

teries up the river, but still able to keep up frequent communication by courier through the swamps.

On the evening of April 9 1862, General Gillmore issued his general order for the bombardment. It was remarkable for the precision with which every detail was given. The instructions, with few exceptions, were adhered to throughout. For their striking illustration of the unerring as well as pro-estimated results of applied science, engineers and artillerymen held them not among the least remarkable features of the siege. They were addressed to raw volunteer infantry, absolutely ignorant of artillery practice till the siege commenced, and taught what little they knew about serving the guns, in the intervals of leisure from dragging them over the beach into battery. Plainly if the young engineer should succeed it would only be because adverse circumstances could not hinder him.

On the morning of the 10th General Hunter decided to delay the bombardment till the garrison should be summoned, in his felicitous phrase, to surrender and restore to the United States the fort which they held. The commanding officer tersely enough replied that he was there to defend and not to surrender it. General Hunter quietly read the response; then stepping to the door, said, "General Gillmore, you may open fire as soon as you please," in a moment a mortar from battery Halleck flung out with its puff its great load of metal, and the bombardment had begun. The enemy opened vigorously, but rather wildly in reply.

It soon became evident that the fire of the mortars, comprising nearly one half of the artillery bearing on the fort, was comparatively useless. For one shell in ten fell within or upon the fort. The columbiads did not seem to be particularly efficient, but the rifles soon began to indent the surface of the wall near the south-east angle. Neither the garrison nor our own soldiers saw much in the bombardment promising decisive result; but by one o'clock, General Gillmore was convinced that the fort would be breached, mainly by the rifled projectiles, which the telescope showed to be already penetrating deeply into the brick-work. It was also evident that on breaching alone, with perhaps an assault when the breach was practicable, could dependence be placed. The garrison could stand the mortar fire far longer than the assailants could have kept it up.

At dark the bombardment ceased, three mortars and a rifle, keeping up a five minutes discharge through the night, to prevent the garrison from making repairs. Ten and a half hours of heavy firing from the whole armament of the batteries had apparently resulted only in a somewhat shattered appearance of the wall about the angle where the firing had been directed, and in the dismounting of two barbette guns, and the silencing of three in the casemates. But, in fact, the breach was almost effected, altho' the garrison does not seem to be aware of it. General Gillmore had selected the point for the breach with special reference to his knowledge of the location of the magazine, the moment his rifled balls passed through the wall of the fort, they would begin to strike the wall on the opposite side of the work.

On the morning of the 11th the bombardment was resumed. The damages to the wall soon became conspicuous, and the heavy shots from the columbiads now served to shatter and to shake down the masonry which the rifled projectiles had displaced. By 12 o'clock two entire casemates had been displaced, and in the space between these

the rifle balls were plunging through to the rear of the magazine. The danger of being blown up became imminent, and the commandant hastened to call together a council of officers. They voted unanimously for surrender, and just as their flag came fluttering slowly down, General Gillmore was giving his directions for opening up another embrasure. He passed over at once and received its surrender.

The loss on our side was one man killed, so perfect had been the engineering skill that directed the construction of the defenses along the line of batteries. The garrison of the fort lost several killed and wounded; 350 were surrendered.

The immediate result of these operations was the total blockade of the port of Savannah, and the reduction of the principal defenses of the city against attack from the sea. But their remote consequences were far reaching, and constituted an era in military science. General Gillmore himself has set forth some of them. "It is true beyond question," he says "that the minimum distance, say from 900 to 1,000 yards at which land batteries have heretofore been considered practically harmless against exposed masonry, must be at least trebled, now that rifled guns have to be provided against," and, he confidently adds, "with heavy James or Parrott guns the practicability of breaching the best constructed brick scarp at 2,300 yards to 2,500 yards, with satisfactory rapidity admits of very little doubt. Had he," he says "possessed our present knowledge of their power previous to the bombardment of Pulaski, the eight weeks laborious preparation for its reduction could have been curtailed to one week, as heavy mortars and columbiads would have been omitted from the armament of the batteries as unsuitable for breaching at long ranges." In short he has shown the enormous power of the new heavy rifled artillery at unprecedentedly long ranges, and in those thirty six hours firing had unsettled the foundations of half the fortifications of Europe and America.

