World's Fair Notes.

(*Continued from page 3.*)

think it advisable to skip this thoroughly delightful part of the Exposition. There is more real harmless amusement and instruction for the average person to be had in the Plaisance for $5 than can be obtained for three times the money elsewhere. It is something to hear the orchestras of all nations, which run in a direct line from the German band down to the Chinese artists, who will certainly be lynched when the cowboys come.

The Russian pavilion was opened with all the pomp and ceremony incident to the practice of the rites of the Greek Church. His Eminence the Most Reverend Nicholas, Bishop of the Russian Greek Church of America, was the celebrant of high mass, and after an address the bishop dipped the gold crucifix in holy water and sprinkled the temporary sanctuary, and then, amid the eager gaze of thousands of spectators and the chiming of bells, he sprinkled each of the exhibits with holy water. The party then returned to the temporary church, and all present were sprinkled with the water and allowed to kiss the crucifix.

One of the engineering successes of the Fair is the transmission of power by compressed air. From the huge compressors in Machinery Hall the air is carried to the Transportation building, in a nine-inch pipe, at a pressure of eighty pounds to the inch. The stately Baldwin locomotives and other exhibits are run by the air thus delivered. In the Mines building live steam is provided, which runs a compressor, which in turn furnishes the power for nearly all the machinery in the building. One peculiarity which was noticed particularly when the locomotives were started was that all the stuffing boxes leaked, until repacked. The gain in comfort is remarkable, as the Transportation building would be insufferably hot, if the machinery were to be run by steam. As it is, the exhaust air assists ventilation. Compressed air is also used in the sewage system of the grounds.

The legislature of Illinois has passed a bill enabling the Park Commissioners to purchase the Art Gallery building at the close of the Exposition. It is noted as being one of the purest and most beautiful architectural designs in the world.

Correspondence.

Square Shafting Made of Sheet Steel.

To the Editor of the Scientific American:

Your illustration of the broken shaft of steamship Hecla in your issue of June 3 shows clearly the inconsistency of one solid shaft forging. Had the same consistency of iron been secured together in sheets of steel say one-half to one inch thick, the shaft made square, bolted or clamped together to prevent either twisting or buckling, with the bearings collared on the square, I will venture to assert the practical engineer will agree with me in saying the steel plates composing a shaft as suggested will be naturally stronger than a single forged body of iron. I claim also a square shaft when broken is more readily mended by clamps and bolts than the round shaft now in common use. My reasoning for this is the same in building a timber of several boards from different lumber when secured properly together is much stronger than one solid timber. G. W. K.

New York, June 8, 1893.

A Simple Method for Determining the Velocity of Projectiles.

To the Editor of the Scientific American:

It may be of interest to amateur riflemen to know the following simple method for ascertaining the effect of gravity on a bullet shot horizontally from a rifle to any distance:

Sight the rifle upon the target, keeping the sights plumb above the center line of the bore of the rifle. Mark where the ball strikes. Then reverse the rifle, so as to have the sights exactly *beneath* the line of bore. In this reversed position sight it on the target as before, and mark where the bullet strikes. One-half the difference in the elevation of the two bullet marks will represent the effect of gravity in drawing the bullet away from a straight line.

Divide the difference in elevation of the two bullet marks by 32 and extract the square root. This will give the time in seconds that it took the ball to travel the distance.

The distance divided by this time will give the speed of the bullet per second. J. A. G.

Grand Rapids, Mich.

The Litchfield Mill.

To the Editor of the Scientific American:

In your issue of June 10, I notice a communication from Mr. E. L. Otis, of Minneapolis, who good naturedly brings you to task for referring to the great mill which exploded in this city, March 21, as probably the largest flour mill in the world. Mr. Otis exhibits true loyalty to his own city, and grows indignant at the thought that outside of his famed flour-milling city of Minneapolis could exist the largest mill in the world. If the SCIENTIFIC AMERICAN had qualified its assertion by adding "winter wheat," no objection to the statement could possibly be sustained, for the Litchfield mill was, so far as we know, the largest *winter wheat* flour mill in the world, having a capacity of 2,000 barrels of flour a day. The product of this mill was all sold in Europe, not a pound being put upon the market in this hemisphere.

