of cutting and housing the natural product. The sanitary advantage of ice frozen from pure water, over ordinary river and pond ice, is another important item in its favor, and one which will reconcile intelligent consumers, if necessary, to a price measurably exceeding that of natural ice.

Whether the cheaper water and cheaper land obtainable at a distance from the market place would more than offset the expense and wastage involved in transportation and extra handling is a matter to be determined. It may be that the most economical place for ice manufacture for New York consumption, all things considered, would be up the Hudson where the water is sweet, perhaps above the State dam at Troy. Ground space opposite or above Lansingburg would be comparatively inexpensive. The water could be drawn from the river and would be uncontaminated by the sewage of Albany, Troy, and the adjacent towns, as would be the case if the works were located further down the river. The condensing or cooling coils could be submerged in the river, and one of the chief items of cost in the production of ice artificially would thus be avoided. The ice as fast as manufactured could be placed on river barges such as are now employed in the trade, and the daily product could be towed down the river cheaply and with comparatively slight wastage. If the claims advanced by the makers of ice-machinery are verifiable in practice on a large scale there ought to be a good margin for profit in an undertaking of this character. If existing machinery will not justify the experiment—and we do not see why capitalists are neglecting it if the opportunity is real—then our inventors should look to it. As already remarked, the field is wide and inviting.

THE MILLERS IN COUNCIL.

The Millers' International Exhibition at Cincinnati, for which preparations have been making for many months, was opened on the 31st ult. It presents undoubtedly the completest display of milling machinery in full operation, and all appliances connected with the trade, together with the largest collection of different varieties of grain and flour, that has ever been brought together in this or any other country. The Millers' National Association fixed the time of holding their annual convention for the first week of the Exhibition, as the latter is to last four weeks, and besides a full attendance of members of the trade from all parts of the United States, an imposing delegation of the leading millers of Great Britain, France, Germany, and Austria, are in attendance.

For many reasons this Exhibition and the assembling of representative millers from all parts of the world is of the utmost significance at the present time. Our exports of wheat for the nine months to the 1st of April last amounted to $149,012,749, and in wheat flour the exports for the same period were valued at $26,375,228. The quantities were smaller, although the proportions were about the same for the like period of the year preceding. The question immediately arises: Is it not possible for our millers to largely increase the quantity of flour, in proportion to wheat exported? To do this would be by so much to enlarge the field for the employment of American labor and capital. Perhaps the most important object of the Exhibition, however, and it is intimately connected with the above question, is the comparison of the methods of milling adopted in various countries. And here we find a very complicated state of affairs; indeed if this were not so it is hardly probable that so influential a delegation of foreign millers would have come across the ocean to see what our millers are doing. It is the habit of American manufacturers, mechanics, and artisans, to perfect their own processes partly by watching closely what every one else is doing in the same line, either at home or abroad; but it is generally the rule with foreigners to scout the idea that anything can be learned in regard to the older trades from our experience. Now, however, these foreign millers want to find out something about the making of our new process flour; they want to know something about the improvements we have been making in milling for the past ten years, whereby our millers have rendered it a task of constantly increasing difficulty for them to hold the business of making flour for their own markets. And the welcome extended to them, and the facilities they are afforded for examining the machinery and looking into the workings of all our large establishments, present a striking contrast to the exclusiveness which most foreign manufacturers maintain toward all would-be visitors.

Just what the new process is it would be impossible to define specifically, for what might be the new process with one establishment may have become substantially an old one with another. The business has been constantly changing within the past few years, the general direction of the movement having been toward the introduction of chilled iron rolls operating in connection with the burr stones, and reducing the wheat two, three, or more times, instead of once, as formerly. Hardly any two millers agree exactly as to what is the best method, but there is a general concurrence of opinion among the leading members of the trade that the plan of gradual reduction, with repeated purifications and regrindings, is the best, although, in thus making a smaller proportion of flour of the finest grades, they have a large proportion of other products, which it will take some time to generally classify. Of all these methods, however, foreign millers will have an excellent opportunity to judge, while our own millers will undoubtedly make the most of an examination of several full sets of English and German milling machinery shown at the Exhibition, as well as obtain much valuable information from a comparison of views with so many of the leading representatives of the trade abroad. Among the mechanical features which are likely to receive particular attention, the magnetic separator, for removing all iron particles from the wheat, is one of the newest. It is astonishing in what a variety of shapes iron finds its way into the wheat, not only from the wire used in binding, but in the way of nails, pins, pieces of reapers, etc., and even as ore dust from wheat lands of this character. The damage heretofore done to the stones and bolting cloths from this cause has been great, and many fires have been caused thereby. Our elevator system of handling grain will likewise be of particular interest to our foreign visitors, where our methods of handling and storing are almost unknown. But, while they will give no little attention to the various differences of classification, and while the conceded objects of both foreign and American millers at this meeting are to discover how best to make the purest and finest flours, we hope the opportunity will not be allowed to pass for these representatives of the trade to properly stigmatize the not unusual practices which have grown up of late in adulterating flour. The mixture of white corn or barley flour with wheat flour is now done by some millers to an extent which would perhaps quite counterbalance the improvement made by others in the quality of their product, while it is well known that alum is used to some extent. For the credit of the trade, as well as for the benefit of the community, we hope that such practices will receive their deserved rebuke, and if possible effectual exposure, at the hands of the millers assembled in Cincinnati.

