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## GOVERNMENT DRY DOCK AT PORT ORCHARD, PUGET SOUND, WASHINGTON.

BY A. M. L. HAWES, C. E.

By the successful docking of the United States steamer Monterey on April 22 of this year, the official test of the Government Dry Dock at Port Orchard, Washington, was made under the supervision of a commission consisting of Capt. Ludlow of the Monterey and Naval Constructor Baxter and Engineer Matson of the Mare Island Navy Yard. Plans and specifications for this dock were drawn under Mr. T. Endicott, C. E., U.S.N., of the Bureau of Yards and Docks. F. C. Prindle, C. E., U.S.N., has been in direct charge of construction.

The new dock, which is 675 feet long by 130 feet wide on coping, and 579 feet long by 67 feet wide on the bottom, is the largest on the Pacific coast, and is at present the largest in the United States (the Brooklyn dock when completed will be 20 feet longer, but will have 2 feet less water over the sill) and it takes rank as one of the big docks of the world. It will give this government pre-eminence in Pacific waters, as it alone can dock any vessel now afloat, avoiding a visit to Atlantic waters. In point of size it is considerably larger than its nearest competitors on the Pacific coast, being about 140 feet longer than the Mare Island dock, and 200 feet longer than the Esquimault dock (near Victoria, B. C.), while as to cost, it was but about \$600,000, as compared with \$3,000,000 for each of the others.

The work has been carried out by Byron Barlow & Company, of Tacoma, Washington, under contract dated

October 29, 1892. The original contract was for a dock 529 feet long by 67 feet wide, and called for completion in 36 months. In March, 1893, it was supplemented by an agreement for lengthening the dock 50 feet, with a time allowance of 3½ months; and again, in July, 1893, some modifications were made and extra work added, with a further time allowance of 4 months. The original contract has been completed (together with the first supplement) for some time, and work under the second supplement is approaching completion, everything pertaining to the dock itself being finished.

The dock is built entirely of wood, save the concrete in the floor foundation and the concrete and masonry entrance. The entrance sill is of green sandstone, with a dressed granite gate seat facing of the massive masonry type, upon a concrete foundation of monolithic form resting on a pile and stringer grillage. The clear opening of the entrance is 92 feet wide, with 30 feet depth of water over the sill at mean high water.

