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

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