THE KRUPP STEEL WORKS OF TO-DAY.

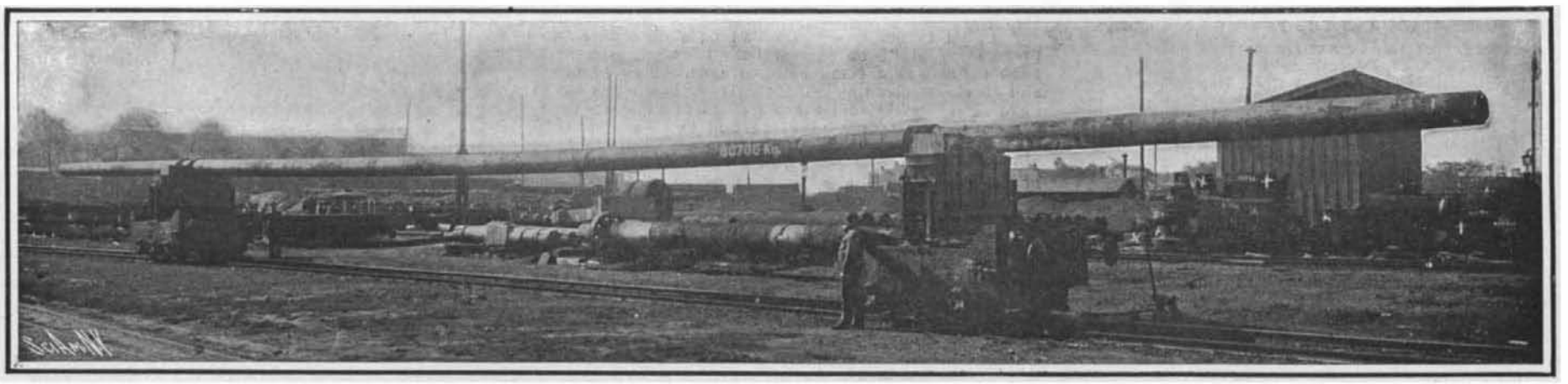
Among the great industrial establishments of the present day, the Krupp Works are undoubtedly the largest and most important, as may be judged from the fact that at the beginning of the present year, in the Essen Works, and in the other large concerns which are identified with the name of Krupp and operated under a common control, there were employed, counting officials and workmen, 65,000 men; while 35,000 men were employed in the Essen Works alone.

The town of Essen lies within a few miles of the Rhine in fertile undulating country, and surrounded by the most important coal mines in Germany. Conspicuous among the buildings of the town is a stately modern building, the Town Hall, which by its imposing size and elaborate architecture affords the first suggestion that the city which it graces has a population of nearly 100,000 souls. In the square before the Town Hall is a noble bronze monument, representing a man clad in a simple citizen's coat, whose right hand rests on an anvil, and whose penetrating eyes are overhung by the heavy brow of a thinker. The inscription records that the monument has been raised to Alfred Krupp, a man who within the time of half a generation raised a small and comparatively unknown country town to a position of importance and celebrity. It is impossible within the limits of such an article as this to give any adequate description of the marvelous establishment which was built up by the genius and industry of this one man; and we must be content to offer the following summary of the vast properties associated with the name of Krupp, which has been furnished by one of the officials of the company.

