A 6,000-TON FLOATING DEPOSITING PONTOON DOCK.

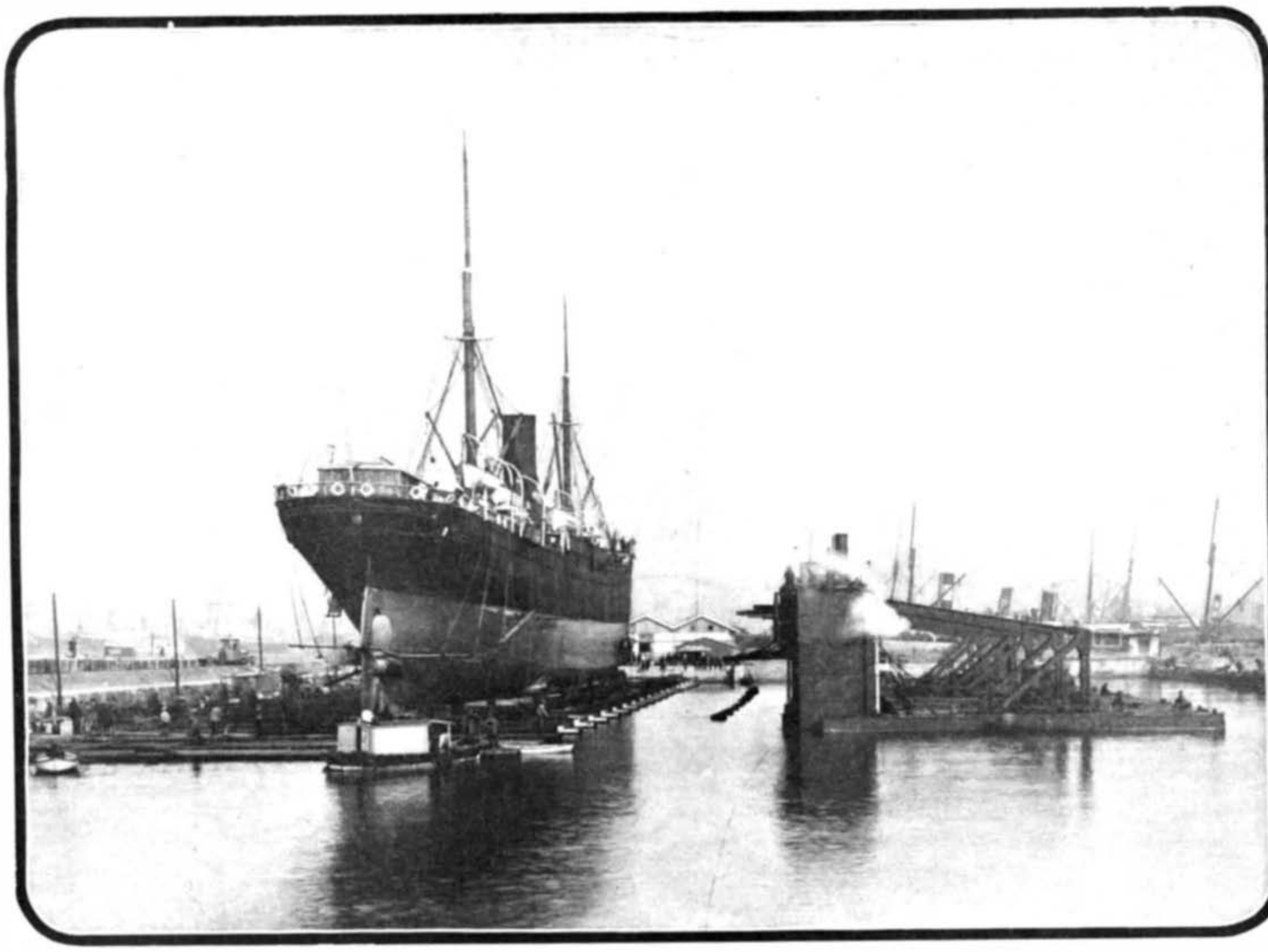
BY OUR ENGLISH CORRESPONDENT.