THE HOWGATE POLAR EXPEDITION.

The steamer to convey the Howgate colony to the Arctic regions has been overhauled and specially strengthened for the service at Alexandria, Va., and has received her outfit at the Washington Navy Yard, preparatory to sailing June 10. The chosen vessel is the Gulnare, a Clyde built steamer of 230 tons.

She is 140 feet in length, and 21 feet 6 inches breadth. The engine is 200 horse power, and has two 30 inch cylinders, each 24 inches stroke. Additional strength has been given by filling in 2½ inch oaken plank between the iron frames and sheathing inside and outside with stout oaken planks, thus making the hull uniformly 15 inches thick. The inside of the hull has been braced with extra heavy white oak timbers placed horizontally. Three heavy white oak breast hooks have been placed inside of the prow, and on the outside of the bow is a sheathing, three-eighths of an inch of iron armor, extending 10 feet deep and 14 feet aft from the stern. In addition on the sides of the vessel extending above the water line there have been placed wedge-shaped oak timbers to be used in easing the vessel upward when pressed by heavy ice. A new main deck has been constructed, and a new smokestack and an extra propeller provided. A new bridge 21 feet long has been placed amidships. The forward part of the vessel will be used for the seamen. Aft of the engine and boiler is the cabin, with staterooms which will accommodate the officers and scientists. The Gulnare will carry in addition to her steam power mainmasts and foremasts and duplicate sets of new sails.

Accommodations are provided for forty persons, twenty-five of whom comprise the polar colony, consisting of Lieut. A. W. Greely, Fifth United States cavalry, commander, with, as assistants, Lieut. G. C. Doane, Second United States cavalry; Lieut. W. H. Low, Twentieth United States infantry; Henry Clay (grandson of Henry Clay); Astronomer—Orray Taft Sherman, who was connected with the Florence Expedition, and as assistants, George H. Rohie, W. S. Jewell, and O. Aldrich, of the Signal Corps United States Army; Surgeon and Naturalist, Dr. Octave Pavy; Photographer, J. W. Rice; and fourteen enlisted men as a working party. In addition to these two half-breeds have been engaged as dog drivers, and will join the vessel at a place called Rigolette, on the coast of Labrador.

The steamer carries two years' supply of provisions for the colony, and rations for the ship's crew for sixteen months, though it is expected that the voyage will be made in five months. A double-walled frame house, 21 x 65 feet inside, is carried for the colony, besides the usual outfit for traveling parties. The station will be provided with a steam yawl and two whaleboats for water exploration, and six sledges, with dogs, for land work. It is expected that fuel will be obtained from a coal vein at the site of the proposed station.

The outfit includes the following scientific apparatus, in addition to a proper supply of surgical and medical instruments and appliances.

Meteorological.—12 spirit thermometers, 12 mercurial thermometers, 12 maximum thermometers, spirit; 3 maximum thermometers, mercurial; 6 psychrometers, mercurial; 6 psychrometers, spirit; 12 minimum thermometers, spirit; 6 black bulb thermometers, in vacuo; 6 black bulb thermometers, free; 1 Regnault's hygrometer, dewpoint apparatus; 3 rain gauges, 6 standard barometers, 6 aneroid barometers, 6 anemometers, standard; 3 self-registers for anemometers, 3 wind vanes, 6 water thermometers, in cases, complete.

Astronomical.—3 sextants, 6 chronometers, 2 magnetometers, 2 fox circles, 6 telescopes, 6 binoculars, 2 spectroscopes, 4 heliographs, 4 sets drawing instruments, 6 sets signal equipments. In addition to a well selected collection scientific works, and an unusually fine collection of Arctic works, a large quantity of miscellaneous reading matter has been contributed by friends of the expedition.

