

made by Krupp, and throws a 300-pound shell or a 450-pound solid shot. The results of previous experiments with this gun led the Russian Government to order 50 of them, which are now in course of delivery. The principal objects of the experiments on the 7th inst. were to ascertain the best description of shell, and to test the quality of armor plates supplied by Messrs. John Brown & Co., of Sheffield.

First a series of cast-iron shells, 300 pounds each were fired at different ranges, and then shells made by Krupp were fired at the 4½ inch armor plates.

The first shell was 22½ inches long (two and a half diameters), with a flat end 4 inches in diameter. Fired with 50 pounds of powder at 700 feet distance, it passed through the plate, oak and teak backing, and broke into many pieces, although filled with sand only. The second and third shells were also of Krupp's steel, the same length but with 6½ inch ends. These shells pierced plates, wood &c, and also went to pieces, although only filled with sand. The fourth shell was made by M. Poteleff of puddled steel, on Aboukoff's system, the same dimensions as the second and third, and went through iron, teak, &c., but was only bulged up from 8 inches to 12 inches and the end flattened; not a single crack being visible in the shell. The fifth the same as the fourth, passed through iron, teak and the second target, and went at least a mile beyond. The sixth and seventh were from Krupp, and were charged with powder; they were quite flat-ended, 9 inches in diameter. One exploded in the plate the other in the wood. The eighth and ninth shells were of cast iron, and, although they passed through the plates, were of course destroyed. Evening prevented further trials, which will yet be made on the same plate.

The results on the plate were highly satisfactory. In a space of 4 feet 6 inches, eight holes were made without any crack of the slightest description; and the marine officers present were highly satisfied, because they are obtaining 4,000 tons of plates from Messrs. John Brown & Co. for their different ships.

Cast-steel guns are decidedly before any yet produced in England of any other metal. The 9-inch gun of Krupp has been fired with 300-pound shells and 50 pounds of powder, about 70 times, without any flaw; and the Russian Government will shortly be in a position to obtain in St. Petersburg a large supply of cast-steel guns, made from Russian iron, by Russians, on Aboukoff's system, which is very nearly the same as Krupp's.—*London Engineer.*

To Prevent the Transmission of Sound through A Plate glass Partition.

Have two plates with an air-space betwixt. An ordinary window may be glazed with double "sheets" or "squares" of glass; and if an air-space of a quarter of an inch is left betwixt each sheet or square of glass, sound will be deadened and heat be retained. Mr. Bridges Adams has proposed double-windows, as described; that is ordinary window sashes, with double glass, having one eighth of an inch or one quarter of an inch air-space betwixt each square of glass. Ordinary windows in offices or street-fronts will be warmer, and deaden the sound, if they be so glazed.

Lake Superior Copper Workings.

A paper by Charles Whittlesey, Esq., on Ancient Mining on the shores of Lake Superior, has been published in the Smithsonian contributions to knowledge. The author has devoted much attention to this subject, and maps of the country, with engravings of old mines and the relics found in them, are contained in this publication. We here learn that evidences of ancient mining operations were first brought to public notice in the winter of 1847-8. The Jesuit Fathers who first visited that region announced the presence of native copper in large masses; and boulders of copper had been found many years scattered among the drift gravel from Lake Superior to Rocky river, in Ohio; but no ancient workings were known till the period mentioned above. In casting the eye over a map of Lake Superior, a remarkable projection, in the form of an immense horn, is observed jutting out from the south shore and curving eastward. This is Keweenaw Point, which is about eighty miles in length and forty in width. Through the whole of this extent of projection, a belt of metalliferous formation extends; and within this all the copper mining operations—ancient and modern—have been confined. The most remarkable feature of this metalliferous region is the character of its products, which occur, not as an ore of copper, but in masses, veins, and rounded nodules of the metal itself.

The first actual mining operations here were commenced in 1761 by Alexander Henry, but they proved abortive. In 1841, Dr. Houghton made a report to the Legislature of Michigan, conveying very definite information respecting the existence of native copper in Lake Superior, and shortly after this fresh mining operations were commenced, and speculators flocked in from all quarters. In 1848, Mr. S. O. Knapp, Agent of the Minnesota mine, made the first public announcement respecting the discovery of ancient mines and the relics of an ancient mining population. This created a sensation far and near, and subsequent explorations have led to the discovery of very many ancient pits. Most of the ancient diggings have been found in dense forests, and outwardly consist of irregular shallow hollows, which had been previously noticed without thought of their real character. There are three groups of ancient mines corresponding with the modern mines in this region. In these old pits, hard stone mauls and hammers have been discovered; also copper hammers, spear heads, gads, arrow heads and knives; and wooden shovels, levers, and a ladder. During the past summer, several of these old mines were discovered in the Onianagon district, and from one a bag of untanned leather in a perfect state of preservation was taken, and has been considered one of the greatest of ancient curiosities. Who those olden miners were, is a puzzle to antiquarians. But providentially they have done great service to us for our practical modern copper miners regard the old pits as pretty sure guides to valuable copper lodes. When an old pit is found it is cleared out and explored, and generally the miners are rewarded by finding rich masses in the excavation. Those ancient miners seem to have possessed quite as accurate a knowledge of the copper veins as the most skilful and intelligent modern mineralogists