ness, and the duty of the surgeon to examine the men's quarters and report in writing to the captain. In the old days the men did their four hours duty aloft and then retired to the comforts of the roomy gun deck with gun ports open on every hand. Now they haul at tackle and falls or toil before the furnaces and retire into a rat hole under the forward hatches.

In port, with windlasses set and a draught of air below, life in the men's quarters is bearable, but on such a cruise as the Bennington is about to set out upon, the inconvenience and discomforts are intolerable. Those who have inspected the quarters on the new ships will not think it strange that the men desert in gangs at the rumor of a long cruise.

It has been suggested that the designers of these ships be made to take a cruise in them, thus getting practical evidence of their defects as to ventilation and living room.

They have spent their time devising engines and batteries; now they should try and devise a means of keeping men enough aboard to work them.

POSITION OF THE PLANETS IN NOVEMBER.

JUPITER

is evening star. He is still the leader of the starry hosts, but, before the month closes, a powerful rival enters modestly into the field to contest his supremacy. It is plain to every observing eye that our giant brother is departing. He no longer appears above the eastern hills soon after sunset, as he did when in opposition, but is high up toward the meridian when his light pierces the sky depths. He makes his transit at 7 o'clock in the middle of the month, sets soon after midnight, and holds his court in the western sky instead of the eastern. This brilliant planet is passing through the small groups of Aquarius. His retrograde or western movement ends on the 3d, when he becomes stationary, and then moves eastward, or in direct motion, until the end of the year.

The moon is in conjunction with Jupiter the day after the first quarter, on the 10th, at 1 h. 50 m. P. M., being 4° 9′ south. Moon and planet will make a pleasing picture when it is dark enough for them to be visible on the evening of the 10th.

The right ascension of Jupiter on the 1st is 22 h. 41 m., his declination is 9° 48′ south, his diameter is 42″.8, and he is in the constellation Aquarius.

Jupiter sets on the 1st at 1 h. 19 m. A. M. On the 30th, he sets at 11 h. 31 m. P. M.

NEPTUNE

is morning star until the 29th, and then becomes evening star. He is in opposition with the sun on the 29th at 10 h. P. M. This far-away planet then makes his nearest approach, for the sun, the earth and Neptune are in line, with the earth in the middle. Observers endowed with exceptional visual powers can see Neptune with the aid of an opera glass; but the number of such observers is small. He is, however, a beautiful object in a good telescope, appearing as a tiny disk of a delicate blue tint. He will be found a short distance north west of Aldebaran.

The right ascension of Neptune on the 1st is 4 h. 28 m., his declination is 20° 6′ north, his diameter is 2″.6, and he is in the constellation Taurus.

Neptune rises on the first at 6 h. 25 m. P. M. On the 30th, he sets at 6 h. 56 m. A. M.

VENUS

is evening star. She sets an hour later than the sun at the close of the month, and keen-eyed observers may possibly find this charming star lingering in the glow of twilight, and giving a foretaste of the brilliancy of her appearance when farther away from the sun. She must be looked for 2½° south of the sunset point on the 30th.

The one-day-old moon makes a close conjunction with Venus on the 2d, at 2 h. 32 m. P. M., being 13′ north, but planet and crescent are too near the sun to be visible.

The right ascension of Venus on the 1st is 15 h. 7 m., her declination is 17° 38′ south, her diameter is 10″.2, and she is in the constellation Libra.

Venus sets on the 1st at 5 h. 22 m. P. M. On the 30th, she sets at 5 h. 32 m. P. M.

SATURN

is morning star. He is favorably situated for observation, rising nearly four hours before the sun at the commencement of the month, and six hours before the sun at its close. He rises about 2 o'clock on the middle of the month, and may then be seen coming up in the east, a little farther east and 12° farther south than the bright star Dembola.

The moon, two days after the last quarter, is in conjunction with Saturn on the 25th at 8 h. 50 m. A. M., being 2° 40′ north.

The right ascension of Saturn on the 1st is 11 h. 49 m., his declination is 3° 20′ north, his diameter is 15″.4, and he is in the constellation Virgo.

Saturn rises on the 1st at 2 h. 49 m. A. M. On the 30th, he rises at 1 h. 6 m. A. M.

