

The new rule of the New York Yacht Club, to which Mr. Flie refers, was drawn up by a committee of the club expressly for the purpose of curtailing the exaggerations of form and construction above referred to, and producing a yacht which, while it was fast and seaworthy, would also be strong and staunch, and capable, after a series of races, of being readily transformed into a comfortable cruiser, should the owner so wish. In spite of the fact that some of our yacht designers have criticised the new rule, and predicted that naval architects would be able, by a skillful manipulation of its provisions, to produce yachts which would be practically as exaggerated as those built under the old rule, the experience thus far had shows the new rule to be a decided improvement, the new boats being handsome in form, almost as fast as their predecessors, and exempt from the many faults of the earlier type. The races for the "America" Cup have always been enormously popular, and of late years the contests have been marked, both on the part of the yachtsmen and the general public, by a spirit of fair play, which is in keeping with the best traditions of this, the noblest of all sports.

The majority of the yachtsmen and the whole of the American people will welcome a challenge; and a decision of the New York Yacht Club to arrange a series of races under their own new rule would meet with universal approval.

A FLEET OF FRENCH MILITARY AIRSHIPS.

The question of the use of airships is one which is very active in Europe at present, especially in France, Germany, and Italy. Upon the state of affairs in France, an important piece of news appeared not long since, and while it must be taken with some reserve, it is nevertheless worthy of mention. Although the military authorities decline to give any information on the subject, it has leaked out that the preparations for the new fleet of airships which is to be used by the army are being carried forward with all possible diligence, and there are no less than five airships to be constructed, of the same type as the "Patrie." These will be turned over to the government in March, 1908. It appears that three of the new airships will be constructed by Messrs. Lebaudy at their headquarters at Moisson, near Paris, while the other two are to be built at the government aerostatic establishment of Chalais-Meudon, near the city. It is the intention to provide a large fleet of airships in the future, as the War Department is now quite convinced of their great value in military maneuvers, for various purposes. Such airships will be constructed in series of five, and the above programme relates to the first five of the fleet, exclusive of the three Lebaudy airships which are already built, including the "Patrie." While the general type will remain the same, the object is to make improvements in detail in each of the series of five airships as they are constructed. As to the first five airships of the fleet, they will be distributed among the principal fortified posts in the center and the eastern frontier regions. Among these will be the forts of Belfort, Verdun, Toul, Besançon, and the camp at Chalons. The work of erecting the sheds which are to house them has already commenced. For some time past the War Department has been paying special attention to the subject of training the aerostatic corps, so that it will be able to handle the airships with certainty. For this purpose one of the airships is stationed permanently at the Chalais-Meudon establishment and the drills are constantly being carried out. It appears that the new Aerostatic Corps is to be composed of no less than 48 officers of the military engineer corps and 92 regular army officers who are chosen for their competence in aerial navigation work and their experience in mechanical engineering. Not long since the airship "Patrie" made a series of flights from Meudon to Paris and return, with the object of drilling the crews in actual flight, which is rightly estimated as one of the most important parts of the work. One of these, on the 8th of July, was the fourth flight which the "Patrie" made during the season. Starting at 7.50 o'clock A. M. it made some evolutions about the Chalais grounds, then started for Paris, mounted by Commandant Bouttiaux, Capt. Voyes and other officers of the Aeronautic Corps. After passing over the suburbs and entering Paris, it made several circuits above the city and then came back to its quarters at 9.10. The total distance, 34 miles, was covered in 1 h. 20 min. at the rate of 25 miles an hour, and this is a remarkable result, seeing that the airship had to struggle against a west wind blowing at a considerable speed. Another flight was made over the city on July 12 including a wide circuit through the region, lasting for nearly two hours. It was quite successful, and about the same speed was made. The landing can be carried out with ease, in spite of the fact that the station at Meudon is quite surrounded by woods, and the maneuver was made with great precision, entirely by the use of the movable steering planes. Capt. Voyer and five others formed the crew.

PRESENT AND PROSPECTIVE DOCKING FACILITIES OF THE PACIFIC COAST.

BY H. A. CRAFTS.

