IRON AND STEEL IN LARGE BUILDINGS.

of the manner in which large, high buildings, in all sired, in which case there will be a skylight at the the principal cities, are now erected. The contrast third floor closing over this court. At present, howit presents to the old method of building, with wooden ever, the building will be finished with the entire posts, beams, joists and stringers, the structure all court separated from the upper corridors only by supported by the walls, is very great. The revolution four-foot bronze-plated railing. in building construction which this change represents may be said to have commenced about 1850. In 1845 Peter Cooper erected the largest rolling mill at that Above this is a skylight covering the entire court suptime in the United States, for making railroad iron, ported by steel trusses. The kitchen and grand dinand at this mill he was the first, soon afterward, to ing rooms are on the eighth floor. The main grand roll wrought iron beams for fireproof buildings. In dining room is 110 feet by 36 feet. The ladies ordinary brick arches to support the floors, in a large struc- girders. ture designed to be fireproof. In this building, however, as in all similar structures up to a very recent with T irons suspended from roof, filled in with fireperiod, the walls were depended upon to furnish the proofing. The roof is constructed of I beams and T principal support of the several floors and give the ne- irons filled in with fireproofing. The total amount of cessary strength and stability to the building. Such iron and steel used in the construction of the building dependence upon the walls alone has been found to be is over 2,500 tons. The first and second stories of iron every addition to the height of the building; and remainder was constructed by the Lane Bridge and structures twenty or more stories high having every tile throughout the building, except in the chambers, desired element of strength and stability, but with where it is cement. The partitions are all built of 4 port. This is accomplished by making a good founda- inch tile. All tile partitions exposed to the weather figured out, with due allowance for the uses to which with Acme cement. the building is to be put, and the several foundations. The total amount of fireproof tile and concrete used for interior pillars, columns, and piers being prepared in the building is over 350,000 cubic feet. in accordance with the manner in which the weight. In the building there are six hydraulic elevators, and strains of the completed building will be distri- four Corliss engines, four boilers, six dynamos, 90,000 almost entirely of glass.

to be ready for occupancy this summer. It is triangular in ground plan, the measurements on the to the outer limits of the sidewalk, while the highest offices, etc. The cost of the building is \$1,250,000. part of the cornice is 131 feet above the sidewalk. The building is of the Italian renaissance style, and Messrs. F. E. Edbrooke & Co., the architects, have personally superintended the construction in all particulars, the drawings required nearly two tons of paper.

every respect. The granite piers in the first story are fire, and one Gatling. 4 feet square, battered 6 inches on the face. The piers In several respects the Castine and her sister ship will in the building exclusive of the fire-proofing.

deep.

open court is the hotel lobby. At the third floor is a sea.

27 inch box girder for the purpose of carrying a solid Out first page picture affords a vivid representation wall to the top of the building in case it should be de-

The court is covered with a flat ceiling of stained glass and plated iron ribs suspended at the ninth floor. the building of the Cooper Institute in New York City, is 80 feet by 36 feet. These dining rooms have 18 foot in 1857, he was the first to employ such beams with ceilings, spanned by 24 inch steel beams and box one third of a mile distant, but wishes to be independ-

The false ceilings under the roof are constructed increasingly difficult and vastly more expensive with were constructed by the Colorado Iron Works, and the where it was necessary to make the walls, at the first Iron Works. The fireproofing comprises all floors, story, four or five feet or more thick, as has often arches, concreting, and all partitions. The arches are been the case in eight or nine story buildings, a large about 6 foot span, except in some cases, which are as proportion of the most valuable room was thus great as 8 feet. The depth of the arch used is 10 coarse gravel, in which we found the water, and below taken up. The modern method of building obviates inches. There is 4½ inches of concrete and cement the water cemented gravel again. The well has a this difficulty, and enables the architect to put up above the floor arch. The finished floor is unglazed steady, natural flow of about 800 gallons in 24 hours. the walls forming only a mere shell inclosing the inch tile except the partitions around the grand dining building, and in no way depended upon for its sup-i rooms and the penthouses on the roof, which are 6 tion for each of the iron columns of the interior, the are plastered with a heavy coat of cement, blocked off weight of the structure in all its parts being carefully to imitate stone. All inside partitions are plastered

buted. In this way of building the walls are only in- feet of electric light wire, 4,200 incandescent lights and tended to support their own weight, serving such pur- 88 arc lights, five electric motors, seven ventilating poses of ornamentation or embellishment as may be fans, a large steam laundry, an ice manufacturing sought, the openings for the admission of light and air plant, two bakeries, a crematory, 160 tile mantels, 142 to the interior being largely increased, or, as has been bath and toilet rooms, in which there are 13 car loads of Lake Michigan by the outcrop of the Silurian limestone followed in some cases, the exterior may be formed plumbing fixtures, and 75,000 lb. of ornamental iron copper-bronze plated.

