Correspondence.

Singular Boiler Explosion.

To the Editor of the Scientific American:

On Sunday, the 11th of January, one of the two boilers of the steam screw tug M. Dougherty exploded, completely wrecking the boat, killing two of her crew, and injuring three others. The boat was steaming up the Monongahela near Elizabeth, twenty miles above here. She carried two boilers, 14 feet by 30 inches each, with three 9 inch and two 8 inch lap-welded flues. They were allowed 175 pounds of steam. It is well established that there were two full gauges of water and but 160 pounds of steam at the time of the explosion. The shell was of first quality steel. The peculiarity of this explosion was that the larboard boiler exploded, throwing the starboard boiler upon the *left* bank of the river and high up on a neighboring hillside beyond, where the exploded boiler fell. The starboard boiler is sound. T. C. N.

Pittsburg, January 16, 1885.

Opportunities for Inventors in the Provision and Grocery Trade.

On every side we find that within the last few years improvements have been making rapid strides in every branch of trade we can think of excepting for grocers. The butcher and marketman uses to-day the same tools and nearly the same methods in vogue a hundred years ago. True, there is but little room to improve the knife, cleaver, or steel, but something is surely needed to lessen the labor and time of sawing, not only in the store or market, but also in the large packing houses. We have stood and looked at the band saw doing all manner of difficult scroll work, and wondered why some of the manufacturers have never tried to introduce them among the packers and marketmen.

The patterns already on the market would, we are sure, answer the purpose with one exception, that of the saw slipping on the driving drum or wheel, on account of the grease from the meat, but we should not think this much of an obstacle to overcome. The amount of lost time in doing the work by hand is enormous. The blades would have to be tempered harder than for woodwork; the general features of the machine could remain as at present. The circular or jig saw would not answer, for reasons that may be apparent to any one acquainted with the action of the bone under the saw while in the meat. The one item of sawing ham houghs is a big one alone, to say nothing of sawing beef bones to remove the marrow, shoulder, shank, and round bones. In the retail markets, sawing the bone in steaks is about the slowest and hardest work a man has to do. A sawing machine to run by hand, if a good one, would be a boon.

Again, can't some one get up a cheap motive power other than steam to run the grocery coffee mill? Even a spring motor that could be wound up quickly, so as to make from one hundred to one hundred and fifty revolutions of the mill, would be worth something if it could be wound up with a few turns of a crank handle, start, and left to run while the grocer was getting some other article for the customer. One who has never been in the business cannot know how valuable every minute is to a man with a store full of customers. You can't grind the coffee ahead, as no one will have it as a rule, even were it advisable.—*American Marketman.*

Progress in Railway Improvements.

Railway inventions secure adoption very slowly. Looking back over the years, we remember that long after the Miller platform had proved itself invaluable, and was largely in use, one of our greatest trunk lines still coupled its cars with link and pin, and endeavored to render the transmit of passengers from car to car less dangerous and unpleasant by keeping a short plank across the ever varying gulf between the swaying cars.

The air brakes too were looked on by many of the older Eastern roads as a new fangled Western device of doubtful utility, and, till appalling accidents compelled, few of the New England railroads had condescend to adopt them; and to-day those selfsame roads find a hundred reasons why they should not adopt a uniform system of signals which has met the approval of a large majority of the railroads of the country.

Talk of insular prejudice! Why, ten years ago nearly all our railroad men scouted the idea of track signals other than a red flag or a ball hoisted on a pole. The complicated system used in England might do for John Bull, they said, but it would never be used here. To-day our principal railroads have not only adopted those very signals, but have even improved on the English block system. Now we have signals at short distances apart which indicate to the engineer with unerring certainty whether the track is clear to the next signal ahead, and which he is otherwise forbidden to pass. These signals are worked by the power of electricity, called into action by the passage of the train itself, and depending on no human agency.