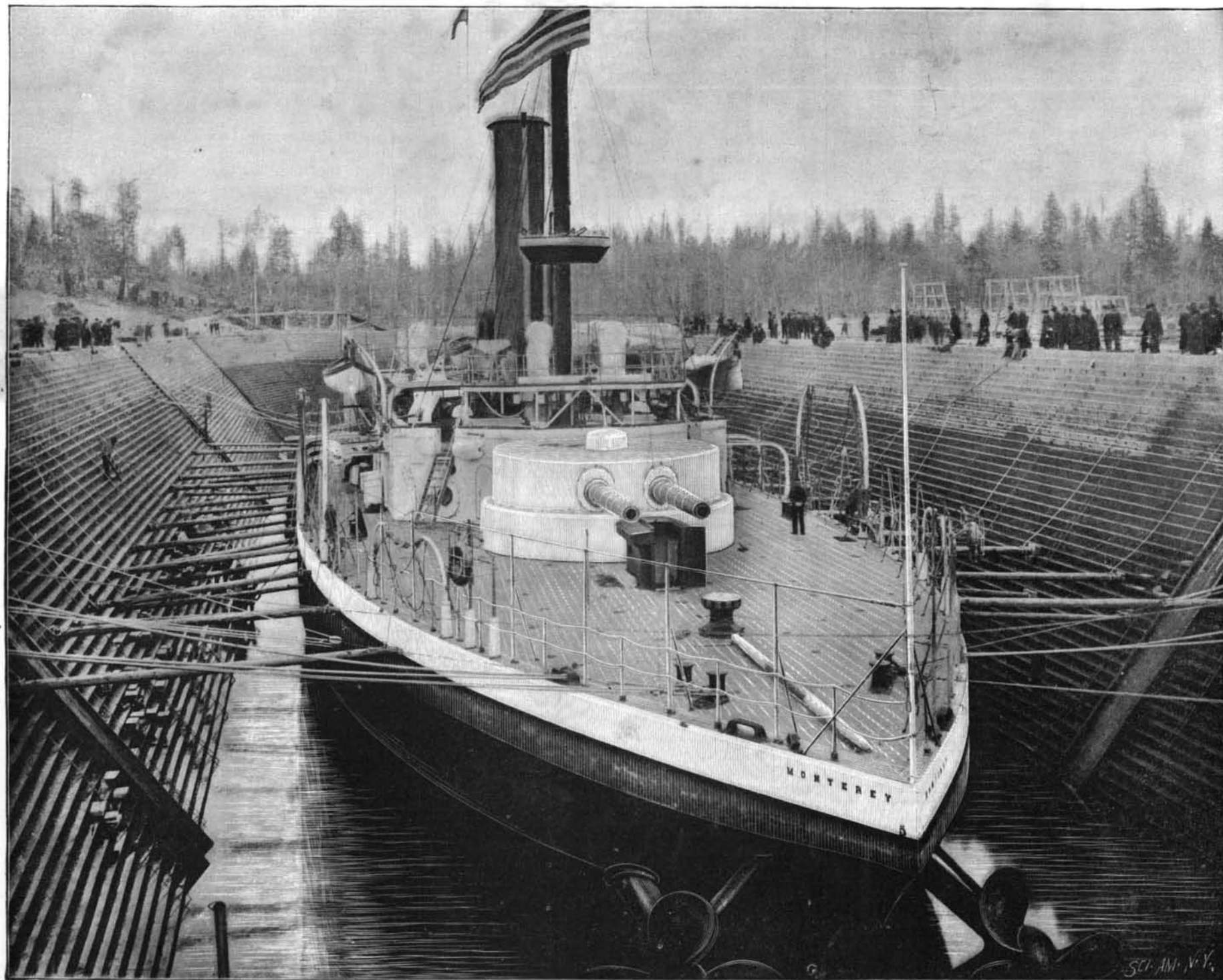
The bottom of the dock rests on about 8,000 piles, driven in a solid cluster down the center of the dock, where the keel blocks rest; and in rows 4 feet between centers laterally and 3 feet between centers longitudinally over all the remainder of the bottom.

These piles are capped with 12 inch × 12 inch longitudinal stringers, drift-bolted to the piles; and crossing these stringers are lateral timbers 14 inches × 16 inches, each being 72 feet long, the full width of the dock. Under this timber grill is a system of drains leading to the pump well. A mass of concrete 3 feet thick fills all the spaces in the grill to the level of the middle of the top

timbers and forms the floor of the dock. A false floor of 3 inch plank is laid with a 7 inch space between the concrete and the planking, and with ½ inch spacing between planks, for the purpose of readily drying the working floor. Sheet piling was driven, completely encircling the bottom of the dock, to prevent leakage.

The sides of the dock are founded on piles driven at an angle of about 30 degrees from the vertical, in rows 4 feet between centers laterally and 9 feet between centers up the slopes. Upon these piles are 10 inch × 14 inch timbers standing on the incline of the side walls of the dock, securely tied to the lower part of the piles by braces, and butting against the 14 inch × 16 inch lateral timbers in the bottom. Clay puddle is filled in to the level of these timbers, and directly on them are fastened the 11 inch × 11 inch stringers which form the altar steps of the dock. About 25 feet back from the top of the sides of the dock is driven another row of sheet piling entirely around the sides and end, to prevent any surface seepage down behind the altars.

The caisson gate which closes the entrance of the dock is the largest in the world. It has a length of 94.9 feet; breadth at top, 13 feet; extreme moulded breadth, 24 feet; and extreme depth, 39 feet. It is in the shape of a double ended boat, built of steel, having its greatest breadth at about one-half of its height. It has a top deck of wood, and a main and lower decks of steel. The top deck is clear, save for a winch and the funnel of the boiler. On the main and lower decks are the boiler, engine and centrifugal pump, (Continued on page 266.)



THE UNITED STATES STEAMER MONTEREY IN THE NEW DRY DOCK ON PUGET SOUND.