On leaving Washington the Gulnare will proceed under sail (to save fuel) to St. Johns, N. F., where she will stop for additional coal and an ice pilot and any further supplies that may be needed.

From St. Johns the vessel will go to Rigolette and take on board the dog drivers and the sledge dogs, which are expected to be ready for the expedition. From Rigolette she will go to Disco, using steam only when absoluely necessary.

At Disco the coal bunkers will be refilled from the supply left by the Polaris, or, failing that, from the Danish stores, and then the vessel will be pushed forward as rapidly as possible to Lady Franklin Bay, where the colony and outfit will be landed. If weather and water prove favorable the vessel will return to the United States with as much speed as practicable. It is expected that she will reach Washington on her return by the middle of October.

OUR IRON AND STEEL IMPORTS.

The recent labor troubles in the iron industry of Western Pennsylvania give especial interest to the figures furnished by the United States Bureau of Statistics, relative to our increased imports of iron and its manufactures. Without touching at all upon the merits of the questions at issue, from the laborers' point of view, the practical one, which concerns consumers as well as producers—the price at which iron and its manufactures can be maintained and meet with the largest market for the product of the mills—meets here a significant answer. The imports of this class are all dutiable, and there seems to be now no probability that we shall have any change in the tariff thereon during the present session of Congress. Yet, notwithstanding these duties, our imports of iron and its principal manufactures have increased enormously within the past few months. The "boom" in the iron industry, which, so short a time ago, seemed to promise an extremely active business throughout all of 1880, at prices that were "out of sight" of those obtainable a year ago, has entirely subsided, and, with the flood of foreign goods which has been coming in, prices have so declined that it is evident, even with the enormous consumptive demand we are having, that fancy figures will not be obtainable hereafter. The iron manufacturers here will have to compete with those abroad, with the advantages of the tariff in our favor, it is true, but with heavy stocks, lower rates for wages, and more abundant and cheaper capital to the credit of the other side of the account.

In the three-quarters of a year preceding April 1, 1879, our imports of pig iron amounted to only $1,366,700; for a like period to April 1, 1880, they were $7,291,453, but the price of American pig in New York the first of this year was $35 per ton, against $17 per ton the 1st of January, 1879. The imports of old and scrap iron for the first mentioned period were but $66,967, but for the corresponding nine months a year later they were $6,705,190. In steel ingots, bars, sheets, and wire, we took from foreign manufacturers in the first period to the value of $837,631, against $2,463,127 in nine months a year later; in bar iron we bought $1,037,205 in the former, as against $3,159,606 in the latter period; and in miscellaneous manufactures of iron and steel the imports stand at $1,595,020 for the nine months to April 1, 1879, against $3,416,065 for a similar period to April 1, this year. A corresponding increase was also experienced in imports of boiler iron, band and hoop iron, railroad bars of iron and steel, sheet iron, hardware, anchors, cables and chains of all kinds, machinery, and cutlery, and there was even an increase in our imports of firearms, which amounted to $466,426 for the former as against $608,072 for the latter period. The only articles not reported as showing an increase are saws and tools and general castings, of which our importations were insignificant during both periods.

We have here given the figures relating to only one of our leading industries, although in many other branches of business like comparisons present themselves. In none, however, are the extremes more conspicuous, both as to prices and the increased imports, than in this department. This comes naturally enough, probably, from the great activity in railroad building, and from the wonderful growth experienced in nearly every branch of manufactures, but our iron-masters already see that extreme profits and speculative prices cannot be hereafter obtained. From a general point of view the situation is in every way encouraging, for our enormous exports of grain, provisions, and cotton still turn the balance of trade in our favor; money is abundant and cheap in all the leading centers, trade is the more healthy for the diminished tendency to speculation, and there is everywhere plenty to do for those who are willing and able to work; but, our money being good now all over the world, the standards of value here for manufactured goods must inevitably bear a fixed and definite relation to the prices obtained for like articles in the leading foreign markets.

The Millers' National Association.

At the meeting of the Millers' National Association, in Cincinnati, June 2, in connection with the Millers' International Exhibition, Mr. Alexander H. Smith, chairman of the committee on patents, advocated more liberal appropriations by Congress to the Patent Office, the abolition of the reissue of patents under new titles, the establishment of a patent court, and reforms with reference to rules for estimating damages in cases of infringement. At the same time Mr. Smith took occasion to denounce "the thieves who steal foreign processes and patent them in this country."