Their automatic action is most interesting to watch. You may be standing near one, no train within sight or hearing. Presently you hear the distant rumble or see the puffs of steam that indicate the approach of a train. As it nears the signal you see the red disk fall, or the vane of lattice bars revolve, in time for the engineer to note its action. He sees it change, and knows at once not only that the track ahead is clear, but that till he has passed the next signal head, this faithful signal will forbid the passage of a following train. You wait and watch as the train disappears, and soon the red disk moves or the lattice bars revolve back to their former position, and you know that the train has safely passed the signal ahead. But this is not all. If the continuity of the track be broken by a rail removed for repairs, or if some straying cow has lain down on the track for a contemplative chew, the signal gives warning of the obstruction, and to fill the measure of its fidelity, if itself inoperative, it displays the warning signal of danger. Yet another purpose is served by electric signals. At level crossings and at stations a gong is made to ring when a train approaches within a certain distance, and the continuous ringing says clearly and unmistakably, "Train coming, clear the track."

But the most perfect of signals can only call attention to some fact, and so long as the element of human vigilance is required to note them, so long shall we remain liable to accidents arising from human infirmities.

The English system of connecting and interlocking switches and their signals, in such a manner that one man controls the action of many without moving from his box, and by which the setting of a switch for a certain movement of a train holds all others till that movement is completed, has already been adopted at some of our larger stations, and seems likely to be gradually adopted with the inevitable increase of traffic.—*Railway Review.*

Hints for Those Who Intend to Build.

Any one who has built a house will be likely to recognize his own experience in the following article from the *Builder and Woodworker:* The ordinary man, the writer justly continues, has very little knowledge of the amount of labor required to get out complete working drawings for a good-sized building. Now, the intending builder contemplates building in the spring, say April or the beginning of May. What does he do? Instead of going to an architect during the winter months, when work is slack, and giving him his ideas, so that he may have time to work them out and develop them, he waits until a week or two before he is ready to build. Then the intending builder rushes off to an architect, and wants plans submitted to him at once. But every house must be treated by itself and separately, and the architect, like the physician, diagnoses the case, and takes measures accordingly. First he takes a survey of the ground; notices if there are any irregularities or peculiarities that may have to be overcome in a scientific manner. Then he prepares sketches, plans, and submits them to his client. Nine times out of ten some modification or alteration is desired—an alteration may be trivial in itself, but which may necessitate considerable careful thought and study.

With the sketch plans will be an appropriate estimate, which will generally come within a few hundred dollars of the actual estimate. Of course everybody wants a $15,000 house for $10,000, but this is such a trifle that every well educated architect is used to this pleasing trait, and would be disappointed if his client did not develop it. The alterations in the sketch plans having been made, the architect must get out a full set of working and detail drawings, showing with the greatest accuracy every important piece of construction and furnishing detail, very often full size of carving, or ornamental work or special features. These drawings have then to be traced, the tracings being used by the contractors, and the originals remaining in the architect's office, and becoming a part of the contract. All this takes time, but the builder is anxious to see his house under way, and wants matters rushed. When the drawings have all been prepared, contractors are invited to estimate on the work and furnish their bids, which of course is again a matter of time. But at last the lowest estimate has been accepted, the contract signed, and the ground broken for the foundations. The troubles and tribulations of the architect are by no means ended.

As the work progresses and begins to show its shape, the owner takes friends to see his new acquisition. Mr. A. suggests that the house will be a gem, but it ought to have a smoking room. Then Mr. B. visits the house and likes it ever so much, but there ought to be a little private room for its owner. Architect again consulted, and in some way or other a room is squeezed in. But these suggestions from the male side of the house are as nothing compared with the orders, hints, and suggestions furnished by the presiding member of the fairer sex. Ladies, as a rule, seem to think that houses will stretch like so much India rubber, and that it is as easy to add a room here, or a picturesque bower there, as it is to purchase the extra half yard for a dress, which every dressmaker finds her patron fails to provide. The moral of all this is that when you make up your mind to build a house, take plenty of time about it; having settled on your plans, allow your architect to carry them out, and don't attempt to change them half a dozen times, because if you do the result will be unsatisfactory.

Prof. Benjamin Silliman.

Prof. Silliman, of Yale College, died at his residence in New Haven, Jan. 14, in the 69th year of his age. He had been ill since Oct. 6, and his death was caused by heart disease, which induced dropsy and uræmic poisoning.