A very fine example of a floating depositing pontoon dock has recently been completed, and handed over to the port authorities of Barcelona, for utilization at that port. This type of dock differs from those so generally familiar—the two-walled floating pontoon structure as evidenced at Bermuda and Algiers (La.), and the single-sided dock—both in its general design and the functions it has to fulfill. As a matter of fact, the depositing dock is only adapted to those ports where there is either ample vacant, or nearly so, space; where business is not too congested or pressing, and in non-tidal basins. At the same time it possesses several advantages over the graving dock, and if properly cared for is practically as durable.

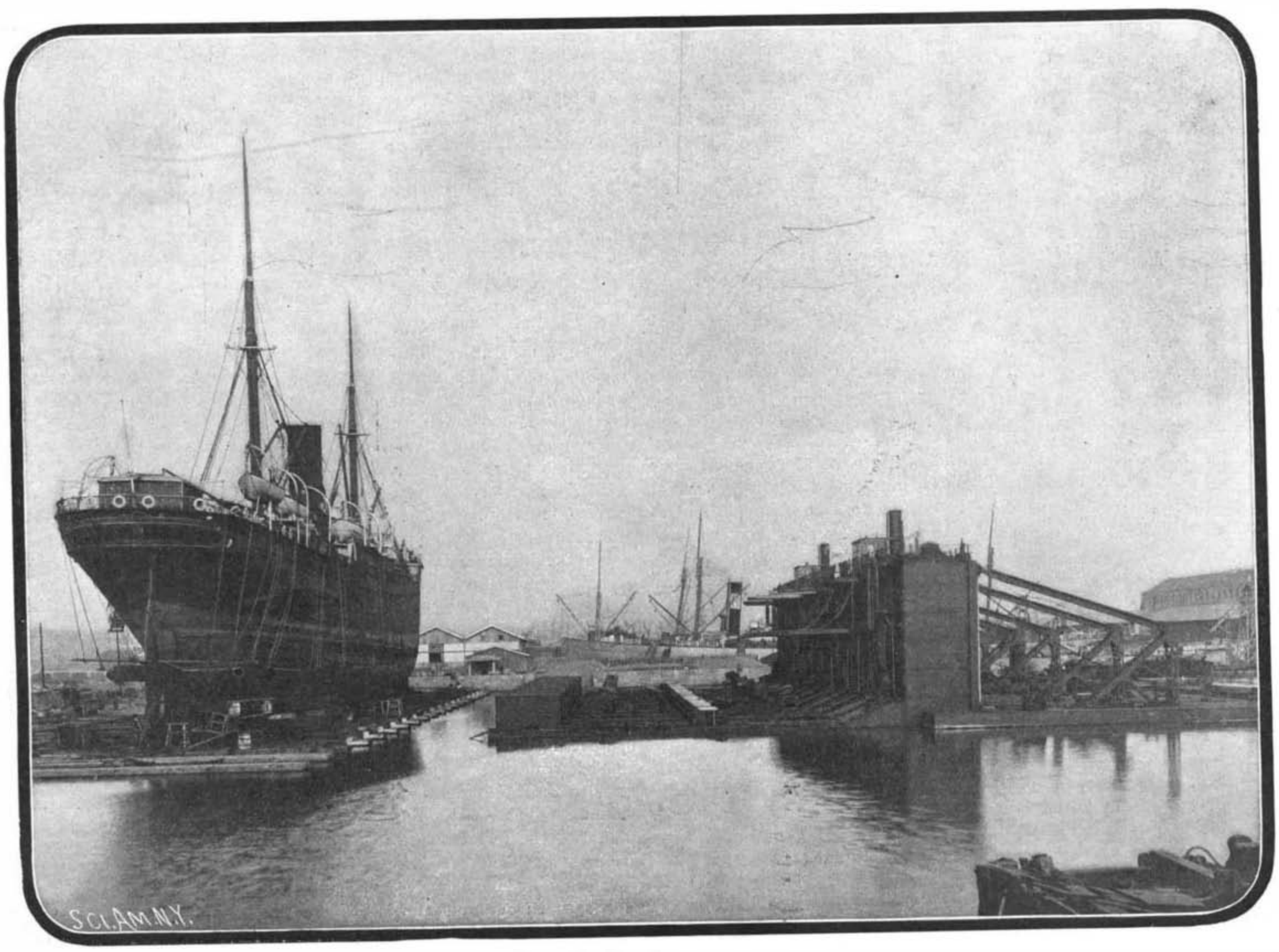
For years past, some description of docking accommodation has been necessary at Barcelona, which is absolutely deficient in any such facilities; but it was not until 1894 that the port authorities took practical steps to provide any adequate arrangements for drydocking large vessels. Several schemes for coping with the difficulty were projected, but they were all abandoned. Finally the problem was solved by the authorities deciding in favor of the depositing dock, invented by Messrs. Clark and Standfield, of 11 Victoria Street, London, who make a speciality of this branch of marine engineering. A public competition was opened for the acquisition of one of the docks, and a number of tenders were submitted. In the following year the result of the competition was announced, and the tender of Messrs. Clark and Standfield, the inventors of the system, was accepted, working in conjunction with the firm of the Maquinista Terrestre et Maritime, of Barcelona, since one of the conditions of the competition was that the dock must be built in Spain.