Sir Joseph Whitworth.

At the late meeting of the British Iron and Steel Institute in London, the Bessemer Medal for 1880 was conferred upon Sir Joseph Whitworth, whose successes as a mechanician have earned for him a world-wide reputation.

Sir Joseph was born December 21, 1803, at Stockport, Cheshire, England. At the age of fourteen he entered his uncle's cotton mill in Derbyshire; and in 1821 he proceeded to Manchester, where he spent four years in the machine shops of Crighton & Co. and others. He afterwards spent several years in noted London workshops. In 1833 he returned to Manchester, and started business on his own account as a manufacturer of engineers' tools. It was here that he first became generally known for superior workmanship and for his inventions for the improvement of machinery, the production of true surfaces, etc. His theories on the latter score were announced in a paper read before the British Association at Glasgow in 1840, and during the next ten years he was able to carry them out practically in various mechanical inventions and improvements, among them the duplex lathe, the reversing tool of the planing machine, interchangeable nuts and screws, and standard gauges. His tools achieved especial distinction at the great Exhibition of 1851, where he received the Council Medal for a measuring machine of wonderful delicacy and exactness. He was one of the Royal Commissioners to the World's Fair in this city in 1853, and on his return he undertook for the British Government the construction of machinery for the improved production of firearms. Since that time he has been one of the leading exponents of the science of gunnery

He was elected Fellow of the Royal Society in 1857, and has won several grand prizes at international exhibitions for improvement in cannon and in the working of steel. His strongest claim for permanent favor and honor rests, however, upon the "Whitworth Scholarships," which he founded in 1869 for the encouragement of mechanical and engineering science. These scholarships are thirty in number, of $500 a year each, and tenable for three years by successful competitors in certain specified mechanical subjects.

Another Mathematical Prodigy.

An eleven year old boy, Jacques Inandi by name, is astonishing the French with his marvelous faculty of reckoning. He can neither read nor write. His calculating power appears to rival that of Jedediah Buxton, Henri Mondeux, Colburn, and others of the class.

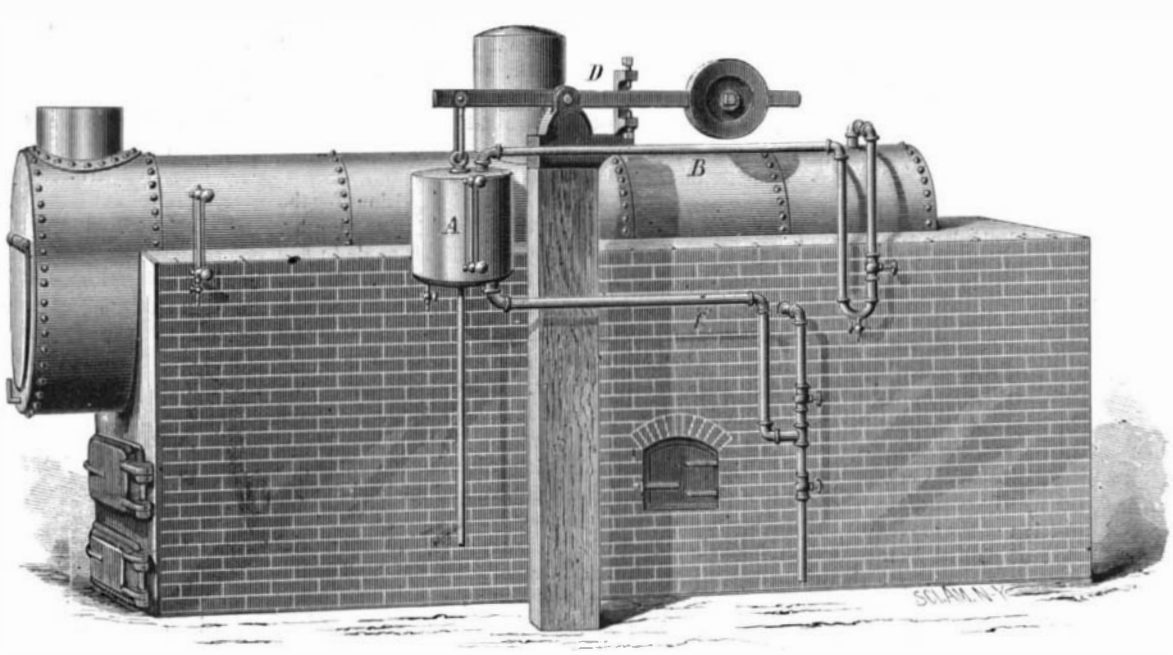
AUTOMATIC FEED WATER APPARATUS FOR STEAM BOILERS.