During the last forty years the name of Prof. Silliman has acquired a steadily growing prominence in the several departments of chemistry, geology, and mineralogy. His father was the first to occupy the chair of Chemistry at Yale College, which he filled from 1802 to 1853, and was then succeeded by the son. *The American Journal of Science and Arts*, more generally known as *Silliman's Journal*, was founded by the elder Prof. Silliman in 1818, and the son at an early age became a contributor to the publication, which was afterward conducted by the son, together with Prof. Dana. In 1842 Prof. Silliman began to receive private pupils from Yale in analytical chemistry and mineralogy, and later to take advanced students in physics and chemistry, an enterprise which proved the germ from which has grown the present Sheffield Scientific School of that college.

In 1846 Prof. Silliman published his "First Principles of Chemistry" which became a standard textbook at once, and of which over 50,000 copies have been sold. In 1849 he was elected to the chair of Medical Chemistry and Toxicology in the Medical Department of the Louisville University, which at that time was one of the most flourishing institutions in the United States. He held this professorship for five years, until 1854, when he resigned to take charge of the instruction in chemistry in the Academical and Medical departments of Yale, a position which had been made vacant by the resignation of his father, the instruction in geology and mineralogy having been assigned to Prof. Dana. He resigned his position in the Academical Department in 1870, but continued to serve the college in the Medical Department. In 1853 he had charge of the chemical, mineralogical, and geological departments of the world's fair in the Crystal Palace in New York, and in connection with Charles R. Goodrich edited, the following year, "The World of Science, Art, and Industry" and "The Progress of Science and Mechanism," in which the chief results of the great exhibition were recorded. In 1858 he published his "First Principles of Natural Philosophy and Physics," a second edition of which was issued in 1861.

He was one of the 50 original members named in the act of Congress of 1863 incorporating the National Academy of Sciences, and served the Government during the war on some important commissions. He made three visits to California—in 1864, in 1867, and 1872—occupying his time with professional work in the mines, and mineralogical and geological explorations. In 1868 he presented his private cabinet of minerals to Cornell University, where it is labeled with his name. He made important additions to the mineralogical collections of Yale, and the metallurgical cabinet of the Yale Scientific School is the result of his explorations and labor.

Prof. Silliman had been the State Chemist of Connecticut since 1869, and in this capacity was frequently called to the witness stand as an expert in murder and other trials, and he was also employed as an expert in numerous patent cases calling for an exceptionally good acquaintance with chemistry and physics. He printed, in addition to his more ambitious works, a great number of memoirs on scientific and practical subjects and many addresses and opinions which are valuable as contributions to scientific history. He was one of the trustees of the Peabody Museum of Natural History, and was a member of numerous scientific societies on both sides of the Atlantic.

The Mersey Railway.

The whole length of the tunnel under the river Mersey, which is 1,300 yards from quay to quay, is now arched in, and the greater part of the land approaches are finished, so that the laying of the permanent way will shortly commence. The total length of the line will be 4½ miles, independent of some extensions now being proposed. It runs from the London and Northwestern and the Great Western joint lines at Birkenhead to the Central Station at Liverpool, the course being chiefly under the public streets in the land portion. The underground parts of the stations at Greenlane, Tranmere, and Hamilton Square, Birkenhead, with that at James Street, Liverpool, are in a forward state. The hydraulic machinery for lifting train loads of passengers, the machinery for mechanical ventilation, and the locomotives and carriages are in course of manufacture. It is expected that the railway will cost half the mileage rate of the Metropolitan Railway, and that the main line of three miles will be opened about June next. The engineers are Messrs. J. Brunlees and C. Douglas Fox; the contractors are Major Isaac and Messrs. John Waddell and Sons.

Gas Tar as a Health Preservative.