### GOVERNMENT DRY DOCK AT PORT ORCHARD, PUGET SOUND, WASHINGTON.

(Continued from first page.)

and the wheels for operating the gates below. A row of four 20 inch pipes runs through the hull about 8 feet above the keel, and eight more are in a tier about 15 feet above the keel. These are used in refilling the dock. Besides the ordinary pig iron ballast there is a chamber, with exterior connections, for water ballast. A 10 inch piece of timber is bolted to the steel keel, and to the face of this timber is copper fastened a strip of rubber 6 inches wide and about 1½ inch thick in the middle and tapering to the edges.

When a vessel is docked, this caisson is hauled into position by means of the steam windlass; its draught is then regulated by means of the water ballasting, and when the pumps begin to lower the water inside the dock, the pressure of the external water forces it to a seat against the granite masonry facing, the rubber strip acting as a packing and making a perfectly watertight joint. When a vessel is ready to come out of dock, the twelve 20 inch gates are opened and water pours into the dock through the pipes. When the water inside the dock has risen to the level of that outside, the small centrifugal on the caisson pumps out a portion of the water ballast until the caisson floats up from the seat. It is then swung clear and leaves the entrance of the dock entirely unobstructed.

The boiler and pumping plant are located on the right hand side of the dock entrance. They are installed in a brick building, with stone trimmings, founded upon pile and concrete grillage. The boiler plant consists of six horizontal, eighty 4 inch tube boilers, 6 feet in diameter by 16 feet in length. The pumping plant consists of three 42 inch centrifugal pumps 14 feet high, each operated independently by a 24 by 28 inch vertical engine of the marine type, and an auxiliary 10 inch centrifugal, having its own independent engine, used for keeping the dock dry when empty. These pumps all stand in a pump well, having its floor about 15 feet below mean high water or 18 feet above the bottom of the dock, making the extreme suction of the pumps about 20 feet. The total capacity of the pumps is sufficient to empty the dock, which holds 13,500,000 gallons at mean high water, in two hours.

Work on the second supplemental contract is being pushed for an early completion. A dredge with a "tulip" bucket is completing the excavation in the approach to the dock. A novel feature of this dredge is the operation of opening and closing the bucket by means of compressed air. A 36 inch cylinder is hung upon and connected with the stems of the leaves, and a steam hose pipe makes a flexible connection to the compressor. This method of opening and closing the bucket avoids entirely the waste of material spilled overboard by the old chain toggle, and the waste of time in hauling up and dumping loads of water when the bucket failed to grapple and fill. It makes the action of the bucket positive, easy, and quick.

As soon as dredging is completed the walls of the slip will be constructed, and it is expected the entire contract will be completed well within the time limit.

#### The Destruction of Military Balloons.

Foreign experiments show that the only possible enemy of a balloon is the shrapnel shell, says the Army and Navy Journal. Experiments with these shells have been made with balloons at elevations ranging from 200 to 800 meters and at a distance of from 3,000 to 5,000 meters from the firing ground. Out of thirty shrapnel shells the Russian artillerymen put twenty-five balls through a balloon 300 meters high and 3,200 meters from the firing ground. At 5,000 meters from the firing ground the Germans made twenty holes in a balloon 250 meters high out of twenty-six shrapnel shells. But when the air ship was 800 meters in the air and the firing distance 5,000 meters, only two balls struck it out of sixty-five shells and three balls out of eighty shells during the experiments last year in Austria. The conclu-

sion is that, in order to keep the balloon beyond the reach of dangerous projectiles, it must be kept 5,000 meters from the enemy and at an altitude of 800 meters, beyond which observations are uncertain. A battery of eight guns was placed at 5,250 meters from the windlass. Firing was begun, but the balloon constantly changed its position. Men in shelter moved the windlass by means of a cable. This obliged the gunners to alter their pointing constantly. They fired eighty shells at it—all that were allowed for the experiment—and when the balloon was hauled down it was found that there were only three insignificant holes in it, which had little or no effect upon its ascending power. Eighty shrapnel shells represented 10,000 balls and pieces of broken shells. From this it would appear that the captive balloon is much less subject to assault than we might suppose. Like the Irishman's horse, it has only two faults: it is hard to catch, and it is good for nothing when caught. As Hoenig shows, it is not to be compared with bold and well mounted officers.