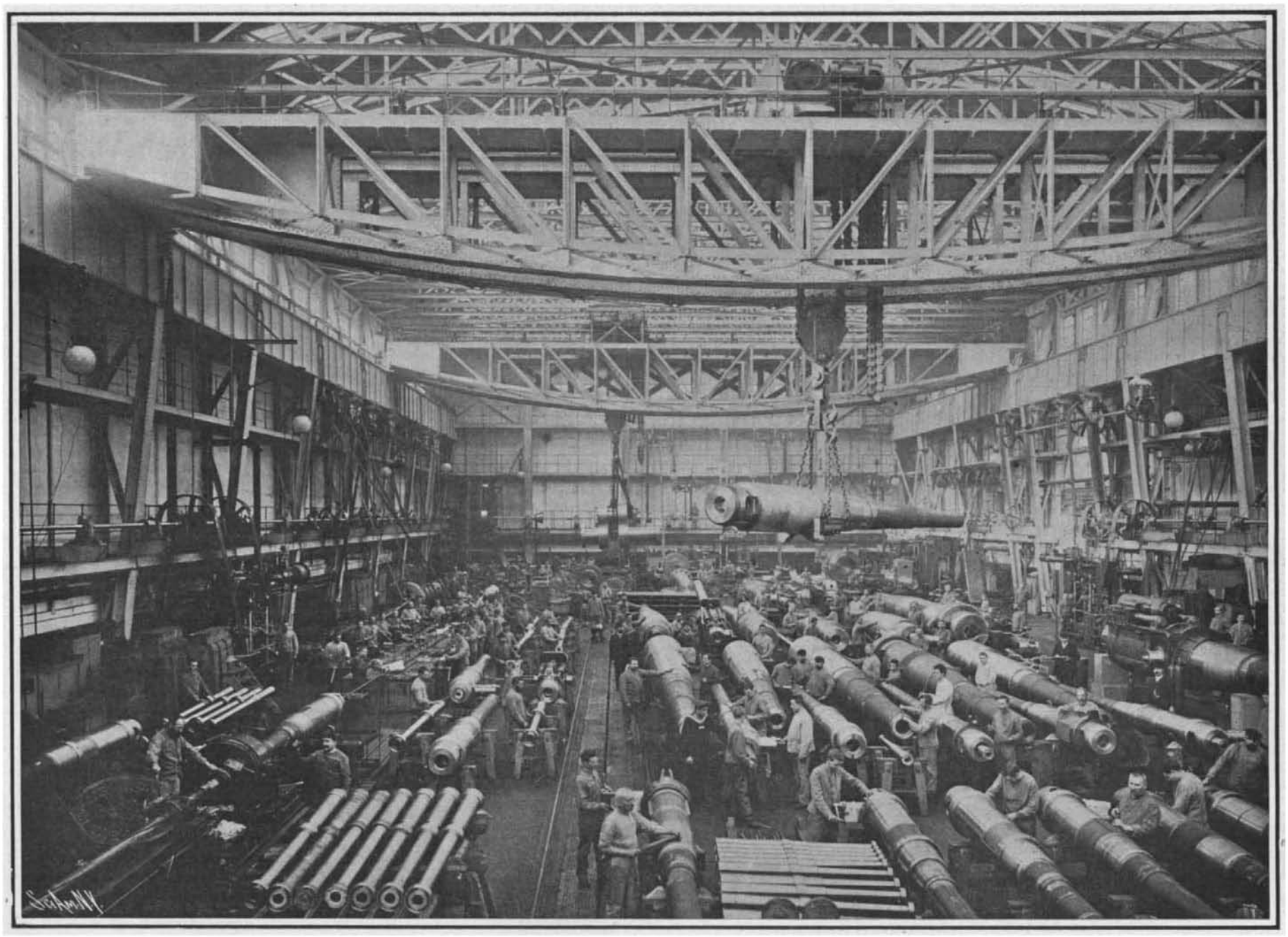
After the death of the late sole proprietor, Friedrich Alfred Krupp, who died November 22, 1902, the Krupp Works passed, undivided, into the possession of his eldest daughter Bertha; and in accordance with the last wishes of Krupp they were then, beginning from the 1st of July, 1903, formed into a joint stock company, the shares of which have entirely remained in the possession of Miss Krupp. On October 15, 1906, the heir to the Krupp property was married to Herr Krupp von Bohlen und Holboch, who has since joined the council of trustees as its vice-president. The company is controlled by a board of managing directors, comprising eleven members, ten of whom reside at Essen, and one at Magdeburg, the latter at the same time presiding over the board of directors of the Grusonwerk at Magdeburg-Buckau. That the works have continued to increase in spite of the severe loss sustained by the death of their founder is shown by the figures giving the number of people employed in all the Krupp Works, counting both officials and workmen. In 1902 there were employed in all the Krupp Works 45,000 men, and in the Essen Works alone 25,000 men. In October, 1905, only three years later, 62,000 men were employed in all the Works, and 33,000 at Essen, and these figures, as we have already shown, had risen by January, 1907, respectively to 65,000 and 35,000. The actual ratio of growth is larger than appears from these figures, because of the great increase in the use of labor-saving devices between the years 1902 and 1907. That is to say, the rate of growth of output must necessarily have been larger than the rate of growth of employees.

On April 1, 1902, the shipbuilding yard "Germaniawerft" at Gaarden, near Kiel, and the engineering works at Tegel, near Berlin, passed into the possession of Fried. Krupp, who had already in 1896 taken over by contract the management of the Works, for a period of twenty-five years. In order to raise the Germaniawerft to the maximum of its productive capability, and to make it equal to modern requirements, the firm decided to recast the works from the very foundation, and also to transfer to Kiel the Tegel Works, which thus were amalgamated with the new establishments at the Germaniawerft. The grounds at the disposal of the Germaniawerft, at the time of the above-mentioned contract, covered an area of 138,716 square meters; this area was raised to 235,000 square meters, upon which the erection of the new and extensive buildings was carried out and completed during the years 1898-1902.

