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SUPPLEMENT.

## The Manufacture of Ironwork as an Art.

VISIT TO THE JACKSON ARCHITECTURAL IRON WORKS—GOING THROUGH A FOUNDRY SURROUNDED BY STREAMING METAL—HOW THE MOST DELICATE DESIGNS ARE PRODUCED IN IRON, BRONZE, COPPER AND BRASS—CASTING A THREE-TON COLUMN.

[COMMUNICATED.]

"The liquid ore he drained  
Into fit moulds prepared, from which he formed  
First his own tools, then what might else be wrought  
Fusile or graven in metal."

—Milton's "Paradise Lost."

We live in an era of advancement. Progress is the watchword, and the

York. Land has become so extremely valuable here, particularly in the lower wards of the city, that architects have been forced to make a study of architectural ironwork so as to be able to economize space in construction—space so valuable to investors and capitalists that it often becomes a question as to whether they shall or shall not improve their properties, the saving of one front foot possibly meaning the difference between a paying and a non-paying venture. This will be realized when it is seen that in Wall street, Pine street, and on lower Broadway and the various streets on the line of that great thoroughfare, property brings such enormous prices. Here every square foot counts.

Thus the efforts of the architect have been directed toward a study of design and construction in ironwork. Beginning on the old lines he felt that the cumbersome metal was hardly



EXTERIOR OF FACTORY OF JACKSON ARCHITECTURAL IRON WORKS.  
28TH STREET, EXTENDING THROUGH TO 29TH STREET.

work of to-day gives way to the invention of to-morrow. Hardly a decade has elapsed since simplicity in ironwork for building purposes was as characteristic as was its commonplace character and its uniformity. But new ideas have come upon us. We are no more satisfied to tread the beaten tracks. Our architects have studied the best examples of architecture in Europe; our designers have learned to draw under masters of the art; and our decorators have given years of labor toward the perfection of their studies. Our people, also, have become wealthy, and with their ability to purchase the best in art, their taste has proportionately improved. Hence, our finer appreciation of the better things in art, and the ever increasing aspiration among us toward the use of more artistic design and workmanship.

To make an application of the expressions contained in the preceding paragraph to the products of the foundry would almost at first sight appear farfetched. But in reality this is not so. Ironwork, which is the principal product of the foundry, is beginning to enter very largely into the building construction of to-day. This is especially the case in New

an inviting subject for his thought. Whereupon the question presented itself to him—"Why can I not make this black mass attractive to the sight. Its use has become necessary and its utility bids fair to increase with each year. Why can I not do with it what has been done with stone. Why, indeed, can I not make the office building, the store front, the wholesale and retail business house, and even the flat or private house, as attractive where iron-work is used, as though stone, brick or terra-cotta had been used?" Thus arose a new branch of architecture. It has developed to enormous proportions. It has created a new field for the thought, the study and the application of the architect and draughtsman, and it is called "architectural ironwork."

### IN THE FOUNDRY.

Did you ever ask yourself how architectural ironwork is produced; how the immense iron columns and girders that are used in the construction of our large office and business buildings were brought into existence, from inception to completion? Have you ever pondered over the thought, the

