CALCIUM CARBIDE IN NEW YORK CITY.

The Fire Commissioner of New York City has taken steps to regulate the trade in calcium carbide. Owing to the fact that this substance is now stored in most of the sporting goods houses and bicycle stores in the city, it has seemed necessary to take some steps regarding the matter, as the gas is generated by coming in contact with water, and it will readily be seen that it might cause a disastrous explosion, if kept in considerable quantities, in case of a fire. According to the new rules, all calcium carbide in transit through the city and in storage must be in hermetically sealed iron receptacles and marked plainly "Calcium Carbide. Dangerous if not kept dry." No single package must exceed 100 pounds. As to the sale of the carbide, not more than 20 pounds, either in bulk or in cartridges, can be stored or kept in any building used for a dwelling or mercantile purpose, and this amount can only be kept on a permit obtained from the Fire Department. This permit will provide that quantities in cases of 2 pounds shall be in tight metal packages and kept elevated at least 6 inches from the floor in a fireproof safe above the street grade. The manufacture, transportation, storage, selling, or use of liquefied acetylene is absolutely prohibited within the city limits. Provision is made for the storage of calcium carbide in sealed receptacles in quantities not exceeding 100 pounds in isolated buildings of fireproof construction. The storage must also be with a permit from the Fire Department, and the entire quantity stored must not exceed 500 pounds in the aggregate.

THE HEAVENS IN JANUARY.

BY GARRETT P. SERVISS.

At 10 o'clock P. M. in the middle of January the array of constellations is the finest that the heavens, in our latitudes, ever present. Orion is on the meridian, in the most favorable position for the exhibition of his splendors. The two great stars that adorn his shoulder and his foot, Betelgeuse and Rigel, show their contrast of colors admirably, sparkling through the crisp air. Betelgeuse glows like a Brazilian topaz, while Rigel's light is of diamond purity. Midway between them glitters the Belt, with its three bright stars in a row, so accurately spaced and aligned that they seem to have just obeyed the command, "Eyes front!" In themselves they would hold attention, but on a dark, clear night the sky about them is seen to be sprinkled with a multitude of tiny stars, whose twinkling affects the eye like half-illuminated frostwork. Below the Belt hangs the Sword, sheathed in the mysterious haze of the Great Nebula.

Following the direction indicated by the stars of the Belt, downward toward the left hand, at a distance of some twenty degrees, the eye is led to Sirius, ablaze, if the air be a little unsteady, with prismatic hues. The spectacle of Sirius shining above a snow-clad hill on a January night is a surprising revelation of the power of a star to enhance the beauty of a terrestrial landscape.

Westward from Orion runs the winding "river of stars," Eridanus, with Cetus just setting beyond it, while toward the east, above Sirius, appears Monoceros, followed by the interminable Hydra, dragging its slow length above the horizon.

Next in attractiveness to Orion and his immediate neighbors, which include Auriga, with the brilliant Capella, nearly overhead, is the winter arch of the Zodiac, beginning at the level of the hills in the west with Pisces, and rising through Aries to Taurus (the tip of whose horns touches the meridian above Orion), and then descending in the east through Gemini, Cancer and Leo, to Virgo, whose westernmost stars are just poised on the horizon.

Under Gemini and Cancer, the latter being easily recognized by the glimmer of the beehive cluster, shines Procyon, the leading star of Canis Major.

Glancing northwestward, Perseus, Andromeda, and Pegasus are seen aligned in a downward slope to the horizon, while Cassiopeia's "W" shines between them and the Pole, balanced against the Great Dipper, which is rising, bowl upward, in the northeast.

THE PLANETS.

Mercury is a morning star, in the constellation Sagittarius. It reaches its greatest western elongation on January 11, when it may be seen nearly two hours before sunrise.

Venus is a morning star, and very brilliant, rising, at the beginning of the month, about 4:30 A. M. It travels from Scorpio into Ophiuchus. On the 25th it will be in conjunction with Saturn.