The annexed engraving shows an improved apparatus for regulating the supply of water fed to steam boilers. It operates by gravity of water contained in a movable tank connected with the boiler by two pipes, one above, the other below the water line. A rod connects the movable tank with the valve of a feed pump, or with the throttle valve of a steam pump, if a steam pump be used.

In the engraving, A is the tank, connected with the boiler by pipes, B C, the pipe, B, entering the boiler at the top or at any other convenient point above the water line, while the pipe, C, enters anywhere below the water line. The weight of the tank, A, and the water contained by it are supported by a weighted lever, D, which is adjusted so that, when the boiler is properly filled with water, the weight on the lever will be overbalanced, and the tank, A, will rest in its lowest position; but when the water level in the boiler is abnormally low the level of the water in the tank, A, is correspondingly lowered, and the tank is thereby made lighter, when the weight on the lever, D, preponderates and raises the tank, A. The movement of the tank, A, both up and down is limited by two screws in an arm projecting from the framework supporting the lever, D. The motion of the tank, A, is made available in regulating the amount of water supplied to the boiler by connecting the tank by means of a rod with a valve in the boiler feed pipe, or with the throttle valve of a steam pump, or with the valves of an injector, all depending, of course, on the particular method of feeding the boiler. When the tank rises it opens the valve and allows the water to flow into the boiler; when it descends the valve is wholly or partly closed, and the feeding is checked. By means of this device, the inventor says, the water level in a boiler can be perfectly maintained without special attention, and it makes no difference whether the water foams or is perfectly quiet, the weight of the water contained by the tank, A, is depended on, and not its seeming bulk. It is claimed that this device is far move reliable than gauge cocks or water gauges.

This device is supplied with valves by means of which it may at any time be blown off and cleaned. We are informed that one of these boiler feeders has been in use on a boiler in Red Wing, Minn., for the past ten months, and has been subjected to every possible test, and has proved reliable under all circumstances.

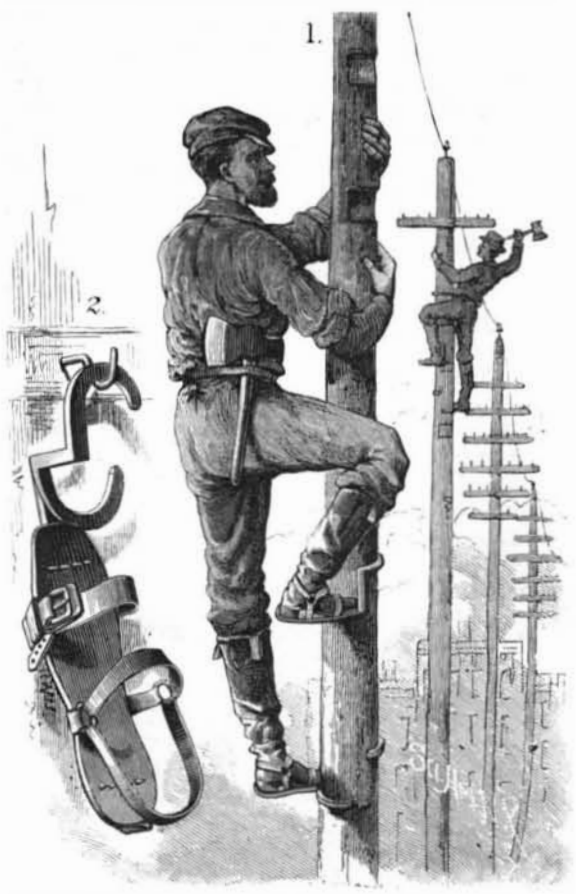
Further information may be obtained by addressing Mr. Henry Bergstrom, Red Wing, Minn.



BERGSTROM'S BOILER FEEDING APPARATUS.

CLIMBING APPARATUS.