Now that it has become an established fact that the main strength of the United States navy will be transferred temporarily, at least, to the Pacific, it becomes interesting to know what the present and prospective docking facilities are on that coast. Outside of possible accidents, the cruisers and battleships will have to be docked at stated intervals in order to have their hulls cleaned and repainted. As a matter of strict economy, it is said that a steel bottom ought to be cleaned and repainted at least once a year. Now on the entire Pacific Coast the United States government has just two drydocks—one at Mare Island in San Francisco Bay, and another at Bremerton, Wash., on Puget Sound. Both of these are graving docks, and are distinguished from the floating drydock by being built into the land, and being therefore fixed and permanent. The government drydock at Mare Island is of granite, 513 feet long over all, with a width of 80 feet 7 inches at the entrance, and a depth of 27 feet 6 inches over sill. The government drydock at Bremerton has a wood body and masonry entrance. Its length over all is 650 feet, width of entrance 92 feet 8 inches, and depth over sill 30 feet.

The inevitable naval base under the new order will, of course, be at San Francisco; and the docking facilities of that port consequently become a subject of more than ordinary importance. As may be readily seen, the drydock at Mare Island will be far inadequate to the needs of the occasion, when the mobilization of Uncle Sam's fleet on the Pacific becomes an accomplished fact. To be sure, a second graving drydock at Mare Island has been under process of construction for the past six years; but from various causes much delay has been occasioned, and it is stated upon good authority that it would take two or three years to finish the work, even though it were to be hastened with all possible speed. This new dock when finished will be 720 feet long, 102 feet wide, and 30 feet deep. The chief difficulty thus far encountered is in securing a substantial foundation. The formation composing its site is hardly more than a deep bed of mud; and in order to secure a foundation that will hold up the structure when finished, it is found necessary to drive a dense mass of wooden piling. Upon this foundation it is proposed to build the dock of reinforced concrete.

Fortunately, however, the government need not depend upon itself for docking facilities in San Francisco Bay. At Hunter's Point on the west shore of the bay, five miles south of the city of San Francisco, the San Francisco Dry Dock Company operates a very extensive plant, and has already done considerable docking for the government, notably in the docking of the battleship "Oregon" in 1894 and the cruiser "New York" in 1903. Recently Howard C. Holmes, chief engineer of the company, has completed plans for the largest drydock in the world, to be soon constructed by the company at Hunter's Point. The company's present plant consists of two graving docks and two floating docks. The first graving dock was completed in 1868. It is 490 feet long over all, 97 feet wide at the gate top and 56 feet wide at the gate sill; midships it is 117 feet wide at the top and 58 feet wide at the bottom. This dock has wooden altars and wooden caisson. The second graving dock was completed in 1903, and in it the battleship "Ohio" was docked in February of that year. This dock is 750 feet long over all; width at gate top, 103½ feet; at gate bottom, 86 feet; midships at top, 122 feet wide and 74 feet at bottom. This dock has concrete altars and a steel caisson; it is filled through the caisson, while the old dock is filled through a seven-foot tunnel.

The largest drydock in the world to-day is at Belfast, Ireland; San Francisco will shortly possess a dock of even greater dimensions. The new drydock above referred to will be 1,050 feet long from gate to the landward extremity; width at coping, 144 feet, and at bottom, 92 feet; depth over sill and below coping, 39 feet 10 inches, or 34 feet 6 inches at high water. The interior facing of the dock will be of reinforced concrete of an average thickness of 15 inches; and the altars will be of the same material. The stairways and timber slides will be formed in the main body of the dock, and will be flush with the surface of the same. Such portions of the sides of the dock as will be above the rock formation underlying the site will be reinforced concrete, and will be proportional in thickness to the height of the same, and anchored into the rock with structural steel posts. The gate seat proper will be of dimension granite, but the approach and buttresses will be of reinforced concrete. The keelsons are to be of Douglas fir and the flooring of Port Orford cedar, all anchored and embedded in a sub-floor of cement. The drainage of the dock will be by surface gutters connected with a sump. The caisson or gate will be of steel construction, and will be virtually a vessel 147 feet long at the deck, 128 feet long on the keel, with a beam of 26

feet and a depth from deck to bottom of 41 feet.