Mars has become the "star" of the planetary company, being in opposition to the sun on January 18, and therefore visible the entire night. It is in the constellation Gemini. On the 15th it will be about 60,000,000 miles from the earth, so that a telescope magnifying 250 diameters will bring it within an apparent distance equal to the real distance of the moon. A comparison of the lunar features seen by the naked eye with those of Mars seen with the telescopic power mentioned will be an object lesson in the difficulties of planetary observation. This is a very unfavorable opposition of Mars, but its red color and its conspicuous position will serve to attract all eyes.

Jupiter, in the constellation Libra, is a morning star, rising, at the opening of the month, soon after 2 A. M.

Saturn is also a morning star, in the constellation Ophiuchus. It rises on the 1st about 5:40 A. M., and those who get up early to see Mercury about the 11th will enjoy a sight of the ringed planet also, as well as of the brilliant Venus.

Uranus is a morning star in Scorpio and Neptune an evening star in Taurus.

THE MOON.

January begins with the moon approaching last quarter, that phase being reached on the 4th. New moon occurs on the 11th, first quarter on the 18th, and full moon on the 26th.

MISCELLANEOUS.

There will be a partial eclipse of the sun on January 11, visible along the North Pacific coast.

A meteoric shower is due on the night of January 2, the radiant point being in the constellation Draco. These meteors, which are described by Mr. Denning as swift and making long streaks, should be looked for in the north, under the Pole Star.

There will be a minimum of the variable star Algol on the 19th, about 7 P. M.

AN ARCTIC RAILROAD.

BY PROF. J. H. GORE.

Several years ago, when the railroad was built from the head of the Gulf of Bothnia to the iron mines of Gelivara, it was thought that the limit of Arctic engineering had been reached. If the practical results of this road had come up to the expectations of its promoters, it is quite likely that no second attempt would have been made to erect and maintain a road lying wholly within the frozen zone.

The ore from this region contains from 68 to 70 per cent of iron, but having a little more than one per cent of phosphorus, it yields to only a few of the many reduction processes, notably the furnaces constructed on the Siemens-Martin principle. Such works as those at Stettin find it profitable to ship this ore from the Swedish mines, bring the coal from England, and place the iron on the market in competition with iron that comes from countries where the raw materials are found side by side.

In Luleaa, the ore costs about $2 per ton, and the freight to Stettin or Westphalia amounts to $2.25 per ton, since the vessels must return, at least for a greater part of the way, in ballast. However, the chief difficulty is not in the matter of cost of transportation, but it lies in the fact that the northern part of the Gulf of Bothnia is open only about four and one-half months out of the year. In this short period, however, the annual shipments are 800,000 tons. Another incentive for the construction of a better avenue for export is the increasing demand in England for this grade and character of ore, to take the place of Spanish ores, which are growing scarce and more difficult to obtain. The English reducers find that by mixing the Gelivara ores with their own poorer ores they can obtain, in their high furnaces, 55 per cent of excellent iron.

With any number of open harbors on the Norwegian coast, it was seen that a railroad built directly across Sweden and Norway would furnish the best possible outlet for the products of these mines, besides opening up a large area of land now practically inaccessible. A few years ago the route was agreed upon and work begun, but partly through lack of funds and partly because of the fear that the road, when completed, might be used by Russia for carrying troops in case of war with the joint kingdoms of Sweden and Norway, no great progress was made. However, the two governments have now taken the matter up and will push the work forward as rapidly as the conditions will permit. Norway has appropriated nearly three million dollars for the construction of that portion which lies in her territory. This will be the shorter end, but more difficulties will be encountered, for on this section there will be thirteen tunnels, two long bridges, and many deep cuts and viaducts. For the Swedish end, the government has made a grant of about eight million dollars. It will have, as now projected, only four tunnels and one bridge of any length.