#### Religious Origin of Sculpture.

What evidence Greek records yield, though not extensive, is to the point. Curtius, who, referring to actions of the singers and composers of hymns as well as to those of the plastic artists, says that "the service of the temple comprehends the whole variety of these efforts," also says that "the earliest sculptors were persons of a sacerdotal character." On another page he adds, concerning sculpture—" . . . in this domain of artistic activity all things were bound by the decrees of the priests and by close relation with religion. . . .

They [artists] were regarded as persons in the service of the divine religion."

The extent to which sculpture subserved religious purposes may be judged from the statement of Mahaffy that—

"The greatest sculptors, painters, and architects had lavished labor and design upon the buildings [of the oracle of Delphi]. Though Nero had carried off 500 bronze statues, the traveler estimated the remaining works of art at 3,000, and yet these seem to have been almost all statues."

As showing the course of professional development it may be remarked that though, in archaic Greek sculpture, the modes of representing the various deities were, as in Egypt and India, so completely fixed in respect of attitudes, clothing, and appurtenances that change was sacrilege, the art of the sculptor, thus prevented from growing while his semi-priestly function was under priestly control, simultaneously began to acquire freedom and to lose its sacred character when, in such places as the pediments of temples, figures, other than divine, and subjects other than those of worship, came to be represented. Apparently through transitions of this kind it was that sculpture became secularized. Men engaged in chiseling out statues and reliefs in fulfillment of priestly dictates were regarded simply as a superior class of artisans, and did not receive credit as artists. But when no longer thus entirely controlled they executed works independently, they gained applause by their artistic skill and "became prominent celebrities, whose studios were frequented by kings."—Herbert Spencer, in *Appletons' Popular Science Monthly*.

more than twenty lakes existed, all very large, and stretching far to the north into the very heart of the supposed arid Sahara. If there be no water, and, therefore, no vegetation, where does the charcoal come from which is sold by the Tuaregs? Where do they find nourishment for the numerous camels, horses, sheep, asses and goats they possess?"

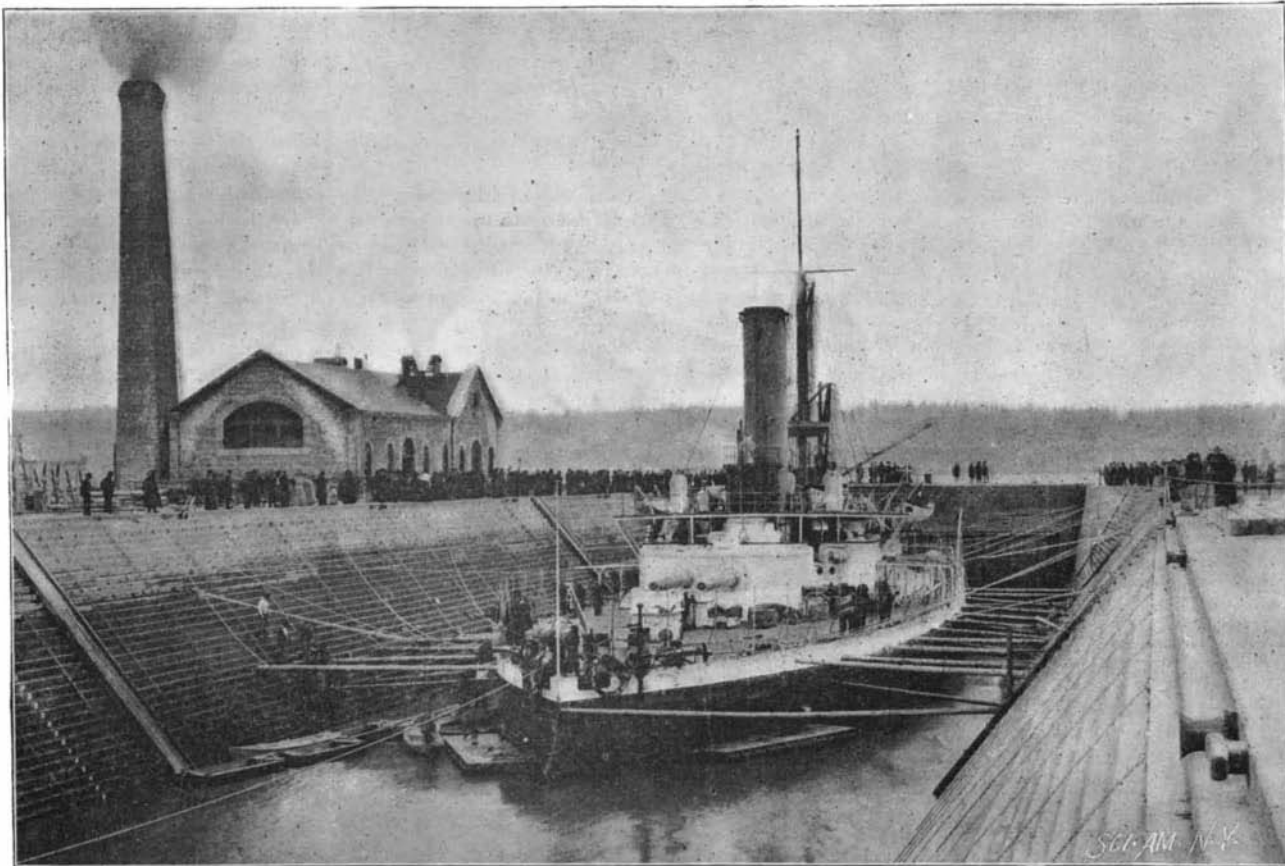
#### A Novel Plan of Building.