The serious outbreak of cholera with which France has recently been visited has caused inquiry to be made as to the extent to which persons engaged in particular manufacturing operations enjoy immunity from or are rendered more susceptible to the attacks of epidemic disease. It has been known almost ever since the establishment of gas works that the exhalations arising in the various processes of gas manufacture, although, perhaps, not specially pleasing to the olfactory organs, are not detrimental to health, but are, on the contrary, highly beneficial in special forms of disease, such as whooping cough and croup. The extensive use, in throat ailments, of preparations in which some form of carbolic acid figures largely is a testimony to the value of this derivative of coal tar as a therapeutic agent. A recent issue of the *Journal des Usines a Gaz* contained an article in which particulars are given respecting certain investigations made by a Dr. Lemaire some years ago into the subject of the influence of coal tar and its derivatives upon the health of the workmen employed in the preparation of these substances. His inquiries were made chiefly in connection with the employes of the Paris Gas Company. He found that those whose duties did not necessitate a prolonged stay in the parts of the works where tar was to be found were liable to all kinds of ailments, and formed a considerable proportion of the number on the sick list; while among the workmen specially occupied with tar, only three were sick in the course of seven years. This result is all the more striking when the number of workmen in the service of the company at the period referred to is considered. There were altogether 20,553 men, of whom 764 were engaged in some occupation connected with tar.

Dr. Lemaire also cites the case of the Bayonne Gas Works, where the workmen had not only not been attacked by cholera during its prevalence, but generally enjoyed immunity from skin diseases. M. Bouley, a professor at the Veterinary School at Alfort, found, as long ago as 1860, that gas works employes escaped during cholera epidemics; and the communication of this fact to Dr. Lemaire caused him to institute his inquiries into the subject.

Whole Meal Bread.

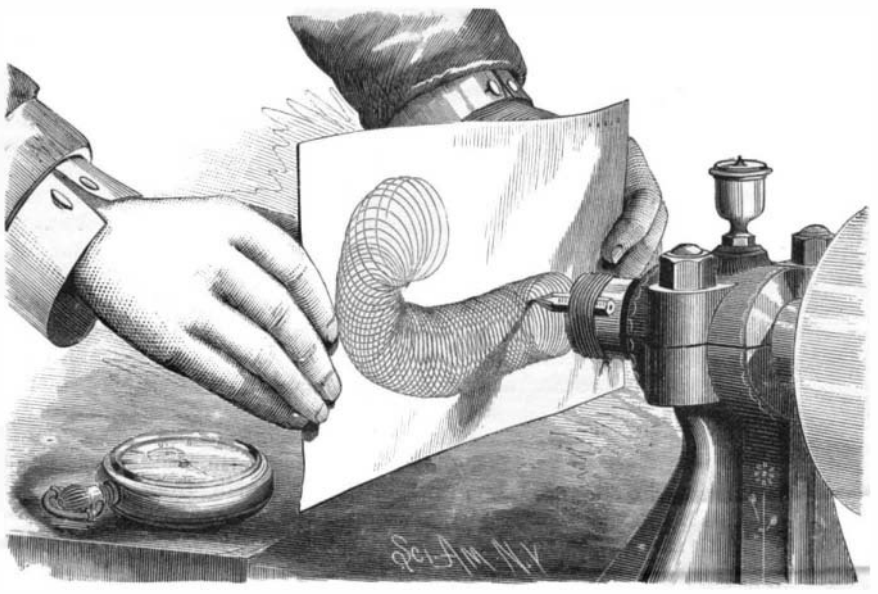
The late exhibition of breadstuffs at Humphrey's Hall, Knightsbridge, although it was not so largely attended as was expected, has been the means of reviving attention to the subject of whole meal, so strongly advocated by the Bread Reform League and by its indefatigable honorary secretary, Miss Yates. If the chemists alone had to decide the question of the relative values of whole meal and ordinary white bread, the public would have to wait a long time before it could obtain a satisfactory reply; for on this point chemists differ more than doctors. If we interpret the opinion of the profession of medicine correctly, there is a growing disposition in favor of the whole meal bread, on practical rather than on theoretical and chemical grounds. The bread which contains all the constituents of the wheat, except the outer, insoluble, and irritating portion of the seed, seems, when the appetite for it has been obtained, to be more satisfying and digestible than the white and fashionable product which is found on most tables, of rich and poor alike.