first page gives a good idea of this modern method of wood. The stairways are marble. The wainscoting putting up great business and office edifices. It is the and finish in the rotunda, all corridors, the cafe, the H. C. Brown Palace Hotel in Denver, Col., designed grand dining rooms, and the grand drawing rooms are real oynx.

There are 318 chambers above the first floor, all openthree sides being 230, 231 and 326 feet respectively, and ing on the street fronts, with not less than two windows the corners of the triangle being rounded. It is nine each; there are 18 large stores on the first floor besides stories high, with a basement 18 feet deep extending all necessary room for the hotel, cafe, bar, private

The New Gunboat Castine.

This latest addition to our new navy, launched at work requiring nearly three years. It is said that the Bath, Me., May 11, is a twin vessel to the Machias, built at the same place, and illustrated in the Scientific The first story is of Platte Canon pink granite up to AMERICAN of December 19 last. The launch was in the second story sills, all facing above being of Arizona | every way a great success and witnessed by numerous brownstone. There is a series of arches in the seventh officials and a vast number of people. Work upon the tilever arms and one intermediate span, is 794.42 ft.; story spanning 12 feet between piers, and under the vessel was begun in 1890, and it is expected she will be arches is a very rich carved cornice 3 feet high extend- completed in November next. She is a twin screw steel ing entirely around the building. The cornice is gunboat of 1,050 tons displacement. She measures 190 moulded with dentils and carving, forming a very ift. in length and has a beam of 32 ft. When coaled and beautiful and dignified finish. Over the main entrance provisioned for sea, she will have a mean draught of ber trestle, and nearly a mile of embankment to a juncis a series of projecting bays supported by cantilever 12 feet. She is 160 tons larger than the Petrel, tion with the existing track of the Kansas City, Fort beams. The entrances are spanned with elliptical the first of this class which was launched, and her Scott & Memphis Railroad, a few hundred feet west arches beautifully carved throughout. The entire tonnage exceeds that of the recently completed pracbuilding is well decorated with relief carving costing tice cruiser Bancroft by 212 tons. Her twin screws are revolved by vertical triple expansion engines The backing of the walls from the second to the inclosed in a water-tight compartment. She is exfourth floors is extra-hard flagstone from the vicinity pected to show an indicated horse power of 1,600, material of the main bridge is steel. The main posts of Fort Collins, Col. Above the fourth floor the walls and to develop a speed of 14 knots an hour. Her radius are 80 ft. high and weigh 28 tons. Many of the are backed with pressed brick, manufactured at of action at 10 knots speed is 4,668, and 2,452 miles at pieces weigh 10, 12, and 16 tons. The main pin of the Golden, Col. The piers in the basement under the her maximum speed. She will carry a crew of 150 cantilever truss is 14 in. in diameter, and weighs 2,200 granite piers are built of dimension flagstone, 16 men. The Castine will mount a very effective battery inches thick. These piers are 5 by 6 feet, with flagstone for a vessel of her class. The main armament will comfootings and concrete bed. The concrete was made prise eight four-inch rapid-firing guns. The secondary of Denver Portland cement, which has proved where it battery will consist of two 47 mm. revolving cannon, has been unearthed to be very hard and satisfactory in two 37 mm. revolving cannon, one one-pounder rapid-