A German inventor has built a house of tubes, whose advantages are, he says, a constant temperature and, incidentally, strength, comfort, and beauty. He first put up a frame of water tubing, allowing continuous circulation to a stream of water. Around this frame he put up his house in the ordinary way. The peculiarity is that all floors and ceilings are crossed and recrossed by the water pipes. The water, having passed through horizontal tubes under the floors and ceilings, passes through the vertical tubes until all have been gone through. In the summer, fresh, cool water circulates under pressure through the network of tubes, cools off the walls, and, after having run its course, flows considerably warmer than when it entered. In its course it has absorbed much heat, which it carries away. During the long and severe winter the water entering through the basement is first heated to nearly 100 degrees and then forced through the ceiling. Of course much of the heat is left all over the house, and at the outlet the temperature of the water is about 40 degrees. The speed of the circulation of water can be regulated so as to allow fixing a certain temperature, equal throughout the building.—Stone.

#### The Future of the Sahara.

M. Bonnel de Mezières, member of the Maistre and Attanoux Missions, has, says the Paris correspondent of the London Daily News, expressed his opinion on the future of the Sahara, to the effect that there is no doubt that immense sand ocean will be in time changed into a fruitful territory. He says:

"The Sahara rivers which I have crossed all hide a rich subterranean stratum of water, and form the natural passages to the Soudan, on which, with very little trouble, vegetation can be largely developed. In the south of Temassinin and in the Igharghars there are groves of tamarind, gum trees, etc., of two miles long, scarcely separated by grassy and clover-covered plains. The rivers, which in spring are full of water, are from three to ten miles wide. When the water retreats, the beds of the rivers are changed into rich meadows. The date seeds planted by Flatters at El-Biod have grown without the least care into fine trees, and the same is the fact also of the seeds planted near the cisterns of Tebalbalet, in spite of the inconsiderate manner in which the Tuaregs get in the harvest. Trees are not so rare in the Sahara as is supposed. The Tuaregs often assured our expedition that we should have to march for two or three days without finding water, but very soon we found a little out of the path some filled up or otherwise purposely hidden wells. For the Tuaregs, who serve as guides to caravans, always choose the most difficult and desolate routes, in order to keep the caravans in a state of dependency. Caravans will become more frequent; travelers will succeed each other, but the secret of the Sahara is well kept, and its reputation of barrenness is still preserved. For example, Oscar Lenz crossed the Sahara and reached Timbuctoo without seeing anything but desert land, and yet he mentions that behind a chain of hills which he passed there was a place called by the natives 'The Head of the Waters.' Dr. Borth, who was for months in Tuareg camps, and was the guest and friend of the Sheik El Bakey, was told innumerable facts about the traditions and manners of the land; but its geography was hidden from him. When Lieut. Hourst and Lieut. Bluyet explored the region and an arm of the Niger, they found a lake nearly one hundred miles long. And when the officers of the Timbuctoo extended their excursions, they found that not only one but



THE PUGET SOUND DRY DOCK AND PUMPING PLANT.

