ing. At the end of the boom stationary sheaves are secured, and tackle is provided for drawing the sliding carriage in and out, according to requirements. In order to rotate the beam, a single line of steel rope is carried around the base ring bearing against a number of rollers set vertically. The ends of the rope are secured to the ball carriages at the end of the back stay. These ropes enter the engine room, and are carried to a windlass drum, and being pulled one way or the other draw the ball carriages around the base ring and cause the boom to swing as desired.

All tackle is carried to one main hoisting engine placed upon the deck of the pontoon in the engine house. This engine has two cylinders 8 by 14 inches, and by a system of worm gearing and clutches actuates any of the different windlass drums required. To give some idea of the size of the parts, it may be mentioned that the hoisting gear alone weighs 13½ tons; that the lower main hoisting block, with its eight sheaves, each 26 inches in diameter and working on a 2½ inch steel pin, and receiving 1⅛ inch steel wire rope, weighs 2,000 pounds.

As regards bearings, ball bearings are used at three places. One, as just mentioned, at the foot of the back stay, another at the foot of the king post, and another upon the crown casting directly under the booms. The sheaves in all the blocks have plain brass bearings.

Two windlasses are established upon the deck of the pontoon outside the house, and are driven by a Manton steam-capstan engine. These are useful in moving the pontoon and in many operations on shore or on a ship's deck.

The load limit is as follows: With the back stay secured to the after edge of the pontoon, 75 tons can be lifted with the sliding carriage at two-thirds the length of the boom, and at full boom length 50 tons can be lifted. With the back stay brought into the ball carriages at the base of the tower, 30 tons can be lifted at two-thirds boom length and 30 tons at full boom length.

The derrick is in constant use putting in and taking out boilers and machinery in general. The engraving shows it in position for working upon the United States steamer Boston. In the background, to the left of the picture, is seen the old stationary derrick, now little used. This had a capacity of 60 tons, and in its day was one of the great derricks of the country. The new system favors a less lofty superstructure, in order to secure greater strength.

Miscellaneous Notes.

What part of the New World did Columbus first set foot upon? has long been a much disputed question, and added importance now attaches to the subject from the fact that Castelar and other Spanish notables are proposing to make a combined voyage of vessels from the Old World to the New in September and October, 1892, as a feature of the honors to be paid to Columbus. Gov. Blake, while Governor of the Bahamas, a few years ago, made several cruises among the islands of which he had official charge, for the express purpose of studying this question. With the log book of Columbus to guide him, he followed the explorer's course as nearly as possible. A draughtsman sketched the outlines of the various shores, and the governor's wife made water color drawings of the scenery. He also studied the dangerous currents against which the early explorers had also to contend. By a process of elimination, one after another of the islands was rejected, as failing to fully satisfy the description given by Columbus, while Watling's Island wholly agreed with it. It had the lake in the center, the fertile soil, the reef encircling it except at the capacious harbor with its narrow entrance, and the bluff hard by. Such an independent study, together with the conclusions of the geographers who had not themselves seen it, entitles Watling's Island to be definitely considered as the spot seen when the joyful cry of "Land!" was raised, and indeed it has been officially named San Salvador, although many authors have heretofore called Cat Island San Salvador.

A curious incident in connection with the recent launch of the Royal Arthur at Portsmouth, England, is made the subject of a sketch by a London illustrated paper. No sooner had the water become quiet after the vessel left the ways, than numerous small boats appeared upon the scene, and their occupants, equipped with a variety of long-handled scoops, began to collect the grease floating upon the surface, and which had been used to insure the slipping of the vessel smoothly into the water. It is said that several hundredweight of grease had been employed for this purpose, and the thrifty boatmen would undoubtedly be able to dispose of their unique variety of flotsam for similar dockyard service in the future.

MR. RENARD, the distinguished French aeronaut, is building a new dirigible air ship of over 3,000 cubic yards capacity. It is said that the motor is made of aluminum and operates perfectly. The balloon will soon be finished and will be tested shortly. It will leave Meudon and maneuver between Versailles and Paris.

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SCIENTIFIC AMERICAN SUPPLEMENT

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For the Week Ending March 21, 1891.