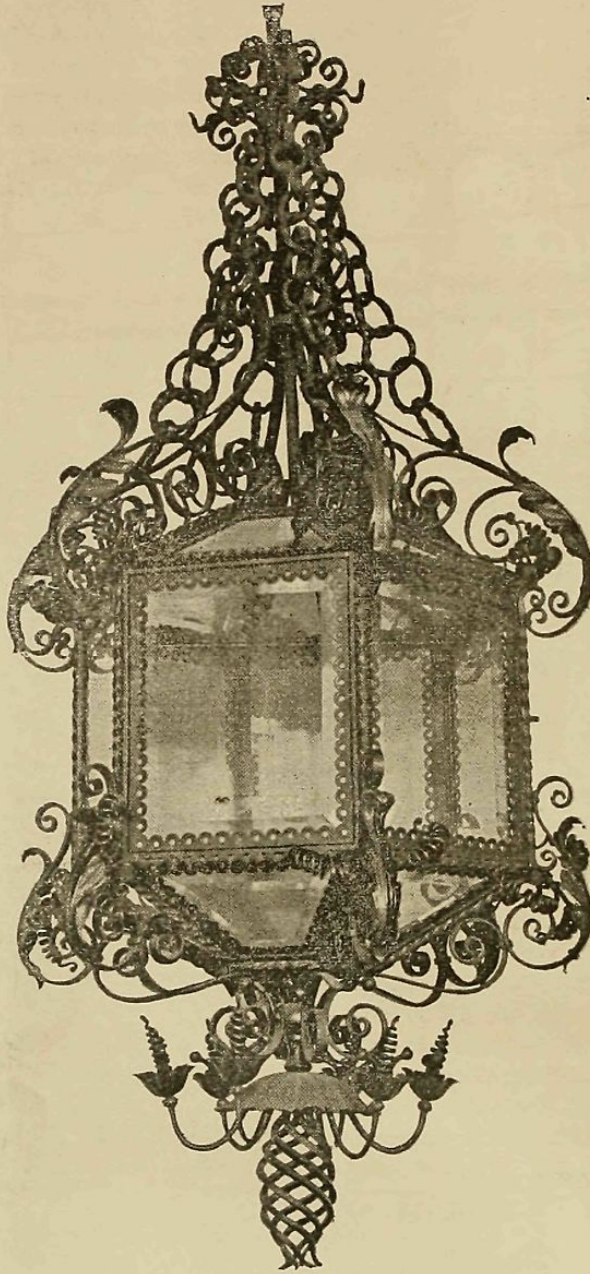
intelligence, the nice workmanship and the painstaking care which is required to produce the thousands of articles in different kinds of metals which we use in our homes, in our offices and in the construction and ornamentation of our business buildings all over the city? If you have not, follow me in this article through the different departments of one of the largest architectural ironworks in the Metropolis, and I think I will be able to interest you, especially if you are a builder, or in any way connected with structural or ornamental work in buildings.

Arriving at the works of the company at Nos. 305 to 323 East 28th street, I was met by one of the managers of the concern. Our first step was to enter the main yard and inspect the "raw material." This comprises stacks of the various brands of pig-iron, thousands of which they have stored, consisting of the standard grades of Low Moor, Thomas and Sloss iron. "By tests made," said the manager, "these vary in ultimate

the best iron in the market, and we have found that it has paid us to do so."

#### AROUND THE CUPOLA.

We then entered the room where the cupola is located. Here we found a number of men busy attending to the immense fire which is continually kept at a white heat to melt the raw material. The fire is first started with wood, on which a layer of coal is placed. The next layer is of coke and the next of iron. On top of all this more coke is placed. The whole is fanned by a blower of great power, which is kept going by machinery. The fire is kept at a white heat and fed with the raw iron for hours. The material all melts and flows into an immense receptacle below. Here tons of liquid metal are held captive until the hour for casting arrives. Let us leave the metal for a while, however, and pass on to the other preparative processes.



WROUGHT IRON LANTERN.

strength from 115,000 to 126,780 pounds per square inch. The average ultimate strength per square inch is over 121,000 pounds.

At a meeting, in February last, of the American Society of Civil Engineers, the eminent analyst, Prof. J. B. Johnson, read a paper entitled "Cast-iron-strength—resilience, tests and specifications." This paper has been published, and is a valuable contribution to the literature on the subject. In an addendum to the paper the remarks made in a discussion which followed appear. In this discussion George A. Just, Louis De C. Berg and Prof. Johnson took part. Mr. Just, in the course of his remarks, gave the result of some tests made by him of the cast-iron used by the Jackson Architectural Iron Works. The tests were made on the 150,000 pounds Fairbanks' machine in this city, and they resulted in a showing of an average ultimate strength per square inch of 121,829 pounds; an average ultimate strength of 54,000 pounds per square inch in compression (1x1x8 inches long. Planed ends); and an average ultimate strength per square inch of 17,081 pounds in tensile strength (specimens: one inch square x 16 inches long.

So much for the raw material used by the Jackson Company in their castings. "We have for years made a point," said the manager, "of using

#### THE CORE.

"What is a core?" asked the writer, "and of what is it composed?"