In 1903 the extension of the blast-furnace plant at



Hollow steel shaft, 17¾ inches diameter and 150 feet long, forged from 80-ton ingot.



Gun shop No. 5 where heavy naval and coast-defense guns are finished and their breech blocks assembled and fitted.

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Rheinhausen, situated on the left bank of the Rhine opposite Duisburg-Hochfeld, was begun. These works were started 1896-7 with three blast furnaces, 23 meters in height and of 450 cubic meters capacity each. The extension of 1903 comprised three more blast furnaces, 26 meters high and of 600 cubic meters capacity each, and a steel works and rolling mill. In 1906 a seventh blast furnace was added. The whole establishment is laid out on entirely modern principles, and forms one of the most important iron works in Europe. The works have their own harbor communicating with the Rhine.

It is well known that the oldest specialty of the Essen works is the production of crucible steel, which is made in closed crucibles from raw materials, and poured by hand from these crucibles into ingots, which weigh up to as high as 85 tons each. These ingots, even in the largest sizes, are absolutely homogeneous and close-grained. Therefore, crucible steel is used for all purposes where reliability is the first consideration, where a sudden rupture would lead to the most serious consequences. Hence, it is an ideal material for the manufacture of guns, rifle barrels, armor-piercing shell, and for the more important structural parts of locomotives, stationary and marine engines, and hoisting machinery; it is also used for large rolls, for the manufacture of armor plate, and other milling purposes.

Next in importance is the production of open-hearth steel, the manufacture of which was first introduced in 1869. The growth of the open-hearth plant has been steady and on a vast scale, five different shops having been established in this department. The latest and largest of these contains ten furnaces of from 25 to 30 tons capacity; and in the whole of the five shops there is a total of thirty-five open-hearth furnaces with a total capacity of 625 tons. These five open-hearth buildings alone cover an area of over 32,000 square meters.

From the very beginning it has been a principle at the Krupp Works to put quality above quantity; and there is no doubt that the wonderful development of the concern and its worldwide fame have been largely the result of this fundamental principle, as expressed by Alfred Krupp's dictum: "In my factory second-rate material will not be used and shall not be made."

In the accompanying illustrations are shown some characteristic views of the various parts of the Krupp establishments. One of these shows a 5,000-ton hydraulic forging press used in forging of heavy ingots down to the required shapes ready for machining. This press is shown at work on an 80-ton ingot. Its anvil block is movable, and its crosshead can be adjusted. It has a three-cylinder accumulator, capable of varying the pressure from 200 to 300 and 600 kilogrammes per square centimeter. In the Essen Works alone there are about seventy hydraulic presses, the largest being a 7,000-ton press for bending heavy armor.

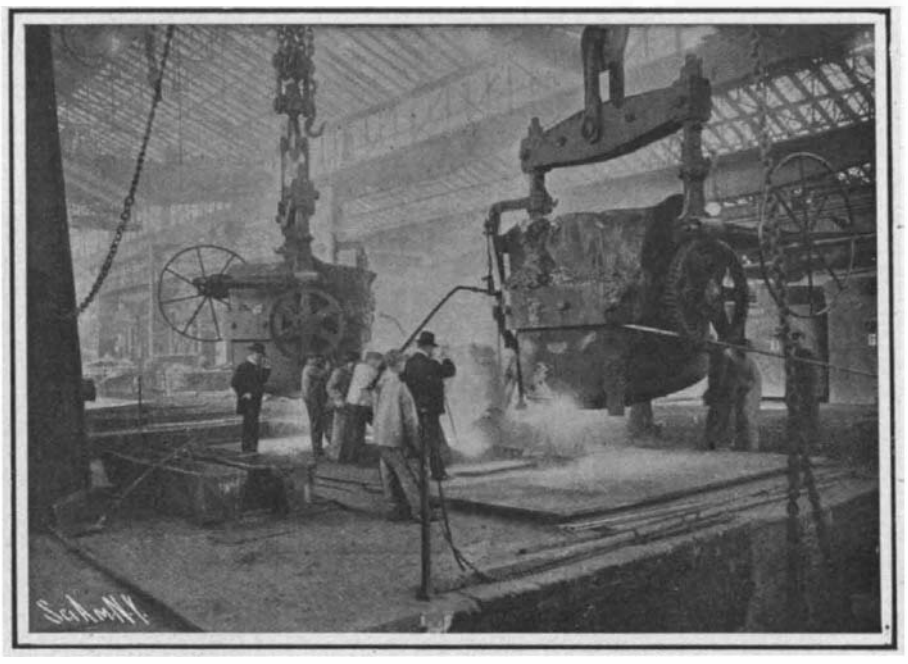
Another view is taken in the open-hearth plant, and shows the casting of an open-hearth nickel-steel ingot for an armor plate. The metal is tapped from the furnace into two ladles of 40 tons capacity each, which are picked up by two 75-ton traveling cranes and brought over the mold, into which the metal is run direct through a vent in the bottom of the ladles. One of the most interesting of our illustrations is that taken in the crucible steel plant, which contains sixty-eight gas generators, eighteen heating and seventeen smelting furnaces. Here ingots have been cast weighing as much as 85 long tons, from crucibles holding 90 to 100 pounds of metal each. The great shaft shown in another illustration, which is 150 feet in length, was forged and turned from an ingot weighing 80 tons. To cast this ingot required the contents of 1,768 crucibles, handled by 490 men, the operation of casting taking, altogether, 30 minutes. This shop is served by four traveling cranes with an aggregate capacity of 173 tons. The crucible plant connected with the foundry has a capacity for making from 2,000 to 3,000 crucibles per day.