MARS

is morning star. He rises at the close of the month about three hours and a half before the sun, and may be dimly discerned as a small ruddy star, 4° east and a little north of Spica. An opera glass will certainly bring him into the field.

The moon is in conjunction with Mars on the 27th at 11 h. 52 m. A. M., being 2° 3′ north.

The right ascension of Mars on the 1st is 12 h. 26 m., his declination is 1° 38′ south, his diameter is 4″.2, and he is in the constellation Virgo.

Mars rises on the 1st at 3 h. 45 m. A. M. On the 30th, he rises at 3 h. 24 m. A. M.

MERCURY

is evening star. There is nothing noteworthy in his course as he makes his way toward his greatest eastern elongation, setting later and increasing in diameter as the distance widens between him and the sun.

The right ascension of Mercury on the 1st is 14 h. 44 m., his declination is 16° 2′ south, his diameter is 4″.6, and he is in the constellation Libra.

Mercury sets on the 1st at 4 h. 52 m. P. M. On the 30th, he sets at 5 h. 24 m. P. M.

URANUS

is morning star. He is too near the sun to be visible. His right ascension on the 1st is 14 h. 1 m., his declination is 11° 47′ south, his diameter is 3″.4, and he is in the constellation Virgo.

Uranus rises on the 1st at 5 h. 52 m. A. M. On the 30th, he rises at 4 h. 6 m. A. M.

Mars, Saturn, and Uranus are morning stars at the close of the month. Mercury, Venus, Jupiter, and Neptune are evening stars.

For an Eiffel Tower at Chicago.

It is reported that arrangements have been about completed by which a tower higher than the Eiffel construction will be erected in close proximity to the World's Fair grounds at Chicago, to be finished by February 1, 1893. The designs contemplate a tower 440 feet in diameter at the base and 1,120 feet high, having three circular platforms or landings, the first 200 feet from the ground and 250 feet in diameter, the second 400 feet from the ground and 150 feet in diameter, and the third 1,000 feet from the ground and 60 feet in diameter. Above the latter will be signal service offices and departments for scientific investigation. Around the outside of the first landing will be a grand colonnade fifteen feet wide, and the numerous restaurants, kiosks and booths to be provided are designed to accommodate many thousands. An offer in writing has been made by a large iron firm to put up the tower in the time stated for the sum of $1,500,000, which is less than the cost of the Eiffel tower, the lower price being made because standard and merchantable sizes of steel can be used in the American construction. The promoters of this enterprise are said to embrace capitalists of Chicago, St. Louis, Cincinnati, Pittsburg and other places.

World's Fair Items.

—The foundation work of the Administration Building is all finished, and the material for the iron work of the edifice itself is being received on the grounds. This building is constructed of material to last but two years, and it will cost $650,000, although it covers a space of but 250 feet square. It is designed to represent in itself one of the noblest achievements of modern architecture, and will occupy the most commanding position on the exposition grounds. The building consists of four pavilions, 84 feet square, one at each of the four angles of the square of the plan, and connected by a great central dome, 120 feet in diameter and 260 feet high.

—Aside from the cost of the great exhibition buildings, which will not be far from $7,000,000, the following are among the sums which have been, or will be, spent in preparation of the exposition grounds: Grading and filling, $450,000; landscape gardening, $323,500; viaducts and bridges, $125,000; piers, $70,000; waterway improvements, $225,000; railways, $500,000; steam plant, $800,000; electric lighting, $1,500,000, statuary, $100,000; vases, lamps, etc., $50,000; lake front adornment, $200,000; water supply and sewerage, $600,000; other expenses, $1,000,000; total, $5,943,500.

—The great extent of the fair can hardly at present be measured, but some idea of its immensity may be gathered from the fact that the space thus far set apart for exposition purposes is three times the area of the Paris exposition grounds, or about the size of Central Park, New York, between 700 and 800 acres.

The Fahrenheit Thermometer.

In a note published in the Proceedings of the Cambridge Philosophical Society, Mr. A. Gamgee investigates the principle according to which Fahrenheit constructed his thermometric scale.