It is believed, too, that for children the whole meal is the best for sustaining growth and for building up the skeleton strongly and in perfect form. The supply of whole meal bread is now much facilitated by the improvements that have been introduced in the decorticated or granulated flour, to which Lady John Manners has called public attention in her late paper on Wheat Meal Bread. In the decorticated whole meal the extreme outer coating of the wheat grain is, by a special process of abrading, to the perfection of which Dr. Morfit has rendered able service, cleverly removed. After the abrading process is completed the whole of the grain is reduced to a fine flour, in which there is retained all the substances that are nutritious and digestible. Considering the fact that the whole meal bread, when it is properly manufactured, is easily assimilated, we are lead to the conclusion that it must be more nutritious generally than other bread, in which starch predominates. But we do not wish to be dogmatic, and would prefer, before pronouncing a strong opinion, to hear what medical men from their unlimited field of observation have to say. It is for this reason we direct attention to a topic which must soon be very widely discussed among all sections of the community.—*Lancet.*

A SIMPLE MODE OF ASCERTAINING THE REVOLUTIONS OF A SHAFT.

To the Editor of the Scientific American:

Noticing a revolution counter in one of your recent numbers, I send you an automatic record of 582 revolutions per minute made by a process less generally known than it should be.



SIMPLE MODE OF ASCERTAINING THE REVOLUTIONS OF A SHAFT.

A lead pencil is tied to the end of a shaft so as to revolve in a circle of convenient size. A piece of paper is lightly held against the end of the pencil, which, if the paper is held still, traces a circle upon it; but if the paper is moved backward and forward, the pencil traces a series of loops intersecting each other. It is easy to count them, and thus to determine the number of revolutions made while the paper touches the pencil.

I inclose a record, which, having been in position ten seconds, shows that the velocity was 582 revolutions per minute.

M. C. MEIGS.

Washington, D. C., December 20, 1884.

[The accompanying engraving clearly shows how the pencil is fastened to the shaft and the position in which the paper is held.]

A VERY good artificial stone is made by using one part of Portland cement and three parts clean, sharp sand.

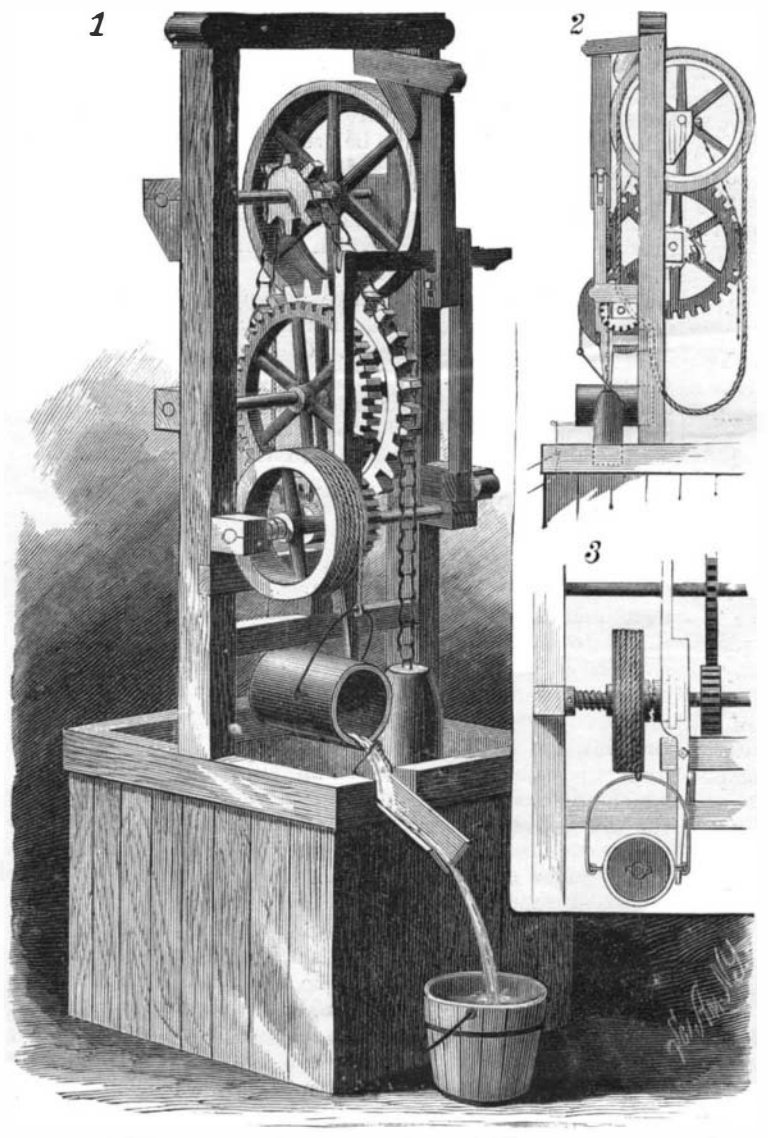
Milldams.