The man that did this was a young captain of Engineers, who had never seen a gun fired in battle till on this expedition who had nevertheless staked his success in his profession on the soundness of his theories about artillery, and in doing so had faced the opposition of the talent and experience of the entire brilliant corps of which he was one of the youngest and less known members.—U. S. Army and Navy Journal.

THE GERMAN FLEET.

The *Allgemeine Zeitung* publishes some remarks by "an eminent officer of the French navy," on the German fleet. "Nothing prevents the German Empire," he says "from creating a powerful navy. Its coasts on the Baltic and the North Sea extend for a distance of 1,400 kilometers, and a canal sufficiently deep for ships of war, will soon unite those seas, and make the difficult passage of the Sound and Belt unnecessary. As for the mercantile marine, it is known to be superior in tonnage to the French; the number of sailors at the disposal of Germany is, therefore, sufficient to provide for a very considerable naval force. . . . The coast, too, is so protected by rocks and sandbanks that it presents very great obstacles to the attack of a hostile fleet, and when the works at Kiel, Memel, Pillan, and at the mouths of the Elbe and Weser are completed, it will require a very large number of small ironclads to enable an enemy

to effect a landing or any other hostile operation. It thus appears that Germany neither wants coasts, nor ports, nor beacons. What she wants is ships. She has only five ironclads, with as many corvettes and a few smaller vessels; her iron clads, the *Konig Wilhelm* especially, are very good, but the other vessels are almost useless." In regard to the torpedo vessels lately adopted by the German Admiralty, the officer observes:—"the small size of these vessels, their slight elevation above the surface of the water, and the impenetrability of their plates will make it possible for them to approach a fleet at anchor even in the daytime if it does not keep an ironclad ready with steam up to drive the aggressor back. At night their operations would, of course be much easier, and it would be necessary to have a small fleet of cruisers to watch their movements. . . . There is nothing more dangerous than vessels lying deep in the water; artillery is almost powerless against them. This was strikingly shown in the war between Paraguay and Brazil, where rafts with big guns slung upon them did immense injury to the Brazilian fleet. All the Brazilians could see were the guns and the gunners, and it was impossible to take aim at such small objects in the heat of a naval battle. . . . Three of the German torpedo vessels have already been constructed and three more are now being built at Danzig; and ten officers and 340 men, selected from the German navy for their special qualifications, are to be employed exclusively in the management of this most important part of the service. We also had a torpedo school at Rochefort before the war, but economical considerations have compelled us to abandon the work we had then commenced. It seems to me that nothing can be more sensible and effective than the new organization of the German navy, and when it is complete, which will not take a very long time, Germany, though not a first class naval power, will be in a position to deal hard blows at other nations with fleets of much greater pretensions; for the navies of England, France, Russia, and the United States have had to go through experiments, the fruits of which Germany is now reaping without any cost to herself."

The *Portsmouth, N. H. Journal* of June, 29 says; "Commander Matthews, in command of the Torpedo Station at Newport, R. I., visited the naval Station on Thursday of last week, to test the torpedo apparatus of the U. S. S. *Torora*. A torpedo containing 135 pounds of powder was attached to a spar and sunk at an angle of 35 degrees on the starboard bow of the vessel, at a depth of about thirteen feet and a distance from the ship 30 feet. The explosion threw an immense volume of water into the air, a quantity going up as high as the mast heads and coming on board. A large number of fish of several kinds was soon seen floating on the water, killed by the powerful explosion. A 75 pound torpedo was taken on board the ship's launch and exploded with results quite satisfactory. The experiments made were entirely successful. A large party of officers were present."

Three Austrians have patented a process for conveying away under water, the smoke of river and ocean steamboats. It is said to be a complete success. The invention will greatly increase the efficacy of submarine vessels, while it will enable all ships of war to do away with their most vulnerable point—the funnel.