**The Chinese Post Office.\***

The Chinese government—so a recent telegraphic message from Peking informs us—has requested Sir Robert Hart, of the Imperial Maritime Customs, to reorganize the postal system of the empire. This decision affords another proof that China is awakening at last to a proper consciousness of its backward state, and allows one to indulge the hope that efforts will soon be made in other directions to bring the country more into line with modern progress. The Chinese post, as it stands, is altogether different from anything to be found in any other country which pretends to civilization. It is in the hands of private individuals. There is a special courier service for the conveyance of imperial edicts and other official dispatches; but this corresponds to the corps of Queen's messengers which we have in Great Britain, and is altogether distinct from the postal system. An exception must be made also in the case of treaty ports, where the different nations have their own post offices, the various consuls being regarded as the postmasters for their several countries. They take charge of and transmit communications intended for foreign countries, and they are responsible (with limited responsibility) for communications addressed to dwellers in the district over which their jurisdiction extends. Foreigners living in the interior or away from the treaty ports must make their own arrangements for transmitting their letters and packages to the nearest consul, who will see that they are forwarded. Save when a friend or neighbor is making a journey to that particular place, the only course at their disposal—assuming that they do not care to employ a special messenger—is to intrust the matter to a native "letter shop."

These letter shops are found in great numbers in every town of the empire, and not even the most insignificant village is without one or more. In Shanghai alone there are something like 200, and the rates of transmission are kept low by reason of the competition. For this same reason the shopkeepers are very obliging, and the service they afford is, under the difficult nature of the circumstances, singularly satisfactory. They cannot afford to risk their reputation by bad work, and it says much for the system, as it is carried out, that those foreigners who are under the necessity of availing themselves of it speak well of it in regard to security, though naturally they do not say much for it in the matter of rapid delivery. The letter shop men do not use stamps, but their particular "chop" or seal is always affixed to the envelope or package—for packages of moderate size and weight are carried; and they will insure the sender against loss. When given in at a "letter shop" the contents of an envelope are displayed before it is sealed and stamped with the "chop" of the shop. Charges for transmission of valuables are made on a percentage of declared value, and, as with letters, these differ according to the distance to be carried. A receipt is given, and the shopkeeper then becomes responsible either for its safe delivery with unbroken seal or for its return to the sender.

Owing, as we have hinted, to the competition that exists in large cities and thickly populated districts, this is necessary if the shopkeeper hopes to retain his customers. In some parts of the empire about two-thirds of the expense of transmission is paid by the sender, the remainder being collected from the receiver; thus the shop is secured against entire loss from transient customers. Another feature much appreciated by native merchants is that of keeping an open account with the shop. Charges are entered against regular customers and settlements are made monthly. In case of loss it is seldom necessary to call in the aid of courts, the force of competition being sufficient to insure reasonable settlement. The employes of the several shops go from house to house seeking customers. In the northern provinces, where horses are plentiful and roads relatively good, the letter carriers commonly use horses or donkeys, which are supplied at stations about ten miles apart. Each messenger carries from seventy to eighty pounds of postal matter, and travels about five miles an hour. When he arrives at a station, a few minutes only are allowed to change horses and he is off again till the end of his route is reached, when the bag is given to a fresh man, who starts at once, now matter what may be the hour of the day or night, and regardless of wind, rain, heat or cold, until he, too, has completed his service and handed the parcel to a third messenger, and thus it reaches its destination. For short distances, and in all the central and southern parts of China, the messenger travels on foot at a rapid pace. This service would be liable to highway robbery, but the robber bands of each district collect blackmail, and for the sums paid them regularly they not only do not molest the messengers themselves, but agree to keep others from doing so.

There are two kinds of stamps known among dealers as Chinese stamps. The first was introduced by Sir Robert Hart (who is to reorganize the whole system), and is used only in the customs service. The other is a local

\*From the St. James's Gazette.

