under water in another vessel."

CULTIVATING ALMONDS.

Mr. Robinson read a letter asking further information in relation to the cultivation of almonds.

Col. Haraszthy—"I plant the almond pits in the spring, and during the season the trees grow to the hight of four or five feet. In the autumn they are budded with good varieties, and the next spring the seedling is cut off above the bud. In three years they begin to appear, and, in California, they have never been troubled with leaf-curl or mildew or anything else. The almond is a hardier tree than the peach. When I was in Wisconsin, I raised almonds there successfully, though we sometimes had the thermometer indicating 30 and 35 degrees below zero."

Mr. Carpenter—"Experience has shown that some varieties of the almond will bear this climate and others will not."

Dr. Trimble—"Is the pulp of the almond good to eat?"

Col. Haraszthy—"It is very poisonous. It is so full of prussic acid that it is a convenient source of supply for that substance."

GRASSHOPPERS IN WINTER.

Mr. Robinson—"I have here a communication saying that a farmer's club has been formed on Long Island, and, at their first meeting, the crop of a crow was presented, and it was found to be full of grasshoppers."

Mr. Carpenter—"I saw the crop, and I think there was a mistake in calling them grasshoppers. I should say they were crickets."

The President—"Will the naturalist of New Jersey please tell us whether grasshoppers live through the winter?"

Dr. Trimble—"I have seen the crop, and should call them grasshoppers not fully developed; they had only the rudiments of wings. In this state they live through the winter. They lie at the roots of the grass, where they are partially protected, and afford a favorite food for crows. One morning, during the cold weather this winter, I found, on the paved walk at my house, a fully formed katydid, frozen as hard as a bone. It was a striking object at the time, as you know the color is a bright, delicate green. I took him into the house and put him into a box, and he soon came to life. I then put him into the greenhouse, but in a few days he disappeared."

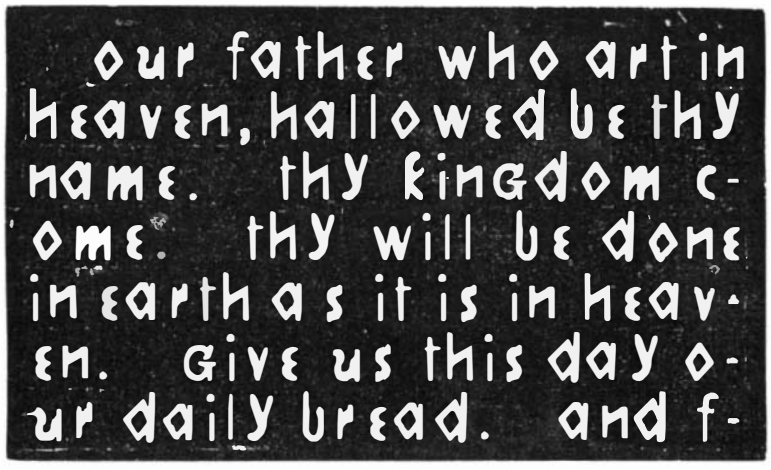
After a long discussion on the Wilson Strawberry and other subjects, the Club adjourned.

THE Fire Department of Philadelphia has 36 steam fire-engines and 38 hand engines.

WHAT INVENTION HAS DONE FOR THE BLIND.

Very few of our readers, probably, are aware of the great improvements which have been made, in this country, to ameliorate the condition of "the blind," or the name of the person from whom those improvements have originated; and it affords us pleasure to make even a brief record of some of the facts, and at the same time to pay a well merited tribute to the inventive genius of one of our own countrymen, through whose skill and untiring industry, the blind, in all parts of the world, have been so truly benefited and cheered in their sad life of "perpetual night." It is to the talent and exertions of that well-known inventor, Mr. Stephen P. Ruggles, of Boston, that the blind, in this country and Europe, have received more real and substantial good, in facilities for learning, than from any other source—or all other sources combined.

Mr. Ruggles first turned his attention to devising means for facilitating the education of the blind, as early as the year 1835, at the Perkins Institution, in Boston; and it was esteemed a most fortunate circumstance, that a gentleman of such acknowledged skill and fertility of invention should have determined



to devote his best energies to their instruction. He applied himself with philanthropic ardor and enthusiasm, for several years, to the careful study of all their requirements and capabilities, by constant daily observation amongst the pupils in their hours of study and recreation. The first and most important step, was, of course, to give them books. By the old method, as practiced in Europe and this country, the books were so bulky, so unwieldy and costly, as to be of no practical value. He soon became convinced that he could produce a type of less size, and less hight of face, which the blind could read with the greatest facility; providing the raised impression was hard and sharp, and the angles of the type adapted to the touch of the fingers. After many experiments he finally succeeded in reducing the size of the type and the hight of its face so as to place books, of comparatively very small dimensions, in the hands of the blind students and pupils. The size of the type now in use, the hight of its face, and the peculiar bevel of its face, are all his own invention.