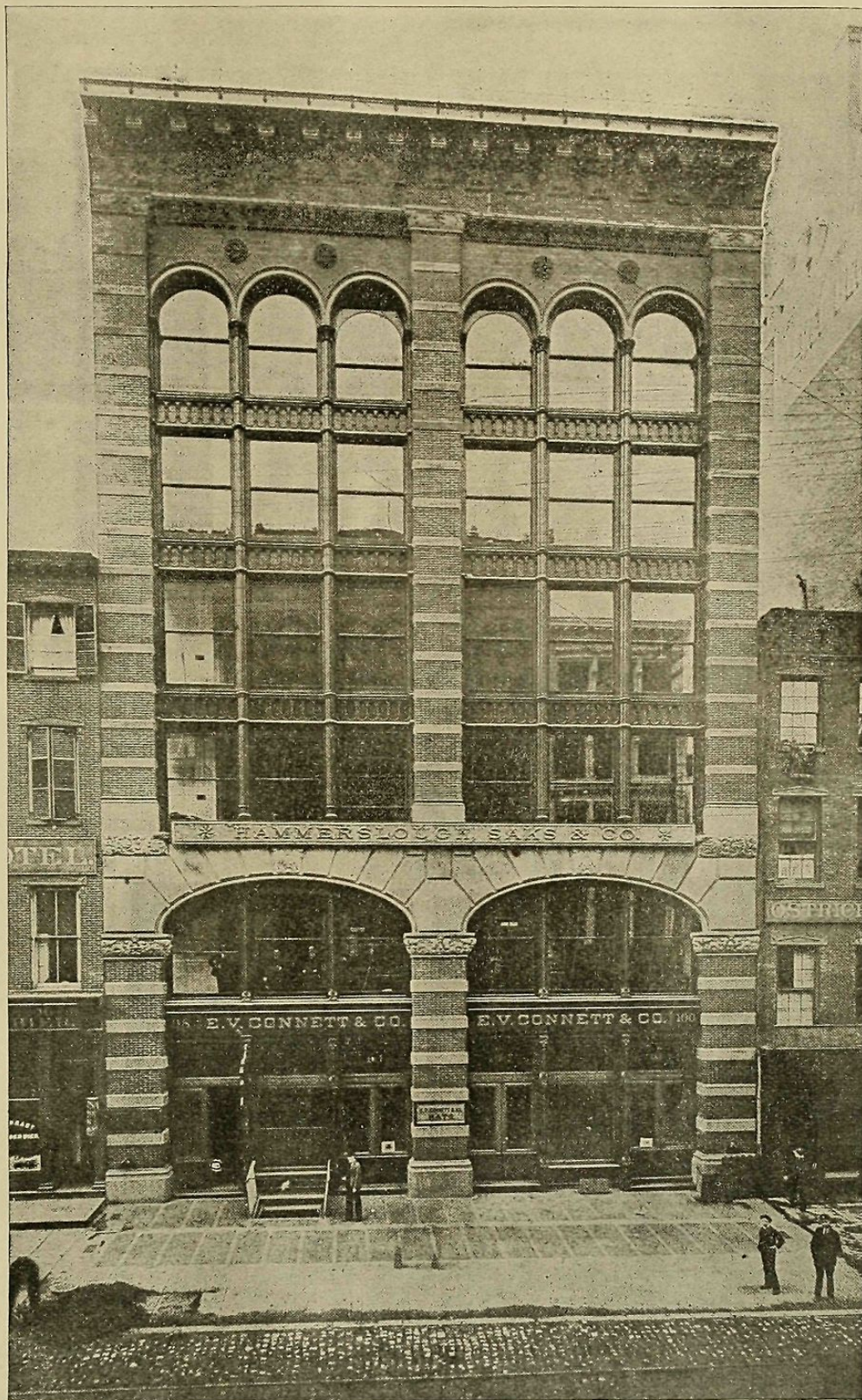
"A core," was the manager's reply, "is an internal mould which occupies the space—the inner part—intended to be left hollow in casting metals. It is composed of sand and flour, and is kneaded into a sort of dough until it assumes the exact design or shape of the hollow space which is to be left in a pipe, a tube, or other casting not of a solid character. We buy 200 or 300 barrels of flour at a time, and boatloads of sand from the seashore, for the purpose of making these cores." I was then shown some of the patterns, many of them being of the most delicate character, and requiring the most skillful treatment.

#### IN THE MOULDING SHOP.

One of the most important, as well as interesting, of the processes is that seen in the moulding shops. Here scores of moulders are reproducing in sand the models and patterns for the structural and ornamental cast-iron work. This work is beautifully done, and an entire day is sometimes consumed by the moulder and his assistants in modeling a single design. The work is done partly with the fingers and partly with modeling tools.