from the second to the fourth floors are 3 feet 4 inches be peculiarly well adapted for service in Asiatic and by 8 feet. The piers above the fourth floor are 3 feet South American waters. Their slight draught will enby 8 feet. There are over 100,000 cubic feet of masonry able them to ascend the rivers where vessels of deeper draught could not navigate. Their batteries are heavy The construction of the interior is upon cast iron enough for any service they are likely to be called upon the proposed plan, if successful, will save. Lake Michicolumns and steel beams arranged to receive the tile to perform, and the effectiveness of the four-inch gun gan, however, is a treacherous water and considerable arches. The general spacing of columns is between on its rapid-fire mount has been recently demonstrated risk will be involved in ferrying cars across it, espe-20 and 21 feet apart. The principal floor beams are by the Bureau of Ordnance trials. The rig of the cially in winter when ice abounds. The new boats 12 inches deep, and the cross girders are 15 inches Castine will be that of a two-masted schooner with a are to ply between Frankfort, on the Michigan shore, square sail on the fore. She will spread 6,506 ft. of and Kewaunee, on the Wisconsin shore, a distance of There is an interior court fifty-six feet square in the canvas, which will be sufficient to enable her to make 52 miles, connecting the Toledo, Ann Arbor & Northcenter of the building. On the first floor under this her way to port should her machinery be disabled at ern with the Green Bay, Winona & St. Paul Railway.

Correspondence.

Permanence of Water in a Bored Well.

To the Editor of the Scientific American:

A manufacturing concern using about 10,000 gallons of water a day have bored a well on their plant 115 feet deep and have struck nice, clear, and suitable water, drawn up by a pump and a 100 foot plunger, 2 inch pipe. The water rises 2½ to 3 feet above the ground without the pump. Sometimes, when starting in the morning, the water is cloudy, but soon clear again. There can be pumped 8,000 gallons in ten hours now. The concern has been getting water from a river about ent of it, as the pipes, ground, and pump station are not their property. Is there any chance of this water giving out, or what are the prospects for permanency in depending upon this well; and can you advise anything to increase or protect the flow? A reservoir to hold about 200,000 gallons of water is contemplated to be built.

We are situated about 80 to 90 feet above Lake Michigan, about 10 miles west of it, and one-half mile west of the Desplaines River. Our well is 115 feet deep, the soil is clay to about within 3 feet of the water, then follows 1 foot of cemented gravel, then 18 inches of very

In the meantime we have followed your advice of increasing and utilizing all possible pumping facilities, and are well supplied with plenty of water at present.

[The indications as described are most favorable for a large and permanent supply of water to the extent of your pumping capacity. The only possible obstruction that could occur will be from gravel coming into the pipe, which can be soon cleared by the boring tools. We have no record of failure from an artesian well drawing its water from a coarse gravel bed under a thick clay bed. The gravel bed in which your well terminates probably outcrops to the north and west, toward the Wisconsin line, and where the country is somewhat higher than at your place. Your well seems to be in a geological water basin, that is shut off from between the lake shore and the Desplaines River, having its drainage to the south through the Desplaines The building in course of construction shown on our All the wood finish throughout the building is hard River, and deriving its water supply from the ridge land to the north and west.—EDITOR,]

A New Steel Bridge Over the Mississippi.

On the 12th of May a great steel bridge over the Mississippi River, at Memphis, was formally opened for traffic, amid appropriate festivities and with not a little public rejoicing. It was built by the Kansas City, Memphis & Birmingham Railroad Co. It is situated on the spot where Ferdinand De Soto crossed the Mississippi in 1541, and in excavating for the shore pier on the Tennessee side some Spanish halberds, supposed to have been used by him, were found. The bridge is the third largest of its kind in the world. Active work upon it began in the fall of 1888, when the first caissons were sunk. There are five spans and six piers, including the anchorage pier. The east shore, or cantilever. span is 225 83 ft.; the main span, consisting of two canone continuous span, 621.06 ft.; one deck span, 338.75 ft. The total length of the bridge is 2.597.12 ft. The structure is extended west of the main bridge by an iron viaduct 2,500 ft. in length, followed by a 3,100 ft. timof Sibley, Ark. The river piers are sunk to depths varying from 75 to 131 ft. below high-water mark. All were sunk by the pneumatic caisson process, and are of masonry from the caissons to the bridge seats. The

A Railway Ferry Across Lake Michigan.

The bold idea of ferrying loaded freight cars across Lake Michigan is soon to be put into practice. A large propeller is under construction at Toledo which will have a capacity of 21 cars, and it is expected to tow a barge carrying 15 cars, making 36 cars, or more than an average freight train. The cost of transferring grain and other freight from cars to steamer and from steamer to cars forms a very heavy item of cost which -Railway Age.