

I cannot begin to enumerate all the novelties shown, and may as well stop here as anywhere. The fair is one of the finest held here in a long time, and far surpasses those curious exhibitions given by that old fossilized institution in your city, the venerable American Institute. I believe the judges of this fair have no interest in the machines, and have no idea of awarding themselves premiums.

HAMMER AND PEN.

THE TARGET EXPERIMENTS AT FORTRESS MONROE.

The following account of the target firing with fifteen-inch smooth-bore and twelve-inch rifled Rodmans on the 21st ult., is from one whose position and official capacity enabled him to ascertain all the facts in relation to the trial. It will be seen that his report differs essentially in several important particulars from that published in the papers generally:—

FORTRESS MONROE, VA., Sept. 24.

On Friday, 21st inst., the fring at the great target of iron plates and massive granite backing, took place here. Frames covered with two sets of wires were arranged in front of each gun in line of fire and fifty feet apart. The wires communicated with two sets of galvanic batteries, one for each set of wires; these, in turn, being attached to two recording machines, known as the "Benton Ballistic" and "Schultz Chronoscope," and which measure the velocity of whatever projectile may be used. On firing, the shot breaks the first set of wires, and each machine records the fact. When the second set are broken the record is again made, and the interval of time taken to pass from frame to frame—fifty feet—and the rate per second, are easily obtained.

Again, when the charge is prepared, a strongly-constructed cylinder of iron, solid to all appearance, is tied to the bottom of the cartridge. It is known as the "Rodman Pressure Plug." It consists of a cylinder, nicely fitted with a piston, terminating with a cutting edge, like a tapering wedge, and rests on a thick copper disk. On the shock caused by the explosion of the charge, the copper is cut crosswise and the depth and length is proportional to the strength of powder. The precise and relative pressure of the gunpowder and velocity of projectile are of great importance in gunnery.

The target represented the section of a casemate, the like of which for strength is not to be found in the United States.

Two 4-inch iron plates were secured edge to edge and bolted to the granite, while the lower plate had six inches of sand backing between the plate and granite wall. The structure was about 26 feet high, 7 feet 9 inches thick behind the plates, with a weight on the top of 200,000 lbs. of old guns etc., to increase the inertia. The whole represented a wall 30 feet high. Many of the stone were from 1,000 to 2,000 lbs. in weight. The mass of masonry was well secured with cement, iron "dowels" and "toggles." The plates weighed each about eighteen thousand pounds.

At 11 o'clock A. M., the 15-inch gun was prepared for action. Every officer was at his post. A cartridge of 55 lbs. of mammoth powder was placed in the gun and rammed home; then followed a ponderous round shot, weighing 432 lbs. The gun was then sighted, when the warning cry was heard "flag up," "prime," "fire." In less than a second the target was struck, a flash of fire, a thin cloud of black smoke, and the air was filled with fragments of shot flying in all directions as if a shell had just burst at the target. Then came an exciting race. Fleet horses, vehicles, well loaded with living freight, and a hand car propelled by three stout negroes freighted with officers, etc., soon arrived at the point of interest. It was found that the shot had broken into many pieces; the plate and part of the shot were intensely hot; the fine dust of the fragments had probably taken fire. Its effect was an indentation in the upper plate of about 15 inches in diameter and three inches deep. At the rear of the target two granite blocks were broken and driven outward about 10 inches, and other seams were opened in their immediate vicinity. The pressure was found to be 17,000 lbs., and the initial velocity 1,155 feet per second.

A second shot was fired from the same gun, aimed

at the lower plate, which was punched through, but the wall suffered less than in the first shot. It was found therefore, that the wall was saved at the expense of the plate.

The third shot was of a very different character. It was a 12-inch elongated projectile, 24 inches long, weight 620 lbs., solid, and known as the "Dyer Projectile," constructed on the expanding principle, and quite recently brought to a state of perfection by Mr. Thomas Taylor, of Washington Arsenal. The charge used, as before, was 55 lbs. The gun was that known as the "Union Gun," a 12-inch Rodman rifle. Eight of these shots were fired at the target, and four solid 15 inch shot. The scene that succeeded reminded one of the ruins of Fort Sumter. The 600-pounder 12-inch, moved with a velocity of about 1,100 feet per second; the flight was smooth and regular, and the shots were distinctly seen in flight. Their effect was tremendous. The granite was ground into dust, which filled the atmosphere; pieces of stone were seen flying toward the gun, a distance of 300 feet. Solid blocks of over 1,000 lbs. weight were sent reeling backward ten and fifteen feet—one piece of 200 lbs. weight being found thirty feet to the rear. So ended the experiments.

ONE OF THE SMITH FAMILY.

The Atlantic Cable of 1865.

The grappling and raising of the cable of last year in 1,900 fathoms, or a little less than 2½ miles of water (instead of three miles, as has been so widely understood), affords, perhaps, an even more striking proof of the resources of telegraph engineering than the successful laying of this year's cable. There was, of course, no difficulty in finding the precise spot in mid ocean where the end of the broken cable lay. But it was a question whether the grapnel would drag steadily along the bottom at such a depth, or whether it would catch and jump successively from one point to another. It was not certain even that, with such a weight of grapnel wire out, it could be told when the cable was hooked, and it was a matter of the greatest doubt whether, even if once hooked, the cable could be hauled to the surface, supposing furthermore, that it was hooked within two or three miles of the broken end, so as to oppose but little friction in "coming home" along the bottom, as a cable laid with but little slack must have done to be lifted at all through two miles of water.