Shanghai stamp used by a company carrying letters about the city of Shanghai and to outposts where there are foreign consuls, chiefly on the Yangtze River and to the ports of Ningpo and Foochow in the south; Chefoo, Tien-Tsin and Peking in the north. These two systems are entirely in the hands of foreigners.

The Chinese government and the Chinese people have for some years been toying with this question of postal reform. Four years ago, for instance, the Taotai Sheng at Chefoo offered prizes for the four best essays on "How to Establish a Chinese Imperial Post Office." There were about fifty competitors, and the prizes were duly delivered. Some of the essayists proposed the enlargement of the courier system; others the use of the offices and employes of the telegraph companies, where they exist, and still others suggested plans closely modeled upon western systems.

One argument for the establishment of a government system was based on the large revenue to be secured that now goes into the hands of the English, French, American, Japanese and German postal agents at the treaty ports. It is well known that large revenue is collected, especially by the Japanese and English offices. One essayist argued that these government offices should be established because during the war with France, in 1884, the commanders of the French fleet were accustomed to receive letters of great importance to them through the foreign offices in China, and the Chinese were unable to intercept them, as they might have done had they then had an imperial government post office.

Another writer thought branch Chinese post offices should be established at San Francisco, New York, London, Singapore, Australia, etc., where many Chinese live, just as those countries have their branch offices in every open port in China. Another proposed rates varying with distance and with the value of letters. He also recommended the use of an imperial stamp which should have the symbol of a circling dragon, corresponding with that of the coins now issued in the Kwangtung Province, and the words "Chung Kwo Yin Cheng Chu"—i. e., Imperial Chinese Post Office—and the value of each stamp expressed in Chinese and Manchu characters. Some of these proposals are unworkable, but all betray a very sensible appreciation of the advantages of a thorough and comprehensive postal system.

**Fate of the Chicago World's Fair Buildings.**

The World's Columbian Exposition Salvage Company have completed their task of removing the buildings of the late World's Fair at Chicago, says the Iron Age. It has stretched over a period of two and a half years, during which time an immense amount of labor has been done. A few buildings have been permitted to remain, but they stand only to serve special purposes, and are only faintly suggestive of the architectural glories which once graced Jackson Park. At the north end of the park stands the Art Palace, now the Columbian Museum, with its thousands of unique treasures. Over by the lake shore is the once beautiful German Building in dilapidation; farther south is to be seen the sham Convent of La Rabida. The Goddess of Liberty still occupies her lofty pedestal, with her cap gone and several of her fingers missing. The old whaler Progress still incumbers the lagoon, because nobody wants to buy it. The vessel was offered the other day for \$30. Here the reminders of 1893 end. But what has become of all the rest of the structures that once filled the park? There are "bits" of the World's Fair at the present time all over the world—in Europe, in Asia, in Africa, in the two Americas, in Australia.

The story of the principal buildings is soon told. In the main it may be told in one word—ashes. Everybody knows the fate of the cold storage building and later of the Peristyle, Music Hall and Casino. Everybody, too, remembers that grand pyrotechnic display—the great fire of July 3, 1894—when the Manufactures Building, Machinery Hall, the Agricultural Building, the Mines and Mining Building, the Electrical Building, the Administration Building, the Terminal Station, and a number of minor structures were consumed. Those fires left but one article of salvage—the steel. This material for the most part went to two places—the rolling mills of the Illinois Steel Company and the steel furnaces at Pittsburg.

Of the remaining buildings a portion of one was removed to Springfield, Ill., two were taken to Kansas City, one was moved over in Stony Island Avenue, Chicago, and still another was worked over into a flat building. These are the only structures that preserve anything like their integrity. The structural iron of United States Government Building was sold to the Lane Bridge Works. The trusses from the boiler house went to Muncie, Ind. The trusses of the annex to the Transportation Building went to Milwaukee.