Although the depositing dock is not much in vogue, types of this system have been in operation with conspicuous success at the shipyard of Messrs. Vickers, Sons & Maxim, of Barrow, England, and at Nicolaieff in Russia for several years past; but neither of these structures approaches the dimensions of the Barcelona dock. That at Barrow has a lifting capacity of only 3,200 tons.

The port of Barcelona is splendidly adapted for the installation of a dock of this type. Anterior to the war with this country it was the focus of the Spanish maritime traffic with Cuba, and the other Hispano possessions in the East; but since the latter have passed under American control, this trade has been diverted into other channels, with the result that the oversea traffic of Barcelona has decreased considerably, and there is consequently not that urgent demand for quay space, and wharf accommodation that there was at the time the depositing dock was projected. Another point in favor of such a dock is that the basin in which the depositing dock is placed is non-tidal.



Ship Docked on Gridiron, Pontoon Sunk and Drawing Clear.



Pontoon Raised, Ready for Another Ship.

A 6,000-TON FLOATING DEPOSITING PONTOON DOCK.

The general principle of the design of the floating depositing dock is as follows: There is a wall or vertical side, as in the case of the two-walled type, and it is similarly constructed; but the pontoon of the structure, instead of consisting of a complete base of caissons, extending the whole length of the dock, is built up of a number of separate pontoons, attached only to the vertical wall at one end while the opposite ends are free, the detached pontoons thus projecting longitudinally from the vertical wall, somewhat in the same manner as the fingers of the hand, with equal spaces between. On the foreshore is built a solid structure called a gridiron, the grids of which correspond in length, width, and spaces between, to the fingers of the dock. The result is that when the dock is lowered into position at the gridiron, the fingers of the dock slide between and fill up the spaces between the grids of the gridiron staging.

To the side of the vertical wall of the dock, opposite to that to which the fingers are attached, is a floating outrigger. This supplies the necessary stability to the structure, which, without these outriggers, would heel over, owing to its being one-sided; and furthermore, they serve to counterbalance the weight of a ship raised on the dock.

The gridiron staging is erected along the foreshore.

The grids are strongly constructed of iron, timber, and concrete. In this particular instance they are built on steel screw piles and are placed 7 feet 10 inches apart. From the description it will be seen that this system of drydocking vessels possesses numerous advantages over the ordinary graving dock. The foreshore can be covered with the gridiron staging on both sides of the harbor, the additions being carried out with greater facility, expediency, and less cost than would be involved in the construction of a drydock.