Vacuties are scooped out with a quick precision that comes with years of practice. When the mould is completed, it is covered with lead facing. Then all particles of dust are blown off with a pair of bellows, so that the molten metal, when poured into the mould, shall come out with the lines clearly and sharply defined, and not show any exterior defects. A dozen men are then summoned, and with great care the finished half of the mould is "let down" on the second half completed, the greatest care being taken that the jointure is perfectly-

thud. The Goliath has released the living mass from bondage and a score of his fellow-workers are ready with ladles, or cauldrons, to catch the iron as it streams forth. The men come forward in sets of two and as each cauldron is filled, others take their place, and all pass on. Showers of burning sparks fly all over the foundry, as each cauldron is taken away and the hot liquid falls to the floor; but only for an instant, as another cauldron immediately takes its place. Now and then a spark dashes on to a man's face.



COHNFELD BUILDING, Nos. 98 & 100 BLEECKER STREET.—ALFRED ZUCKER, Architect.

made to the smallest fraction of an inch. After the flasks have been properly clamped the mould is ready to be "poured."

A VERITABLE HADES.

Casting time has arrived. Tons and tons of white streaming metal are ready to rush forth from the fiery cauldron. The light foundry work is first started, the heavy foundry work next. A man stands, tall and erect, with an immense prong in his hand, ready to push aside the cone of clay that stops up the aperture through which the streaming metal is to flow. He is a Goliath in stature. Scores of men surround him, but he is seen above all the others.

Let he must bear the sting without flinching, for a move backward might cause him to upset the ladle and place his life, and the lives of his mates, in danger. Twenty, thirty, forty, fifty cauldrons are filled and the metal carried to the moulding shops, where it is poured into the mouldings through small holes which are left in the moulding sand to receive the metal. The iron is kept flowing until all the mouldings in the light foundry shop are filled. Then the men rest awhile and preparations are made to begin the casting in the heavy foundry. The cauldrons used now are large and cannot be carried by men. They are handled by machinery. One holds three tons of metal, and another two tons. They are filled with blazing iron, and at a given signal they are turned over and emptied into the heavy foundry moulds. Up flies the smoke, the escaping gases flash forth, and the pouring stream of a moment

"Let go!" Out flows the liquid metal with a quiet, almost noiseless,

ago is now a shapely mass, formed into the design pictured by the brain and drawn by the fingers of the draughtsman.

#### SOME OF THE MOULDINGS.

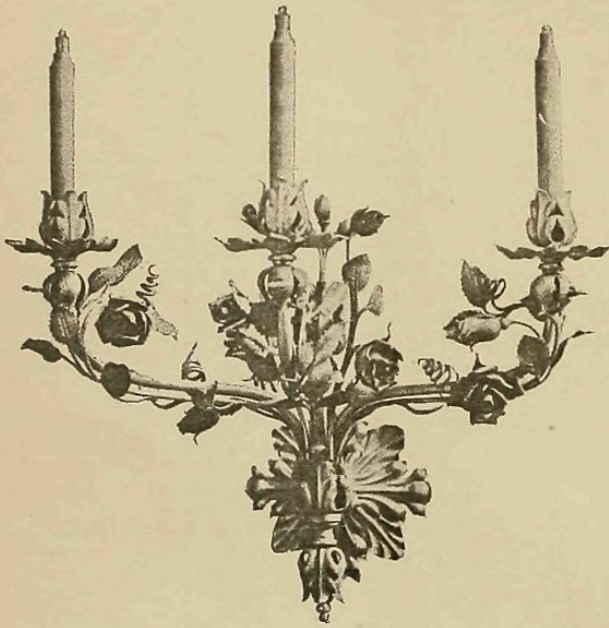
Before the castings were made I ascertained the character of some of the moulds. One was of a column for the new Carregie Music Hall; another of a column for the new Third avenue horse-car depot. Among the others were mouldings for the steering-gear of a yacht, for a soda-water fountain generator, and for a stair string for the new wing of the Museum of Natural History. This serves to indicate the variety of work turned out in the shops.