A scientific explanation of this most disastrous, and at the same time most wonderful, explosion would not only interest Litchfield people, but your readers in general throughout the country.

HARRY E. KELLY,
Editor Herald, Litchfield, Ill.

The White Pine Aphis.

To the Editor of the Scientific American:

I send you by to-day's mail some specimens of a bug or beetle that is destroying the pine trees in this county, and any information that you may give, either by mail or through your valuable paper, will be appreciated by this community. You will perceive two small horns or teats on their backs that the common red ants nurse from. This I watched for an hour this morning. Would like a remedy for destroying them without injury to trees. By request of several citizens.

GEORGE A. MILES.

Ainsworth, Neb., June 6, 1893.

Reply by Professor C. V. Riley.—The specimens referred to by Mr. Miles were in extremely bad condition when received, but from the partially decayed remnants it is evident that they were a large species of plant louse belonging to the genus Lachnus and closely related to, if not identical with, *L. strobi*, Fitch, the condition of the specimens not permitting positive specific determination. This insect is known as the white-pine aphis, and is the commonest species of its family upon that tree in the Atlantic States. The lice congregate in colonies on the ends of the pine twigs, the bark of which they puncture. They are almost always accompanied by ants, which are attracted by the honey dew which the plant lice secrete from the little honey tubes referred to by Mr. Miles. The species has been observed in the past to be extremely abundant in certain years and comparatively rare in others. This alternation in the relative numbers of the Lachnus has been found to be due to the rapid increase of its natural enemies whenever the conditions favor and to the succeeding necessary decrease of the Lachnus itself. Later in the season a great many, if not the large majority, of the plant lice will be found dead, the dried remains clinging to the leaves and branches, and upon close inspection these dead bodies will be found to have a minute hole, from which a hymenopterous parasite has issued. Ladybirds, lace-wing flies, and syrphus flies are all active in preying upon them.

It is difficult to deal with any insect trouble of this kind upon large trees over extensive forests, but individual trees may be sprayed with ordinary kerosene soap emulsion diluted with from five to ten parts of water, and such spraying will undoubtedly have a good effect in destroying the bulk of the plant lice. Otherwise it is pretty safe to trust to the natural enemies which I have mentioned, and which will, in the course of the summer, effectually do their work. An interesting note has been published in one of the earlier numbers of *Insect Life* (Vol. II., No. 10, p. 314) upon the subject of the honey secreted by one of these pine-inhabiting species of Lachnus. I have sent Mr. Miles a marked copy of this bulletin for his information.

It is quite possible that some other agent is at work in the destruction of the pine timber referred to by Mr. Miles and that the Lachnus is only an incident. It would be well for him to have the trunks thoroughly examined for bark borers. Their presence may be known by the exuding pitch and by their exit holes, like shot holes, in the bark. Just now, also, another plant louse, *Chermes pinicorticis*, is proving very destructive to pines, especially white pines, in parts of Nebraska, and this is really more disastrous than the Lachnus. It is a smaller insect and attaches itself in more sheltered portions of the twigs and branches, covering itself with a flocculent material. There has been no experience on a large scale as to the best methods of ridding trees of either of these insects, so that the recommendation to use kerosene emulsion is from analogy as to its action on allied forms.

Nitro-glycerine Precautions.

To the Editor of the Scientific American:

In your issue of February 4, 1893, I note a communication from Mr. J. T. Pettee, of Meriden, Conn., on the subject of keeping nitro-glycerine and dynamite from freezing, thereby avoiding some of the terrible calamities frequently reported, where workmen are killed by an explosion which ensues consequent upon their thawing these substances out.