He next invented and built the first press ever made for printing for the blind. The press was very powerful, giving an impression of about three hundred tuns to each sheet printed, yet was so contrived that the blind could do their own printing.

After succeeding perfectly in the construction of his type, and as well in the construction of the ponderous press for printing, a new and unexpected difficulty presented itself. There was no paper in the market adapted to this kind of printing or embossing. That which was hard enough would crack and break through when printed; and that which was flexible enough not to crack, would flatten down when pressed upon by the fingers of the pupils while reading. His reduced type required a new kind of paper. The peculiar and definite bevel, and hight of the face of the type, and the texture of the paper printed on, were most intimately connected, and it required a long series of experiments, in the manufacture of paper, to get them so harmonized as to work well together. But at last he succeeded in producing the article required.

After getting his new method of making books perfected, Mr. Ruggles next invented an entirely new mode of making maps for the blind. His plan was, a raised character, similar to his type; but arranged with such combinations that, at a trifling cost, he could produce a succession of maps of any size. Maps made in this way were never before known, and the Perkins Institution immediately issued, from this plan, an "Atlas" of the United States, and also a "General Atlas." It would, by most persons, be thought impossible that separate type could be so contrived as to admit of their being arranged in such a manner as to produce a map of any country and then to use the same type to make a map of any other country. Yet, all this was perfectly accomplished by this new invention—every piece of type matching its neighbor, with miraculous cunning, while following the crooked lines and angles, or graceful curves of rivers, coasts, islands, &c., with which such works abound.

Mr. Ruggles next produced the plates for a book on geometry, on a plan similar to his maps. These works proved very valuable and interesting to the blind—for with these books they could pursue there studies without the assistance from seeing persons which, before this, was necessary.

Mr. Ruggles's next production was a colossal globe, with the land and water, cities and towns, rivers and boundaries, &c., all distinctly marked by raised characters on its surface. This globe is thirteen feet in circumference, handsomely mounted, with a meridian and the signs of the zodiac. Astronomical problems are worked by it, and the blind scholars answer promptly all the usual questions, quite as correctly as scholars, of the same ages, in our high schools.

In the brief space allotted to this article we cannot mention all the improvements which Mr. Ruggles has made for the education of the blind; but the school apparatus, generally, now in use, is his invention. We must especially notice their slates as being very ingeniously contrived, and the constant theme of praise by those scholars who remember the "old slates."

In 1838 Mr. Ruggles went to Philadelphia and established one of his powerful presses for printing for the blind in the Institution in that city; and a year or two later placed another press in the Institution for the Blind in the State of Virginia. The perfect success of his method for reducing the size and expense of books for the blind, inaugurated a new era in the history of this kind of work, and the books were rapidly multiplied and sent all over this country and Europe. To show the effect produced abroad, by the appearance of his improvements, we quote the following from the most reliable sources:—

A French writer, formerly a teacher of the Paris school, writes thus: "The Americans have effected a revolution in the art of printing for the blind."

In a report made by order of the Belgian minister of Public Instruction, on the establishments for the Blind and Deaf, the Abbé Carton, commissioner appointed for the purpose, writes thus: "You will be able to perceive that the American print, while it is sharper and more legible, does not occupy but half the space of that of Paris."

Ramon de la Sagra, an able Spanish writer, after some discussion on this subject, which he critically examined in 1835, remarks: "As to the clearness of the relief, and the perfection of the press-work, the Boston books may be presented as models—it is the

same as that of the geographical maps, the figures of geometry, and the musical characters."

The same author says further: "One of the branches in which the young Institution, in Boston, has made admirable progress, is beyond question, the printing of books and geographical charts in raised characters. . . . . By diminishing the characters, a page 8 by 7 inches will contain 784 letters, while it will contain but 408 of the French characters and 509 of the 8 angular characters used in Edinburgh; as I had occasion to mention in my observations on the New York Institution. Seventy-six pages of the French books make a volume two and a half inches thick, while the same number by the Boston method make a volume of but one and a half inch."

In a letter from Dr. Allston, the Superintendent of one of the English Institutions for the Blind, to the government of the Boston Institution, dated June 18, 1836, is the following: "I received yesterday the maps, books, &c., for our Institution, for which I beg you to accept my most grateful acknowledgments. I have been earnestly at work upon them all the morning, and you could not have given me a greater pleasure than you have done. . . . . I am delighted to think you are in such a fair way as to be so great a blessing to the blind. I pray God may spare you long to accomplish your great undertaking."