The dock itself measures 366 feet 11 inches from end to end and has a total lifting capacity of 6,000 tons. It is constructed in three sections each of about 122 feet in length, and 2,000 tons lifting capacity. Only two of these sections, however, will be used in general practice, one being disconnected for the purpose of docking either portion for examination, repair, or renovation. As a matter of fact, it is one of the most salient characteristics of this type of dock with one vertical wall that it can with only the slightest preparation dock itself. The connection of two sections will give the dock a lifting capacity of 4,000 tons, and it will be capable of accommodating vessels up to 300 feet in length. The third section, of 2,000 tons, it is intended to work by itself for dealing with smaller craft, such as coasting vessels, though it will always be in readiness to supplement the lifting capacity of the other and longer dock whenever required, and thus bring the dock up to its maximum lifting capacity of 6,000 tons. The dock when the three sections are bolted up can take a vessel up to 460 feet in length. Hence it is adaptable to a very wide range of vessels, while the ingenious idea of detaching the third section and using it for smaller vessels enables the dock to be always employed. Each section is in reality a complete dock in itself, being equipped with all the necessary pumping and hauling gear. Another very interesting feature of the structure is that supposing vessels of greater length and tonnage than the dock is at present capable of lifting, even when complete, should frequent the port, a further section or sections can easily be added with but little expense.

The dock is situated in a kind of basin or outer harbor almost square in shape. The depositing grids, each 656 feet in length, are ranged on either side of the basin. One grid is intended for the accommodation of vessels of 2,000 tons displacement, and the other up to 6,000 tons. The dock is moored in the center of the basin with the two sections as described placed back to back, and with the pontoons facing the grid staging, the smaller section opposite the lighter grids, which will deal with vessels up to 2,000 tons, and the other dock facing the heavier staging.

The dock is provided with ample machinery for hauling, and gear for traversing the different sections, either together or separately from their moorings to all parts of the depositing grids, the engine power being adequate for the performance of the several operations of lowering the dock, lifting the vessel, and depositing the latter upon the grids in the short period of four hours.

The operation of the dock is simple in the extreme. The vessel to be lifted is towed into the basin and floated over the dock, which has been previously submerged to the requisite depth, by letting water into the pontoons. When the vessel is in the correct position, the water is pumped out of the pontoons in the usual manner, and continued until the vessel is high and dry above water.

The ship's equilibrium is maintained by means of the Clark & Standfield's mechanical side and bilge shores, by the use of which the berthing of a vessel is accomplished quickly and easily. The whole dock is then warped by means of steam capstans broadside on toward the gridiron, the fingers of the dock sliding below the grids. When the fingers have been warped right home, the dock is once more lowered, leaving the vessel high and dry upon the keel blocks on the gridiron. As the dock is submerged, the vessel is still further supported by means of bilge blocks. The dock is lowered until it has cleared the ship, when it is warped out from the gridiron, and again raised and towed back to its moorings in the center of the basin.

Should exigencies demand the drydocking of another vessel while a ship is already berthed upon the gridiron, the dock is pressed into service for this purpose, thus fulfilling the functions of an ordinary floating dock. It will be quite obvious that this system affords a cheap method of providing drydocking accommodations, since the staging may be extended as required by the necessities of the harbor, and two or three vessels may be berthed high and dry upon the gridirons, and another ship may be simultaneously docked upon the dock itself. The raising and docking of a vessel upon the gridiron can be carried out expeditiously, and three or four ships can be berthed in a single day.

The machinery fitted to this dock is sufficient to lift a vessel of the maximum displacement. The dock will raise 6,000 tons in one and a half hours, and in the official trials of the structure the machinery was found to have a considerable margin of power over and above that required.