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THE GREAT GUNS OF THE JAPANESE NAVY.

The attention of naval and military authorities has been strongly drawn of late to the remarkable differences in the effective power of the heavy guns of English make and those of the French.

The 110 ton guns of the English navy, constructed at immense cost, represent the latest and most formidable type of armament which Britain has produced. If the calculations of the makers could be realized in practice, the power of these guns would be astonishing. They are 43 ft. 8 in. long, 16¼ in. bore, intended to sustain a charge of 960 lb. of powder, carry a projectile of 1,800 lb. with a muzzle velocity of 2,128 ft. per second, equal to penetration of almost 34 inches of wrought iron. Several trials of these guns have been made with charges much below the maximum, and in every instance the guns have been so much injured as to render it dangerous to subject them to full tests. The latest trial was that of the 110 ton gun of the war ship Sans Pareil, at Shoeburyness, with a moderate charge of powder. The result was the bore of the gun was found to have drooped and also to have become laterally deflected. This is much to be regretted, for the gun is a magnificent specimen of mechanical construction.

In France the great company known as the Forges et Chantiers de la Mediterranee, at Havre, under contract with the Japanese government, have produced some large Canet guns for the war vessels of that nation, which must be conceded to stand at the present time in the front rank. Japan may be said to beat the world in the actual power of her heavy guns. They have been subjected to the severest tests, no expense having been spared in these trials to render them sure and effective. Each round fired cost $2,000, and some $40,000 in all were spent for the purpose. These guns weigh 66 tons, 12½ inches bore, 41 feet 8 inches length, maximum weight of projectile 1,034 pounds, powder charge 562·2 pounds, muzzle velocity 2,262 feet per second, penetration of wrought iron 45·16 inches. Maximum range over 13 miles. Twenty rounds were fired without the least injury to gun or carriage.

These are wonderful results, and show that the French makers have advantages above all others.

THE FALLING OFF IN SPEED OF OUR WAR SHIPS.

Concerning this subject we recently presented the views of the Secretary of the Navy and of Mr. Charles H. Cramp. Our representative lately called upon Mr. J. Taylor Ganse, president of the Harlan & Hollingsworth Company, with reference to the same subject, who said:

"It is a fact, and to some people it seems to be a remarkable one, that the vessels of our new navy when in ordinary every-day service fall off in speed from the high standard set up on the occasion of their trial trips. And many critics of the new navy, when they comment on this fact, speak of it in a deprecatory tone, and insinuate that there is something wrong with the architecture of the vessels or with the engines or with the efficiency of the crew. Well, to my mind, there is nothing easier to explain than this. And this is just as it should be. There is no defect in the architecture or engines of these vessels, for in my opinion the cruisers and battleships recently handed over to the United States government are fully equal in sea-going qualities and general efficiency to any vessels of their classes ever built for any nation in the world. There are three very simple and, it seems to me, obvious reasons why these vessels do not maintain their trial records:

First. The object of putting a vessel through a trial trip is to see what the utmost speed is which that vessel can possibly attain. It is not in actual service. The contractors see in the horizon one little word, *speed*, and with that before them they shape their course. They are on dress parade, and the every-day regulation incidents, such as heavy guns, ammunition for the guns and for the hungry crew, appliances, etc., are laid aside. It is now or never with the builders. But when it comes to ordinary running, the circumstances are changed. The vessels are laden with guns, with provisions, and with all the necessary outfit for a long voyage. All of this means weight; and with this enormous additional weight she puts to sea, with her decks nearer the surface of the water, and with a consequently augmented displacement. But this makes it more difficult to propel her through the water, and her speed must therefore suffer.

Secondly. An iron bottom when exposed to sea service for any length of time begins to foul, to accumulate vegetable growths, and the longer a vessel is in the water the greater will be this growth, and consequently the greater will be the deterioration in speed from that of the trial trip, when the bottom was clean and free from anything that would retard the speed of the vessel. This retardation in cases where a vessel has been in the water for a month is immense, and this one act alone would be enough to cause a great falling off in speed. In fact it is not too much to say that, all other things being equal, a vessel with a clean bottom can make a speed of twenty-five knots in the same time it would take a vessel with a foul bottom to make ten knots.