On page 149 we present the exact form and size of the type invented by Mr. Ruggles, and which are now used for printing for the blind; the face (or white part) of these letters being raised, in *their* books, about one-fortieth part of an inch above the surface of the paper.

It was never expected by Mr. Ruggles that his inventions for benefiting the blind would be of any great pecuniary value to the inventor, because of the very limited demand for everything used by them; but he has realized a large fortune from the sales of numerous patents and patent rights, granted him in this country and Europe, for a great variety of useful devices of the first importance in many of the industrial arts.

A Terrific Boiler Explosion.

The Troy *Times* has the following in reference to an explosion at a paper-mill in Schuylerville, Saratoga county, last week:—

"This explosion proves to be one of the most destructive boiler accidents that ever occurred in this vicinity. Indeed, we doubt if a parallel can be found to the eccentric and fearful course which the mass of iron, live coals, hot water and steam pursued on this occasion. Usually the explosive force is expended in an upward direction. This paper-mill boiler moved horizontally, with fearful velocity, passing like an iron-clad ram, or a combination of two hundred pound shot, through eleven buildings, wrecking them as completely as if an earthquake had toppled them over. The calamity took place at two o'clock on Saturday morning, when many of the structures were filled with slumbering occupants, all unconscious of danger; and it is really wonderful that scores of people were not killed and wounded. Thus far only two of the victims have died, but several others were injured.

"There were two large boilers in the paper-mill. A fireman, residing in Victory, took charge of the steam apparatus at midnight; receiving directions to allow the pressure to run down from one hundred and twenty-five to one hundred and ten pounds. At two o'clock, just as he had passed the mouth of the east boiler to attend to the other, the former exploded, knocking him down; the steam pouring across the spot where he had been standing a few moments before. The boiler, with a terrific report, started from its place in the mill, taking a northerly course, and passing through nine buildings, all of which, except the last, were demolished. The pecuniary damage by the calamity cannot be less than $100,000."

To Whom it Concerns.—Some master-builders and others, having asked bids for jobs of stone-work from different members of the Stone-cutter's Association of Cincinnati in cases where but one person could get the work, the members have felt compelled to charge a commission of one per cent. on all estimates, as a great deal of time is lost to the unsuccessful bidders. Where the bid is accepted no commission is charged.

Correspondence

Strength of Steam Boilers.

Messrs. Editors:—On page 134, present volume of the Scientific American, you inserted a letter signed "T.W.B." disputing the correctness of the tables I sent you on the strength of steam boilers. (See page 71.)

Your correspondent says that "the error pervading the formula referred to, consists in taking the rings of the cylinder as of sufficient strength and stiffness to retain their shape if the continuity of the circle were cut." With all due deference to your correspondent, I beg to say that the tables were based on no such absurd theory, as we reckon the rivets have some little to do in assisting to keep the rings together, at the place where the continuity of the circle is cut." He also says that "the force to rend it asunder is as the semi-circumference and not as the diameter." To prove this as simply as I can, describe a circle on any given diameter, and from the centre draw radii, say one inch apart at the circumference; and we will suppose that each of thse radii represents the steam pressing from the centre outwardly on the shell of the boiler. Now if we wish to tear the upper semicircle away from the lower one, it will be evident by looking at the figure, that as the radii recede from the perpendicular, their force is decreasing as a *lifting* power, and only act directly to tear asunder that part of the boiler to which they are at right angles. If, however, we raise perpendiculars an inch apart, from the diameter, we get the only correct number acting directly to tear the upper and lower semicircle apart; and so with any other semicircles in the boiler, showing that we must calculate from the diameter, and not from the circumference.

My object in sending you the tables was not so much for the purpose of correcting error—the principle being generally understood—as to give a simple and useful rule, by which any mechanic, who only knew how to work out a simple question in division, might be able to know something about the safe pressure to put on boilers, and so that he might feel perfectly safe by working within certain limits; whilst he would also know that by exceeding them life and property would be endangered. As, however, actual experiment has proved the correctness of the principle, my tables may be depended upon as being strictly within the limits of truth: and I therefore think your correspondent makes a bold and random assertion when he says: "The error thus noticed is general and has been (and may still be) the cause of numerous explosions."

Wm. Toshach.

[We agree with this correspondent in his deductions and we inserted the letter alluded to in accordance with our principle to hear all sides.—Eds.

Schenectady, N. Y., Feb. 23, 1864.

Manufacture of Charcoal Iron in Baltimore.