A decision by the United States Supreme Court, in a case which was carried from New Hampshire, has just been rendered, which will interest all men who have anything to do with water power in general, or with milldams in particular. Many of the States have laws which authorize persons to maintain milldams on streams which are not navigable, the dam being erected upon property owned by the persons, upon condition that they shall pay to the owners of the land which may be overflowed such damages as may be assessed. In the case in question, the claim was made that the effect of such a law was to deprive the owners of overflowed land of their property and the uses of it without due process of law, and hence that the statute was in violation of the Fourteenth Amendment to the Federal Constitution. In the opinion rendered January 5, by Justice Gray, of the United States Supreme Court, he sustained the validity of the New Hampshire act, and this may properly be regarded as a test case, and very probably it will result in upholding the milldam laws in other States.

M. JABLOCHKOFF announces another battery of great scientific interest. A small rod of sodium weighing about 8 grammes is squeezed into contact with an amalgamated copper wire, and flattened. It is wrapped in tissue paper and then damped with three wooden pegs against a plate of very porous carbon. This completes the element. The moisture of the air settles on the oxidized surface of the sodium. It works without any other liquid. The E. M. F. is 2·5 volts, but the resistance is as great as 25 ohms.

WEIGHT POWER MACHINE.

The engraving represents a machine for utilizing weights as a power for lifting water or for other purposes. Journaled in brackets on the uprights of the frame is a shaft carrying a wheel, on one side of which is formed a grooved pulley over which passes an endless rope, and a sprocket wheel over which extends a chain having a heavy weight at one end. The chain also passes over part of a sprocket wheel loosely mounted on its shaft, and provided with a pawl engaging with a ratchet wheel rigidly mounted on the shaft. On this shaft is a cog wheel that engages with a pinion on the lowest shaft, on which is loosely mounted a drum having a spiral groove in which winds a rope to whose free end is suspended a bucket. The drum has a clutch hub to engage with a clutch sleeve that turns with, and slides on, the shaft. A lever, connected with the sleeve, is pivoted to a cross beam, and has its upper end pivoted to a bar sliding transversely; the lower end of the lever is so placed that the bucket will act on it. (This construction is shown plainly in Figs. 2 and 3.) In the bottom of the bucket is a valve, opening upward, and on its top edge is a hook arranged so as to catch on a wire bail at the end of the spout. A brake shoe is so placed as to bear against the face of the wheel on the upper shaft; the arrangement of the levers for operating this brake is shown in Figs. 1 and 2.



VANDERCOOK, SMITH & BAKER'S WEIGHT POWER MACHINE.

The weight is raised by turning the upper shaft by means of the endless rope. The bucket being at the bottom of the well, the clutch collars are disengaged and the brake lowered to rest upon the pulley, thus preventing the pulley from revolving, and stopping the entire machine. When the machine is to be operated, the lower lever is moved so that the clutch collars will engage, and as the same movement releases the brake the weight descends, the drum revolves, and the bucket is raised. When it arrives at the top, the hook catches on the bail and the bucket is swung to horizontal position, permitting the water to flow into the spout. As the bucket swings up, its bail acts on the lower end of the lever, and moves it in a direction contrary to that in which it was moved to start the machine; the brake then prevents the further descent of the weight. The bucket descends immediately after it has been emptied, a spring, coiled by the unwinding of the rope, regulating the speed. The weight can be so adjusted that by raising it once several buckets of water can be raised before it becomes necessary to again wind up the weight.

This invention has been patented by Messrs. M. Vandercook, W. P. Smith, and H. M. Baker, and particulars can be had by addressing Mr. W. P. Smith, of Manton, Mich.