#### THE CHIPPING, CLEANING AND FINISHING SHOPS.

When the castings have cooled down, which generally takes some seven or eight hours, they are taken up and removed to the chipping shops. There they are cleared of all excrescences which may adhere to them. Rough edges are smoothed and protruding particles are chipped off. If necessary, the castings are turned into the lathe, so that the edges may be beautifully smoothed. They are then ready for the finishers' work, when they are completed for painting, after which they are ready for delivery.

#### OTHER DEPARTMENTS.

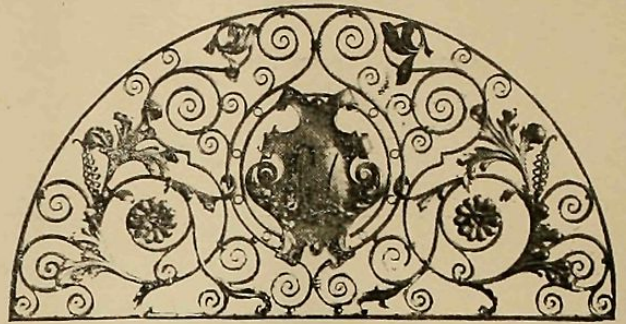
We then passed through several other departments. There is the heavy blacksmith shop, where large forgings are made, and where shears, punches, drill and trip-hammers are at work, and where holes are punched into iron an inch or two in thickness. Then there is the ornamental wrought-iron department, the brass and bronze foundry, the cleaning and finishing rooms for brass and bronze work, the plating and japanning rooms, and the pattern shops, as well as the draughting room, where a num-



WROUGHT IRON CANDELABRA.

ber of expert draughtsmen and architects, as well as competent engineers, are continually at work. In these rooms I noticed a design for some ornamental wrought-iron work which is to be placed in the Women's Lodging House now being built by Mrs. Elliot F. Shepard; for the gates to be placed in the new gate-house for the Aqueduct; a counter rail for the Union Trust Company's banking

room; an ornamental rail and screen for Kidder, Peabody & Co's office, and a very handsome griffin which is to form part of an imposing gateway leading to the Newport residence of Ogden Goelet. This gate has been designed by R. M. Hunt and is one of the handsomest pieces of work in metal ever produced in this country. The company also has a beam yard on 31st street, near the East river, where they occupy fourteen lots. Here they have an immense stock of iron and steel beams, angle iron, channels,



WROUGHT IRON GRILLE.

etc., and where they have adequate space for laying out and fitting work of the largest structural character.

#### SOMETHING ABOUT THE WORKERS.

Over 500 men are employed by the company. The blacksmiths are largely Swedes, Germans and Irish. The ornamental work is done mostly by Germans, with a sprinkling of Frenchmen. In the pattern shop, Englishmen, Scotchmen and Americans are found. Some of the men have saved enough money to own their own houses. One of the workmen has been with the firm for thirty years and is said to have accumulated more than \$20,000. I saw him as he left work a few days ago, and although getting old he is evidently good for some years yet. The wages earned by some of the men are nearly double what an ordinary clerk receives, and they have opportunities of working overtime on extra pay. They have steady work.

#### SOME OF THE COMPANY'S WORK.

The vast amount of structural and ornamental iron, brass and bronze work turned out by the company, since they were established over half a century ago, would fill a good sized book. Among the buildings on which they received the contracts were the following: The State, War and Navy Department Building, Washington, D. C.; the New York Mercantile Exchange; Puck Building; Bloomingdale Bros.; E. Ridley & Sons, and Young Men's Christian Association, Harlem; the Universal, Brooklyn; the New York Catholic Protectory, Westchester, N. Y.; the Potter Building; Smith, Gray & Co., Brooklyn; Excelsior Steam Power Co.; the Loeser Building; the Tower Building; the Market and Fulton National Bank; the Cohnfeld Building; Amberg's Theatre; the Progress Club; the American Museum of Natural History; the Rouss and Lincoln Buildings; the Washington Bridge (ornamental iron and bronze work); the New Criminal Court Building; the 3d Avenue Railroad Co's. new car stables and the Schermerhorn Building on Broadway and 4th st, George B. Post, architect.

The manufacture of iron work as an art has come to stay. Only those who have seen the splendid work turned out by the foundry can realize to what a height of excellence it has been brought. If this article will have given a fair idea of the processes of manufacture, and of the character of the work produced, I shall have achieved the object with which I set out to pen these lines.

OBSERVER.