Messrs. Editors:—Messrs. Stickney & Co.'s Lazaretto Furnace, located at Lazaretto Point, opposite Fort Mc. Henry, Baltimore, is now producing an average of 40 tuns of iron per week. The furnace is 9 feet diameter of bosh, and the hearth and in-walls are of Berry's premium fire-proof brick. It is worked with hot blast. The blowing cylinder is 45 inches in diameter with 5 feet stroke, and is driven by an engine with a 10-inch cylinder, 3 feet 6 inches stroke. There are also 7 kilns for burning charcoal, each 12×40 feet, and 18 feet high to the top of the crown, making a capacity for 60 cords of wood. The iron produced at this, as well as other furnaces in Baltimore, is all made with charcoal, from the Baltimore county ore, which has been pronounced by judges equal if not superior to the ore found in adjacent States. The Baltimore charcoal iron is used chiefly for rolling armor plates for our iron-clads.

John Godfrey.

Baltimore, Md., Feb. 13, 1864.

The Paris *Presse* computes the population of the world at one thousand millions, speaking three thousand and sixty-four languages, and having eleven hundred different forms of religion.

PROGRESS OF AMERICAN INVENTIONS ABROAD.

There is one thing that apparently never ceases; and that is the progress of Invention. Wars may interrupt commerce, society may be upheaved by radical changes, even the very face of the country itself may be, by storms or other causes, laid waste and desolate; in spite of all, Invention, the impersonation of a new order of things, steadily forces its way over every obstacle. To the remotest corners of the globe American genius has penetrated, and in countries long forgotten of the arts may now be heard the busy hum of our cotton machinery—may be seen the quick and economical steam engine; and in many other ways the might and energy of American ingenuity is made manifest. In spite of some adverse circumstances, such as the depreciation of the currency, and the existence of war, the productions and inventions of our countrymen meet with favor abroad; and instead of losing ground, they enjoy increased popularity. Our deductions on this point are drawn from observation; the proof of them is to be found in the appended list, which we publish in accordance with our promise to give the latest intelligence respecting valuable improvements in the mechanic and other arts and sciences, which have advanced the world so much:—

Application of Power to Steam Engines, &c.—Patentees: P. Dickson of Utica, and W. A. Jones, of Winona, Minnesota.

This invention consists in imparting rotary motion without the use of a crank, or having dead points to overcome. By the adoption of a series of dogs arranged to operate on the inner side of the rim of a wheel, a continuous rotation of a shaft or pulley is kept up. These dogs can be reversed by a simple arrangement without stopping the engine, so that the shaft or other part revolves in an opposite direction. The improvements also admit of varying the power exerted by the engine so that it may be increased or decreased, as desired. These are very important additions to the usefulness of the steam engine, and render it still more valuable.

Automatic Toy Figures.—Patentee: Enoch R. Morrison, of New York City.

The greatest excitement was caused by these little automatons last winter, and they are still quite popular. By a train of clock-work motion is communicated to a pair of eccentrics which, being connected to a set of feet, cause the figures to which the clock-work is attached to move from place to place until the force of the spring is lost. These figures are neatly dressed and make a very handsome appearance.

Apparatus for drying Grain.—Patentee: Peter C. Schuyler, of New York City.

This very much needed invention consists in arranging a number of sieves or gratings one above the other, inclined in opposite directions in such a manner that when the grain is carried to the top by an elevator, and a reciprocating movement is imparted to the sieves, the grain will run down from the highest to the lowest one. Currents of heated air pass through this shower of grain, and coming in contact with each kernal deprive it of moisture, rendering the produce fit for storage or transportation.

Machine for transmitting Power.—Patentee: J. F. Rochow, of Brooklyn, N. Y.

This patent relates to an improved method of transmitting power to steering or hoisting apparatus. The arrangement consists of two cog-wheels, having an equal or an unequal number of teeth, one firmly secured to the drum of a steering wheel, the other stationary. In combination with these wheels are pinions attached to a tumbling shaft so that by the rotation of the same through the action of the pinions and the differential wheels before spoken of, a slow rotary movement is imparted to the drum itself. Very great power is gained by this arrangement.

Projectiles and Fuses.—Patentee: Isaac P. Tice, of New York City.

This patent relates to an improved method of protecting fulminates of silver and mercury from explosion by careless handling, or accident; to this end small quantities of curled hair, wool, cotton or sawdust, are mixed with, or interposed between small quantities of the fulminate; also in lining the chamber of the shot containing the fulminate with cloth or cotton; also dividing the chamber into different compartments, whereby the force of concussion is reduced and danger of premature explosion from dropping