The illustrations accompanying this article illustrate the several operations of the dock carried out in the official tests by the port authorities of Barcelona. The vessel employed for these trials was the "Ciudad Condal" of the Compañia Transatlantica fleet, and is 40 feet longer than the section of the dock by which she was raised. This will afford a very comprehensive idea of the scope of the work to be achieved by the dock. Another illustration shows the self-docking capabilities of the structure, as one section is raised upon another section of the dock, to enable the underwater portions of the lifted section to be examined. If properly attended to, and periodically examined, this depositing floating dock will last almost if not quite as long as a graving dock, while its serviceability is far wider in range.

Briquetting Precious Mineral Ores.

BY WILLIAM G. IRWIN.

The attempt to reclaim waste materials by the use of compressing machinery, was first developed in Europe, but of late years it has met with marked success in this country. Briquetting, which originally was confined to the compression of fine coal and coal dusts, was begun in Europe as early as 1842, when the first plant was installed at Berard, France, for producing fuel briquettes on a commercial basis. Prior to that time, the matter of making practical use of the vast accumulation of fine coals and coal dust had occasioned much study on the part of the learned scientists of Europe, and since then fuel briquetting has been carried on in various countries on the Continent and in England. The progress of the industry in those countries has resulted in the development of various types of briquetting machinery, and to-day the fuel-briquetting industry abroad is one of considerable value.

As early as 1870 the attention of the anthracite coal producers of Pennsylvania was called to this work, and attempts at briquetting anthracite culm soon followed. A plant of the Lousian process was installed at Port Richmond, Philadelphia, and considerable success was attained; but after several years of operation it was abandoned, because the compressing machinery was not up to the standard required to make the industry a complete success. During the next few years similar plants were installed at Rondout, N. Y., Mahanoy City, Pa., Gayton, Va., and at several other points in this country. In all these early attempts at fuel briquetting, small briquettes, known as "eggettes," were manufactured. These early plants have all been abandoned.

Since that time American inventive genius has been actively at work evolving new briquetting machinery, and as a result, something like one hundred patents on the subject have been allowed by the United States Patent Office during the past twenty years. The manufacture of fuel briquettes is at present of small importance in this country, only two or three plants having been lately established, but the idea of briquetting other forms of minerals has been receiving considerable attention at the hands of American manufacturers. While inventors abroad have been devoting their whole efforts to progress in the compression of mineral fuels, American genius has aimed at reclaiming the precious mineral ore dusts, and, as a consequence, this new industry is now being widely exploited in this country with great success. Many smelting companies have adopted the idea, and are now reaping a decided profit through the smelting of fine ores and flue dusts, which heretofore have not only gone to waste, but have been a decided detriment to the successful smelting of the larger ores.

Some six or eight years ago a smelting company purchased an improved brick press, and began experiments at briquetting fine ores. While this machine was perfectly adapted to brick making, it did not prove a success when put to this new use. However, the attempt showed the feasibility of briquetting mineral dusts, and early promoters of the briquetting industry at once began experiments along this line. After a close study of the European fuel briquetting plants it was found that the complicated system of grinding pans, mixers, elevators, spouts, etc., requisite in brick making, were unnecessary in the briquetting of ore dust, and also that the brick shape was not the best. As a result a combined mixing and briquetting machine was invented, which has given great success in the briquetting of gold, silver, and copper ores throughout the West, during the past five years. This machine was invented in 1896, has undergone many improvements, culminating in the White briquetting press of 1902. It is made in three sizes, the largest of which has a capacity of 100 tons every ten hours. While it is particularly adapted to the briquetting of precious minerals and fuels, it may also, by a system of interchangeable pockets, be applied to the manufacture of fuel briquettes.