Perhaps the Krupp Works is best known for its production of high-class ordnance, which for several decades it has manufactured in large quantities and with uniform excellence. One of our illustrations shows Gun Shop No. 1, where the heavy naval and coast-defense guns are finished, and where breech locks are assembled and fitted. There are ten large workshops alone for machining and finishing guns and breech mechanisms. They have an aggregate floor space of 5½ acres, and they contain altogether about 700 machine tools.

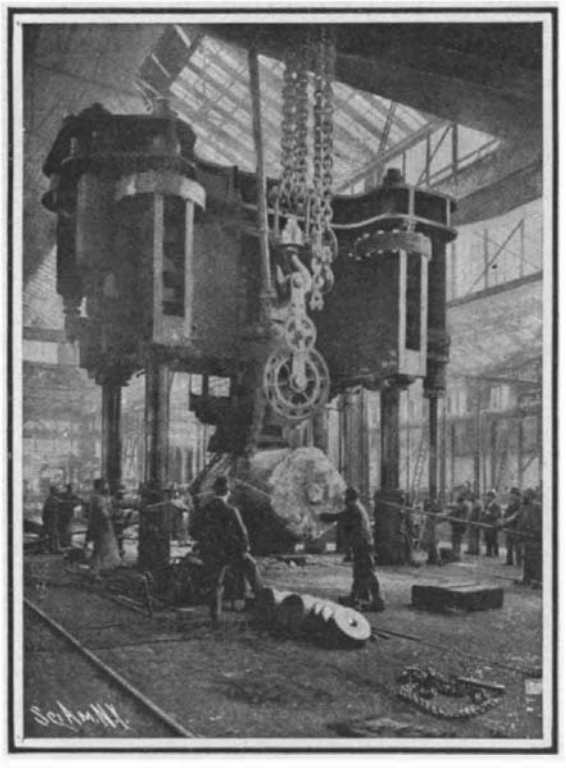
The large quay crane shown in another illustration is located at Krupp's Germania Shipbuilding Yards at Kiel. The crane, which is built of steel, has been tested up to 200 tons capacity, and it is used for handling heavy machinery, boilers, guns, etc. It stands on three legs and carries a top platform, which, in turn, serves to support the horizontal swinging arm, which can be traversed in a complete circle. The arm carries two traveling trolleys, the smaller one for loads up to 45 tons at a radius of 125 feet, and the larger one capable of handling loads of 150 tons at a maximum radius of 76 feet. The track on which the trolleys run is 132 feet above mean water level. All traveling and hoisting operations are controlled electrically from the operator's cab, which is located inside the beam above the platform.

The vast scale on which the Krupp Works have been laid out is shown by the following statistics of the working plant, as installed in the sixty-odd departments: There are about 6,500 sundry machine tools and other workshop machines; 21 trains of rolls; 155 steam hammers; 21 transmission hammers; 74 hydraulic presses, including 2 bending presses of 7,000 tons pressure and 2 forging presses of 5,000 and 2,000 tons pressure respectively; 300 stationary steam boilers; 74 locomotive steam boilers; 539 steam engines of from 2 to 3,500 horse-power and aggregating 59,059 horse-power; 1,361 electro-motors, aggregating over 20,000 horse-power; and 725 cranes of from 400 to 150,000 kilogrammes lifting capacity.

150-ton crane at the Krupp shipbuilding yards at Kiel. Capacity, 45 tons at 125 feet radius and 150 tons at 76 feet radius.



Two 40-ton ladles casting open-hearth ingot for a large armor plate.



80-ton ingot being forged under a 5,000-ton hydraulic press.

Casting an 80-ton ingot. This ingot called for 1,768 crucibles, operated by 490 men, and took 30 minutes to cast.

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