While, theoretically, Mr. Pettee is right in saying that nitro-glycerine and dynamite should be kept from freezing, the practical application would not, in many cases, work to a successful end. If the men who use these explosives cannot thaw them out properly, it cannot be expected that they will exercise anymore intelligence in keeping them unfrozen. But it is already an incontrovertible fact that it is extremely dangerous to transport nitro-glycerine in an unfrozen state.

Therefore, the proper point to aim at is to insist that, if frozen, it must be *thawed out properly*. Upon this point, the laws should be most stringent, and the responsibility for non-compliance should be placed, not upon the ignorant workman, who is only a machine, but upon *those who have the work in charge*.

Apropos of the subject under discussion, I will quote below from an able series of lectures by Prof. Charles E. Munroe, of the Columbian University, Washington, D. C., formerly chemist to the Torpedo Corps, United States Navy, whose practical experience and experimentation with and analysis of every known form of explosive for a period of over twenty years make him the best authority in matters of this kind:

"When frozen, nitro-glycerine may be conveniently and safely thawed by placing the vessel containing it inside another containing water not hotter than 100° Fah., but these precautions should be strictly observed, as most of the accidents which have occurred with nitro-glycerine and explosives of which it forms a part have resulted from foolish and criminally careless attempts to thaw the frozen material by other means. Frozen explosives should never be put into the vessel containing the water, or brought into contact with any heated surface, except as directed above. Nitro-glycerine and its dynamites are extremely tricky when pure and when fresh, and if kept at normal temperatures they are not liable to undergo decomposition; but when subjected to the extreme heat of summer, followed by the excessive cold of winter, for a number of years, they are very apt to become unstable, hence dangerous, unless handled and used with extreme care.

"Many foolish persons suppose that since it is reasonably safe to ignite a cartridge of unfrozen dynamite, it is equally safe to warm it upon a shovel, or in an oven, or in a tin vessel over a fire, or in various other ways, which usually lead to a verdict of *accidental death*, but would be more properly designated as *suicide* or *manslaughter*. It cannot be too strongly impressed upon the minds of those handling them that if dynamite or other nitro-glycerine preparations are gradually warmed up to a temperature approaching their exploding points, they become extremely sensitive to the least shock or blow, and once that point is reached they do not simply ignite, but they explode with great violence; and further, that owing to the poor conductivity of the mass, a portion of it which is in contact with the source of heat may become raised to this temperature, while the rest of the mass is much below it."

The proper way to prevent the loss of life occasioned by this careless way of thawing out nitro glycerine and dynamite would be, it seems to me, to embody the subject matter above in a set of formulated rules receiving the sanction and pressure of the law in each and every State, whereby the verdicts of *accidental death* would be changed to their proper signification, *suicide* or *manslaughter*—suicide where an individual is concerned, manslaughter where a corporation is responsible. SAMUEL RODMAN, JR.,
Late 1st Lieut., U. S. Army.

Chicago, Ill., June 1, 1893.

The American Association for the Advancement of Science.

The forty-second annual meeting of the American Association for the Advancement of Science is to be held in Madison, Wis., from August 16 to August 23, inclusive. By the courtesy of the Regents the sessions will be held in the buildings of the University of Wisconsin and in the assembly chamber of the capitol. Lanterns for projecting views and slides are provided in several rooms, and one room is kept for general lantern use. To it any section may adjourn when lantern facilities are required. The outline of the programme has been published and indicates a full employment of the time of the meeting. F. W. Putnam, Cambridge (office Salem), Mass., is the permanent secretary.

Paint for Iron and Steel.

The invention refers to a new material, called "siderosthen," for the coating of iron and steel surfaces, with a view to prevent the formation of rust upon them. The compounds used for the manufacture of this paint are the tar obtained from works producing fat gas, "goudron," which is a mixture of about 85 part of refined Trinidad asphalt and 15 parts of refined asphalt oil, or, instead of the "goudron," sulpburmay be used. If "goudron" be employed, this is dissolved in the gas tar, in suitable quantities, and this mixture can then forthwith be employed for the purpose in view. If sulphur be used, 8 per cent of it is mixed with the gas tar, and this mixture is then heated to about 100° C.