A sailor is in his element when climbing to the top of a high mast, and experiences no more trouble in reaching the top of the mast than we do in going to the attic of our dwelling. Such gymnastic exercises are, however, not in the province of the engineer, and whenever he has to execute any work upon any object situated at a certain height, his



CLIMBING APPARATUS.

only means of ascending to it are by ladders or stages. The latter are, of course, only used where the expenses of such a structure may be incurred, and not at all suitable for reaching the top of ordinary poles or masts. In such a case ladders are generally employed, as being the only means available, but the lateral pressure upon any high post of a long and necessarily heavy ladder is very great, and its employment in such cases not devoid of danger. As nowadays telegraph poles are erected all over the country, and since the introduction of the telephone, often in situations difficult of access with a ladder, it becomes a matter of considerable importance to engineers to be able to reach the top of these posts with ease in order to be able to execute there the work which falls to their share, and upon the solidity and reliability of which very often many important matters depend. To facilitate the ascension of these posts a Swedish engineer has invented the climbing device shown in our illustration.

The principal part of the apparatus consists of a shoe attached to the foot—something in the manner of skates. It consists of an iron sole plate, which is attached by means of bolts and clips to a steel bar; to the sole are fixed the straps and rings, while the end of the steel bar is turned up at the end to form a cap. To the outer end of this bar two curved arms are hinged in such a manner that their points remain always a certain distance apart.

When the apparatus is to be used the soles are buckled to the feet of the operator, and there must, of course, be a pair of these apparatus with the curved arms set to opposite sides; the man then lifts one foot up after another by holding the foot so that the bar, shown while fixed in a vertical position, is thrown into a horizontal one; this enables the two curved arms to open and to encircle the post, when, by pressing the foot down, they will support the body. Thus one step after another may be taken until the arrival at the required height.

In order to give the operator steadiness, and to free the hands for the necessary work, the operator has a belt attached to his waist which also carries a ring which is capable of sliding along the post. By a simple adjustment the curved arms can be adjusted to the average diameter of the post to be ascended.—*Design and Work.*

NEW INVENTIONS.

Mr. Theodore Suppes, of Buffalo, Ill., has patented an improved washing machine, which is simple in construction, easily operated, and effective in operation, washing the clothes evenly, quickly, and thoroughly.

Messrs. Joel H. Prouty and Solon S. Sprague, of Worcester, Mass., have patented an improved burr-roll for loom temples, which consists of a hollow roll whose body and periphery are one, being formed of sheet metal, which is provided with triangular teeth formed by cutting V-shaped slits in the metal and striking up the pieces thus partly severed from the sheet, while the ends of the roll are provided with openings for insertion of fibrous packing material and of the lubricant for the bearings of the cylinder.

Mr. Rolla R. Jones, of Watertown, N. Y., has invented an improvement in pliers. The object of this invention is to furnish pliers so constructed that they may receive different tools, and that the heads can be removed and replaced as required.

Mr. George W. Terry, of Prescott, Ark., has patented a self-calculating register for postage stamps designed for use in fourth-class post offices, where a daily transcript of the number of stamps canceled has to be kept and forwarded to the department as a part of the quarterly returns, the use of which registers will save a great deal of time and labor in keeping the account.

Mr. Robert Cunningham, of New York city, has patented an improved process of manufacturing articles in imitation of papier mache, consisting in coating the surface of the article with transparent varnish, in then depositing thereon the ornament and allowing it to become fixed, and in then applying over the ornament and its support a covering of transparent varnish and allowing it to become dry.

A device for holding scrubbing, whitewash, and other brushes while in use, so as to permit the convenient and free manipulation of the brush, has been patented by Mr. Eugene B. Randolph, of East Millstone, N. J.

Dust Fires.

A gentleman at Appleton, Wis., communicates to the *American Miller* his experience, which shows, as we all know, that other kinds of dust besides flour are explosive under certain conditions. He says: The loft of my spoke mill, in this city, was wholly used as a finishing room, where the spoke was finished, and polished by contact with rapidly revolving sanded belts. In it was a square or box stove, used for warming purposes. The light, fine dust would accumulate in every crack and crevice of the room, requiring cleaning off every day. One day some of this dust was seen to fall from a rafter upon some live coals that had accidentally got out upon the hearth of the stove. Instantly there was a flash that filled the whole loft, and it was on fire in a hundred different places.

It was with the most active exertions that the fire was subdued, and not without a considerable damage to the building and stock. I believe the air was strongly impregnated with gas evolved by friction; and that the explosion and fire occurring in flour mills are precisely of the same nature and due to the same causes.

STRUCK BY LIGHTNING WHILE UNDER WATER.—At Halifax, N. S., May 29, while divers were at work at Cole Harbor dike a storm came upon them, and the lightning striking an air pump passed down to a diver under the water. When brought up he was insensible, but his injuries are not serious.