The author remarks, in the first place, that although Fanrenheit's thermometer has for a long time been employed in England and America, and that its use therein is general, technical books have not, up to the present, given any accurate information as to the principles that presided in the establishment of its scale. In his treatise upon heat, Mr. Tait has, it is true, given the opinion, afterward admitted by several scientists, that Fahrenheit divided his scale from 32° to 212° into 180° in order to imitate the division of the arc of a quarter circle. This theory is based upon an incorrect supposition, viz., that, before Fahrenheit, Newton had proposed as the basis of the scale the freezing and boiling points of water, the interval between these two points being divided into equal degrees.

Mr. Gamgee thinks that, in his *Scala graduum calories*, Newton advances nothing that Mr. Tait attributes to him, and, besides that, Fahrenheit fixed the basis of his scale and constructed a large number of thermometers long before Amantons discovered the fact (confirmed and pointed out precisely by Fahrenheit) that the boiling point of water remains constant under a constant pressure.

According to Mr. Gamgee, the first thermometers constructed by Fahrenheit were alcohol ones, and were closed and provided with a scale whose two points were fixed. The zero of the scale, indicating the lowest temperature that it was possible to reach, was obtained by plunging the bulb of the instrument into a mixture of ice and salt, while the highest point of heat was determined by placing the thermometer under the armpit or in the mouth of a healthy man. The interval between these two points was divided into twenty-four parts, each of which corresponded to well marked differences of temperature, and each of these divisions was divided into four. In his later alcohol and mercury thermometers, the twenty-four principal divisions were suppressed, and were replaced by a scale of 96°, from ice to human heat. The 32° of these thermometers was obtained by plunging the bulb in melting ice.

Fahrenheit was led to construct mercurial thermometers on making some researches upon the boiling point of water. With mercury it became necessary to increase the scale above to 600°.

The figure 212, the degree of heat necessary for the boiling of water at a mean atmospheric pressure, was a result that *experiment alone* brought out.

Upon the whole, Mr. Gamgee thinks that Fahrenheit took, as the basis of his thermometric scale, the duodecimal scale, which he was accustomed to use.—*Revue Scientifique.*

Remarkable Test of a Torpedo Boat.

An experiment was made at Plymouth, Eng., October 22, with a boom to check the rushes of torpedo boats. The boom was thickly studded with formidable steel spikes, together with a seven inch steel hawser stretched taut overhead as a balk.

Torpedo Lieutenant Sturdee, who had disapproved the plan, offered to prove the correctness of his assertion that the device would not afford the protection desired. He guaranteed that he would either jump or force the boom, and he finally obtained permission to make the attempt.

A swift torpedo boat was loaned the lieutenant for the experiment. Upon this he built a massive arched superstructure extending from bow to stern, intended to raise and support the overhanging hawser. Four seamen volunteered to accempany the daring lieutenant.

The lives of all concerned were specially insured for the benefit of their families by orders of the Admiralty, whose experts believed that the attempt of Lieutenant Sturdee meant almost certain death. The importance of the experiment as a means of making an actual test of the availability of this means of defense alone justified the risk in the eyes of the officials.

The boom having been adjusted across the mouth of the harbor, the torpedo boat started on its hazardous mission. The start was made half a mile away from the boom, and a high rate of speed was attained as the obstruction was neared. At the last moment the Lieutenant and his men rushed below and fastened down the hatches. An instant later the boat, running at a speed of nineteen knots, struck the boom.

The concussion was terrific, and all the occupants of the craft were thrown so violently against the sides of the boat that they were painfully bruised. It seemed for a moment as though, the expectations of Lieut. Sturdee would be realized and the boat force its way through the boom. She jumped nearly clear, but before she got through, the hawser caught her and pressed her against the big spikes of the boom, which held her like a vise and tore her bottom badly. The boat at once began to make water.

The seamen worked at her some time before she could be got free. Then they started for the beach, but the boat foundered before reaching it, the crew being taken off by the boats from shore. There was much excitement among the spectators, and, though Lieut. Sturdee's views had been disproved, his bravery and that of his companions was highly praised.

THE great bulk of alcohol made in this country is produced at Peoria, Ill. It is made from corn. The price paid there for corn was, until lately, 37½ cents per bushel, but it has now risen to 70 cents.