It is well understood that the course of the cable was first marked by buoys, and that the ship engaged in grappling—and there were four ships engaged in the task—first went according to the wind, three or four miles to the north or south, and then drifted broadside on across the course of the cable, with her grapnel dragging. To pay out 2,300 fathoms of grapnel wire took from one hour and twenty minutes to three hours, and the strain on the dynamometer in 1,900 fathoms of water was 7½ tons, increasing to 8½ or 9 tons, according to the motion of the ship. The cable itself weighed 14 cwt per nautical mile in water and a breaking strength of 7½ tons. When the steady strain on the grapnel line at the depth named exceeded 8 or 9 tons, it was concluded that the cable was hooked, and this was generally found to be the case. Hauling in occupied five or six hours, the resistance occasionally reaching 10½ tons. As the wire came in with the cable, the resistance due to the weight of the former lessened, and that of the cable itself increased. When at the surface, the strain on the dynamometer was from 7½ to 8 tons, and the calculated strain on the cable was nearly up to its breaking weight. It was grappled ten times in all, and, besides being raised to considerable heights from the bottom, and then breaking or slipping off the grapnel, it was twice raised to the surface. The bottom of the ocean where the cable was raised is proved to be of ooze containing microscopic shells, and no accident can happen to the cable there unless it is purposely dragged for and broken, as it unquestionably may now be, by an evil-minded skipper having grappling gear of sufficient strength, or unless a wreck fell across it. It is now being confidently predicted by certain writers that both cables will soon be destroyed by icebergs. It is, of course, possible that they may, but the more the probabilities are examined the less they appear. Even if thus destroyed, however, in the iceberg track, which is only two hundred miles wide, the

cable, being in shallow water there can easily be raised and repaired.—*Engineering.*

Jungles on Fire.

The jungles of India are set on fire by the larger bamboos, as they are swayed by the wind, emitting fire from their hard glossy stems through the violence of their friction, and thus spreading destruction through adjacent mountain forests. These are so extensive that the fire continues to burn for many days together, and is as suddenly extinguished by mighty deluges of rain so common in mountainous countries where water pours from clouds resembling small catraets.

MISCELLANEOUS SUMMARY.

SOLDERING SOLUTION.—Mr. F. Oakley sends us the following recipe for a soldering fluid, which, he says he has used for many years, always with success:—

"Two ounces muriatic acid, in which as much zinc is dissolved as it will hold, to which add half an ounce sal ammoniac. Clean the metal well and the solder will run and adhere to any part of the metal to which the solution is applied. It will also solder brass and steel together."

DR. N. DYES, chief medical officer at Verdowa, has been experimenting with feeding of pigs on anthracite coal. The animals seemed to thrive so well under the treatment, that he has adopted this as an internal remedy to be used in all that class of diseases usually treated with coal tar externally.

AN official report shows that the French crops will this year fall short fully one-fourth of an average crop. In consequence, the commission and produce houses are making immense purchases of all kinds of corn and grain, and are anxiously looking for large arrivals from this country.

GOLD IN ALABAMA.—The Columbus, Ga., *Enquirer*, furnishes a communication from an "old miner," who says he has examined a mountain in Tallapoosa county, Ala., the rock of which he has tested, and which he considers the richest auriferous ore in the world.

THE telegraph in Switzerland is the property of the State. The charge is uniformly one franc for twenty-five words, or a little over one cent per word, irrespective of distance. Even at this low price a large revenue accrues to the Government.

IF a continuous solid iron rail were laid from New York City to Albany, no amount of force applied at one end could move the other in less than one minute and a quarter, the time required for mechanical force to travel in iron that distance.

AN immense aquarium is being constructed for the French Exhibition, having a front of one hundred feet. Sharks, porpoises, and every variety of fish are to be therein collected for the amusement of the public.

THE metric system is in force in France, Belgium, Holland, Switzerland, Spain, Italy, Portugal, and the States of the German Confederation, and legalized in the United States, and Great Britain.

THE value of the eyelets annually used in this country, though costing but eighteen cents per thousand, amounts to the sum of four millions of dollars.

AN expert printer will set about 25,000 letters daily, his hand traveling more than nine miles, and in the working days of a year about 3,000.

COMPRESSED peat, by a late patent, is destined to prove a rival of hard india-rubber in the manufacture of picture frames and other small articles.

IRON of a superior quality is found in abundance throughout northern Arkansas, and coal and zinc in the western part of the State.

A SEA wall for the protection of a portion of the harbor of San Francisco, is to be constructed at a cost of \$2,500,000.

TWO YOUNG Americans stand first and third, out of a class of one hundred and thirteen, in the competitive examination of civil engineers, in Paris.

MORE than a million of new-laid eggs are daily imported into England from France.

EVERY thirty-five cubic feet of salt water displaced by a floating vessel are equal to one tun burthen.