In general, the engineering problems are neither numerous nor difficult. The plan is to work in the open during the summer and on the tunnels in winter. Some trouble is anticipated from the snow, which in this region is so moist that it packs and quickly freezes so that it becomes solid or else covered with a heavy crust. It is proposed to erect snowsheds over the most exposed portions and to rely upon snowplows for keeping the rest of the track clear.

The gage decided upon is 1·435 meters (4 feet 7 inches), or 10·5 centimeters (3·7 inches) less than the Russian gage, and the rail is to weigh 40 kilogrammes per meter. In driving the tunnels, air drills will be used, but the motive power for compressing the air will be electricity generated by water. It may look like a great waste of energy to transmute power so often, but the idea is that compressed air drills are the best, and that the electric wire is the cheapest way for transmitting energy, and water power is so abundant that large wastes can be tolerated. According to the terms of the contract, the road is to be in running order over the entire distance, 292 kilometers (181 miles), by the first of October, 1902. It will be equipped with new ore cars of the best pattern and turned over to the company owning the mines. They are to pay all the running expenses, keep up repairs, and turn over annually to the two governments a certain per centage on the amounts they expended in building the road. By way of security, the company's stock is held in trust by certain banks, which guarantee payment of the amounts agreed upon.

The western terminus of the road is Victoria Harbor, which is hereafter to be called Ofoten, in order to have a purely Norwegian name and avoid the evidence of any obligation to Sweden for the use of the name of their queen, whom they have in common. When completed, it is expected to ship 1,500,000 tons per annum, and to place it in England for $3.50 per ton. In addition to this saving of 75 cents per ton, the shipment can go on throughout the year, thus giving constant employment instead of the intermittent type of the present day. Even with this enormous output there is no cause for fear that the supply of ore is likely to be soon exhausted. The most cautious and conservative estimates, based upon a thorough examination by means of repeated borings, place the amount of ore within easy reach at 250,000,000 tons.

In mining, the methods pursued will allow work to go on uninterruptedly throughout the year, by working above ground during the open season and in tunnels when the weather is at its worst. The best appliances for hoisting, loading, and unloading are being acquired—most of them coming from the United States—and there is every reason to believe that this road, though entirely north of the Arctic circle, will pay from the very first.

As intimated already, it will open up a section that possesses unexpected possibilities. Just east of the range of mountains that forms the boundary between the two countries there is a large area of land which affords excellent pasturage, and although timber is lacking there are deposits of peat more than sufficient for fuel. When the peat is removed, a very fertile soil is found which, even in the short summer of this latitude, will yield a good crop of hay and even potatoes. At the present time there is only one person to each four square miles, so that with the building of this road a new agricultural or at least grazing district will be available.

This road will have still another beneficial effect. It comes within 67 kilometers (41·5 miles) of the Russian boundary, and Russia, realizing the importance of having a western outlet that is free from ice throughout the year, is taking steps toward building a road through Finland, and is urging Sweden to put in the short connecting link that will place St. Petersburg within 1,100 kilometers (682 miles) of the Atlantic Ocean. The value of such a connection for Russia would be enormous. At the present time, all imported articles there are sold at an increased price, because of the fact that they, brought in during the open season, must lie in stock weeks or months before being sold. The consumers must also pay higher prices because of the inability of the dealers to take advantage of favorable fluctuations in making their purchases. These facts are so forcefully realized that it is safe to predict that by the time the Swedish-Norwegian road is finished the Russian connection will be made, and very soon thereafter one will be able to travel by rail from the Atlantic to the Pacific—from Ofoten to Vladivostok.

Columbian University.

A PASTE with which wall paper can be attached to wood or masonry, adhering to it firmly in spite of dampness, is prepared as usual of rye flour, to which, however, are added, after the boiling, 8⅓ grammes of good linseed oil varnish and 8⅓ grammes of turpentine to every 500 grammes.—Western Painter.