The pumping plant for the new dock will consist of four 54-inch centrifugal double suction pumps with a joint capacity of 200,000 gallons of water per minute. Each pump will be driven by a 500-horse-power three-phase electric motor, using 440 volts. These will be located at the bottom of the pump pit, and will be so arranged as to be started from the gallery at floor level, it being the intention to use the high-tension current of one of the public service power companies, say at 1,000 volts, and transform the same to the requisite voltage.

The dock will hold 24,000,000 gallons of water, but with the pumping plant described may be pumped out within the space of two hours. The earth conditions at Hunter's Point are very favorable for the construction of graving drydocks, the site of the present docks and of the proposed dock being underlaid with what is known as green serpentine rock, forming a very solid foundation, as well as substantial backing for the sides.

The new dock was neither conceived nor planned in anticipation of any possible massing of the United States navy, but in anticipation of the constantly increasing size of ocean craft and the growing importance of the Pacific Ocean as a maritime field of operation. Some idea of the increase of the size of ocean-going ships may be obtained from the following:

Date.	Length of longest ship.
1840	200 feet
1855	375 feet
1881	525 feet
1905	675 feet
1907	786 feet

The last length cited is that of the "Lusitania" and "Mauretania," now building, and already they are talking in nautical circles of ships that will be 1,000 feet long; and this is a class that will call for a dock of 1,000 feet length and over.

THE CURRENT SUPPLEMENT.

The current SUPPLEMENT, No. 1648, for August 3, contains a large variety of interesting and instructive material. That fascinating mystery, the planet Mars, has again approached the earth this summer; once more the canals and spots will be discussed, and the chances of the habitability will be thoroughly reviewed. Prof. Andrew Ellicott Douglass, who has made a careful study of Mars at Flagstaff, Arizona, contributes a paper on "Illusions of Vision and the Canals of Mars," in which he seeks to explain many of the Martian phenomena on the basis of fundamental defects in the human eye. "Glacial Geology" is the title of an article in which modern theories of glacial climate are outlined by the well-known geologist William North Rice. The shape of the earth is discussed on the basis of a theory of gravitational instability. The Temple of Aizani is described in detail. A system of traction which is designed especially for use upon heavy grades, has been brought out in France within a recent period. The principal feature of this system is the use of a type of locomotive in which a third rail, lying between the main rails of the track, is grasped between the wheels or rails, which thus serve to give an increased adherence to the locomotive, so that a comparatively heavy train can be propelled up a steep grade. The locomotives are described with considerable detail and are illustrated. An abstract of Mr. Allerton Cushman's noteworthy paper on the corrosion of iron is published. Mr. Cushman advances the theory that electrolysis is the cause of iron rust. In an article on the "Form and Energy of Sea Waves," the subject of ocean mechanics is popularly treated. The SCIENTIFIC AMERICAN'S English correspondent writes on "A System of Reinforcing Concrete Sea Defenses," which has been devised by M. de Muralt. By far the most important article from a mechanical standpoint which is published in the current SUPPLEMENT is Mr. Harold L. Brown's thorough *résumé* of "Motor Starting Devices for Gasoline Automobiles." The article is very fully illustrated with photographs and diagrams of the various systems which have been used from time to time. In the article on the Preservation of Timber some valuable data on penetration are given. Day Allen Willey writes on Copper Refining Machinery.

The Swiss exports of clocks, watches, and parts to the United States last year was the largest in the past twenty years, their value being \$2,469,516, against \$2,261,519 in 1905. This trade, which amounted to \$1,671,028 in 1887, declined in 1895 to \$1,000,000, continuing the retrogression until 1898, when the shipments of time-pieces to America amounted to but \$746,240. Since that time the trade has been rapidly recovered. Music boxes from Switzerland no longer find the wide sale as formerly, the sales in 1887 having amounted to \$235,415 and in 1890 to \$300,708. There has since been a continuous drop, the exports amounting to but \$52,174 in 1905 and \$43,151 in 1906.