The object sought in the briquetting of precious minerals is to treat and compress into the form of small bricks, the fine ores, concentrates, flue dusts and all granulated mineral fines which in their ordinary form do not admit of smelting. In the handling of lump ore a considerable amount of this fine material is lost, and until briquetting was used to prepare such material for smelting, the loss to the smelter owner was considerable. Conservative estimates show that the waste in a modern smeltery ranges from 10 per cent to 20 per cent. The briquetting industry also makes it possible to smelt the slimes from the concentrators, and thereby turn to advantage the valuable deposits which have heretofore been flowing down the tailings. A number of briquetting plants have already been installed for using the tailings which have accumulated in the canyons, or in the settling basins. Old dumps made up of fine ores, flue dusts, etc., carrying mineral values of from 3 per cent to 5 per cent are now being briquetted with considerable success. With the large smelting companies, it is generally conceded that the highest economy lies in getting the greatest amount of refined minerals from the least amount of raw material, and this idea is now being carried out through the briquetting industry.

Aside from the increased production made possible by the operation of briquetting plants, much time and labor are saved by preventing the freezing up and barring down of the smelter; and through the system of utilizing the accumulated flue dusts the operation of the smelting plant can now be conducted on a much more economic basis.

A briquetting plant is usually equipped with automatic delivery apparatus for carrying the briquettes from the machine to the storage bins, where they are dried before going to the smelter. Five men are required to operate a plant of 100 tons capacity. A lime-binding material is generally used, although some of the western ores require no binding material, since they contain just the proper amount of silicious material necessary to form a perfect briquette. Where a binding material is required, a set of two lime slakers forms a part of the briquetting plant. These communicate with the hollow middle casting through large openings at the bottom, a cut-off gate being arranged at each of these openings, which is operated from the platform above. These slakers are driven independently by tight and loose pulleys, belt shifters being operated from the lime floor above. Either slaker may be started or stopped independently of the other. The lime pump is driven by a chain from one of the mixer shafts, its stroke being regulated by a rod and hand wheel. The minerals to be briquetted are fed through an opening in the dust floor, their flow being automatically regulated. After being thoroughly mixed with the binding material, the fine minerals go to the press where the briquette is formed, and a series of belt conveyors carry the compressed briquettes to the storage bins. All the machinery of the plant is controlled by one man.

One of the early difficulties experienced in the manufacture of mineral briquettes, and fuel briquettes as well, was the lack of power exerted by the press. This difficulty has been removed through late improvements. The earlier methods of putting the briquettes through the smelter in their green form, have been abolished, and at present they are thoroughly dried before being smelted. Briquettes can now be made from fine mineral ores and flue dusts at a cost of less than sixty-five cents per ton, and some idea of the value of this industry in the smelting of fine mineral ores will be realized when one considers the vast wastes which have long accumulated in smelting operations.

In this important application of briquetting machinery is seen another apt illustration of the alacrity with which American genius adapts old principles to new requirements. While briquetting machinery for the compression of mineral fuels has been going on in Europe for more than fifty years, it remained for Americans to undertake the briquetting of fine ores, and to-day American ore briquetting machinery is in operation in Australia, South Africa, and other foreign countries. At the same time attention is now being given to the briquetting of coal dust and several new ideas are being worked out by the promoters of briquetting machinery in this country.

The State of Pennsylvania and the United States Geological Survey have co-operated in the production of some very detailed maps of the western part of the State, a section which includes a greater amount of industrial activity than is to be found centered anywhere else in the country. The map will be made to a scale of about one mile to 2½ inches, and it will be possible to show the ground plan of the more important buildings in point of size, the location of all water and oil tanks and railroad tracks. From this map the Chamber of Commerce of Pittsburg will have a model of the city made for exhibition at the Louisiana Purchase Exposition. This will be complete in all its details, and will accurately show all the industrial features of the city.