The New York Building, one of the most costly of the State edifices, was almost a complete failure as salvage. The fine mural paintings by Millet were on the plaster and had to be sacrificed. The Iowa and Ohio buildings were annexed to other buildings and were scarcely worth tearing down. The Texas Building was another failure from the standpoint of the wreckers. Only part of the Illinois Building, it will be remembered, was

left by fire—the rest went up in smoke one Sunday afternoon. The Washington Building, that excited such comment by its massive logs, was torn down and the timbers for the most part sawed up.

J. C. Rogers, of Kansas City, secured the Wisconsin State Building and the Victoria Building. In addition he bought portions of other structures. The Wisconsin Building has been reconstructed at Grand Avenue and Seventh Street, Kansas City, where it has been opened as a "gentlemen's club." The building has been christened "The Wisconsin." He is now reconstructing and fitting up the Victoria Building, in Kansas City, for a private residence. Among the equipments of this house will be the six oil paintings formerly in the dome of the United States Government Building.

Mr. Meyers bought the Pennsylvania Building, had it torn down carefully, and used the material in the erection of a flat building at Emerald Avenue and Forty-third Street.

The Rhode Island Building was secured by Dr. Wilmoughby and moved to Stony Island Avenue and Seventieth Street.

Of the twenty buildings bought by the wrecking company the seven largest were burned, leaving only the steel as salvage. The other thirteen did not have as much material together as one of those burned. The figures of the company show that the cost of labor in taking down these thirteen and removing the debris of the other seven was \$150,000.

Over 500,000 square feet of glass was sold to cornice men and florists. The latter used it in building greenhouses and the former sold it in their trade.

All the gutta percha pipe used at the World's Fair was sold to the United States Commission of Fisheries, at Gloucester, Mass., for \$250. The underground pipe on the grounds went to the John Davis Company, Chicago, and was sold to small towns.

The Fisheries Building had little salvage, but it was the one building in demand. Mr. Rogers started the ball rolling when he put in a bid for the glass. Then followed innumerable applications for frogs, lizards, fish, and other ornaments from the columns. These little plaster ornaments were soon at a premium, and a few of them are now being held at a fairly good price.

There are thousands of flag poles all over the West that were in use in some capacity or other at the fair. Schools, convents and universities bought specimens of staff work, some but a few pieces and others large collections.

The fire of July 3, 1894, was especially disastrous to the art interests of the fair. All the figures from the main buildings were taken down, with the expectation that there would be a demand for them, and more money could be made from them than from the regular salvage. Most of the little angels from the Women's Building, the symbolic figures, reliefs, and so forth, were put in the Electrical Building, where it was intended to exhibit them prior to putting them on sale. The fire came and swept them all away. A few memorable souvenirs, however, were saved. President H. N. Higinbotham secured the four lions that kept guard at the base of the obelisk near the south lagoon. They now lord it over inoffensive ducks and chickens at Mr. Higinbotham's farm at Elgin.

The statue of Ben Franklin that stood in front of the Electricity Building, the work of Carl Rohl Smith, was bought by the University of Pennsylvania, and is now in Philadelphia. The statue of Columbus that stood before the Administration Building is now in the Field Columbian Museum. The city of Denver bought the Indian on horseback, and cowboy, the two statues that excited such comment during the time the fair was being held. The park commissioners still own the group that stood about the main basin. One of the groups of the four races is in the museum of Jackson Park, the others were burned. Minerva and Julius Cæsar stand near the museum building. The celebrated Golden Gateway is still intact. It is being held by a local dealer in statuary, and was recently offered to the city of Cleveland for \$1,200.

**Difference Between India Rubber and Gutta Percha.**

"India rubber is of a soft, gummy nature, not very tenacious, astonishingly elastic."

"Gutta percha is fibrous, extremely tenacious, and without much elasticity or flexibility."

"India rubber once reduced to a liquid state by heat, appears like tar and is unfit for further use."

"Gutta percha may be melted and cooled any number of times without injury for future manufacture."

"India rubber coming in contact with oily or fatty substances is soon decomposed and ruined."

"Gutta percha is not decomposed by coming in contact with oily or fatty substances."

"India rubber is ruined by coming in contact with sulphuric, muriatic, and other acids."

"Gutta percha resists the action of these and nearly all acids."

"India rubber is a conductor of heat, cold and electricity."

"Gutta percha is a non-conductor of heat, cold, and electricity."—The Formulary.