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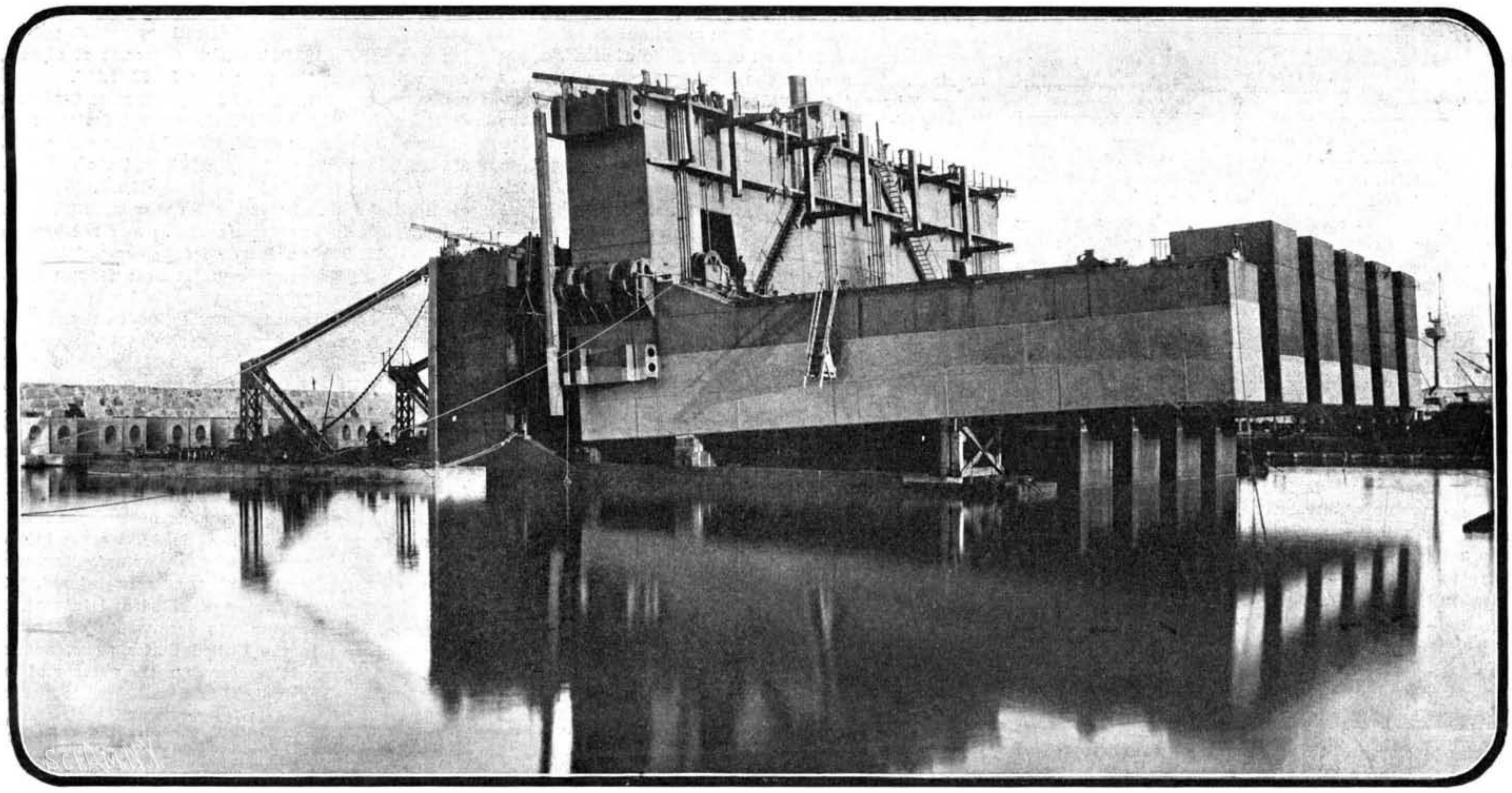
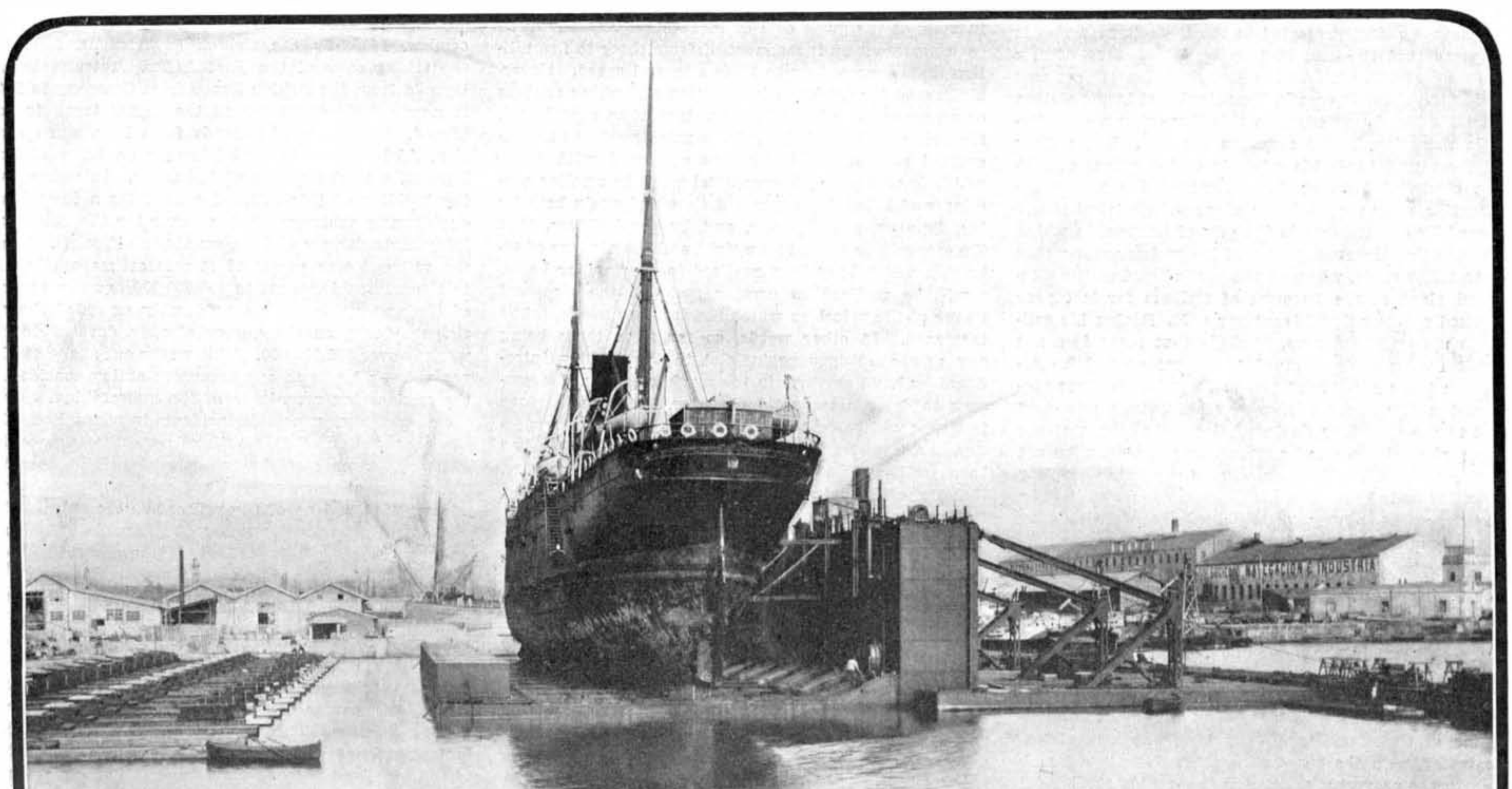


Pontoon Dock Clear of the Water for Painting, Showing Its Self-Lifting Capacity.



Ship Raised on Pontoon, Ready for Transference to Gridiron to the Left.

A 6,000-TON FLOATING DEPOSITING PONTOON DOCK.—[See page 29.]