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## A VENETIAN SHIP RAILWAY

An interesting achievement of the fifteenth century was recently described by Mr. E. L. Corthell before the Engineers' Club of Philadelphia. Brescia, an inland city of immense strength, was besieged by the Milanese. Upon Lake Garda near it were the fleets of the besieging forces. About a hundred miles distant was Venice, apparently unable to cope with the problem of relieving Brescia. An engineer named Sorbolo proposed to the Doge and Senate to take a fleet of warships up the Adige to the limit of navigation and thence to transport them overland to Lake Garda. By exhibiting a model of his proposed apparatus, he succeeded in inducing them to try his project. A fleet of two firstclass and four second-class galleys and of twenty-five light barques was prepared, armed, and provisioned. They were taken up the Adige against its impetuous
current until the point nearest the lake was reached. Here they were placed on cradles while afloat, and by the power of a regiment of oxen were drawn up the incline to the plain. Six hundred oxen were required to effect this for each galley, but once on the level half that number could draw the largest ship. The ground was frozen hard, and for thirty miles was level, and the galleys were drawn in an imposing procession by nearly three thousand oxen over the thirty miles until Mount Pineda was reached. The army accompanying the ships were provided,with tools, crowbars, shovels, and the like, so as to remove obstructions. When Mount Pineda was reached, a roadway was made over it, and by windlasses the ships were hauled up on one side and lowered down the other, only one coming to grief. As they ascended they were wedged foot by foot to prevent an escape. On the descent the one unfortunate vessel broke loose and was dasned to pieces. The other vessels accomplished the descent in safety and crossed the remaining space of 12 miles, and in February, 1439, the entire fleet was afloat on the waters of Lake Garda. A second fleet was successfully sent there by the same route a year later. The work was done under the superintendence of Sorbolo, the originator of the scheme.

The vessels were of no inconsiderable size. The largest were nearly 150 feet long and about 40 feet wide The success of such an operation before the days of steam and railroads is an augury for the success of ship railways. In the four and a half centuries that have elapsed since then, the size of ships has not in creased so rapidly as have the resources at the disposal of engineers for their land transportation.

## THE CELESTIAL WORLD.

a Noteworthy Collection of Planets and
 stars may now be seen near the ecliptic or suns pathin the heavens, the broad curve almost spanning the sky. The planets are Jupiter, Mars, Uranus, and Saturn. The stars are Antares, Beta Scorpii, Spica, and Regulus. Observers may easily trace these shining mysteries for themselves on clear, starlit nights, for they are all, with the exception of Uranus, easy to find, and, when once found, will be a source of satisfaction to those who have learned their names and traced out their position in the heavens. They will appear to rise about four minutes earlier every night, on account of the earth's motion in her orbit, so that by the middle of May the starry circlet may be seen as soon as it is dark enough for the stars to come out.
An observer who would see the celestial exhibition must command an unobstructed view of the sky from the southeast to the northwest horizon. If he commences his observations about the middle of April, at half-past nine o'clock in the evening on a clear night, he will find a radiant star looming above the southeastern horizon. This is Jupiter, the prince of planets, the largest and brightest of the 3,000 stars visible irr the firmament. He will be closely followed by a red star, Antares, the leading brilliant of Scorpio, while near on the northwest shines a yellow star of the second magnitude known as Beta Scorpii. Jupiter, Antares, and Beta Scorpii form a group of surpassing brilliancy.
If now the observer glance to the northwest of the star with a silvery tint. This is Spica, the leading brilliant of Virgo, while northwest of Spica and near to it gleams the red planet Mars, superb in tone, tint, and martial aspect, having just passed opposition. A practiced eye will be required to detect the planet Uranus about $4^{\circ}$ west of Mars and $1^{\circ}$ southwest of Theta Virginis. Uranus shines as a star of the sixth magnitude, and is barely visible to the naked eye. A telescope will quickly bring him to view as a tiny sphere of a delicate green tint
If the eye be turned still farther to the northwest beyond the meridian, Regulus will be seen, the next star in the curve or arc and close to the ecliptic. He will readily be recognized as the bright star in the handle of the Sickle.
The planet Saturn forms the eighth and last star in the curve. He is the first bright star northwest of guishes him from a fixed star, and following in the guishes him from a fixed star, and following in the
farther northwest. Saturn will set in the middle of the month about half past 1 o'clock in the morning, and until that time the eight stars and planets will re main an unbroken curve. The order of observation may be reversed, beginning with Saturn and ending with Antares. The fixed stars apparently never change their places. The planets are always on the move thus adding variety to the celestial pictures that on clear nights reward the upturned gaze. Planets and tars retain the same order during April, but in May a change comes, Mars overtakes and passes Uranus, and Jupiter overtakes and passes Beta Scorpii, almost graz ing the star as he passes. The following is the order of position of the eight planets and stars that shine like golden beads on and near the ecliptic: Antares, Jupiter, Beta Scorpii, Spica, Mars, Uranus, Regulus, and Saturn.
The Opposition of Mars.---On the 11th of April, at o'clock in the morning, Mars is in opposition with the sun, "opposiîe" to him in the heavens, rising at sunset, and is in a straight line with the earth and sun, the earth being in the middle. The epoch is most interesting to terrestrial observers, for, if anything of importance is learned about our brother planet, the discovery will probably be made when he is in opposition, or nearest to the earth. These epochs in Martian history do not occur as often as might be desired, for 780 days, or 2 years and 50 days, must elapse before Mars, having passed one opposition, comes round to another, and 15 years must intervene between the oppositions when Mars is seen under the most favorable conditions. The opposition of 1877 will long be memorable for the discovery of the two tiny moons of Mars, made by Professor Hall with the Washington telescope, at that time one of the largest refractors in the world.
An opposition under similar favorable conditions will occur in 1892, when Mars may be said to have completed a 15 year cycle, and come round to a point where he is about as near to us as possible, or $35,000,000$ miles distant. The ellipticity of the orbits of the earth and Mars accounts for the varying distance of the planets at different oppositions. The earth's orbit s only slightly elliptical, but the orbit of Mars is more elliptical than that of any of the planets except ing Mercury. It will readily be seen that when the earth is at or near aphelion, or the greatest distance from the sun, and Mars, at the same time, is at or near perihelion, or the least distance from the sun, the planets will be at their nearest point of approach. This combination of aspects occurs at the end of every 15 years, and the year 1892 will bring our ruddy neigh bor to view under the best conditions for terrestria observation.
Meantime the opposition of 1888 , if not the best, is better tha that of 1886. Mars is near enough for us to see his moons, his divisions of land and water, the clouds that float in his atmosphere, his snowy pole, his curious double canals, and bright spots.
A somewhat startling coincidence has been noticed by a correspondent of L'Astronomie between the Martian canals and the lunar circle of Plato. The writer says a marked resemblance exists between the drawing of the canals of Mars made by Schiaparelli, of Milan, and the drawings of the lunar circle of Plato made by Stanley Williams, of England. The mysterious duplication of the canals is almost exactly repro duced, as well as the brilliant spots that have so puz zled astronomers. If farther investigation confirms this observation, it is possible that the inhabitants of this planet may watch the progress of inevitable decay on our smaller outside neighbor, as well as the progress of development on Jupiter, the giant of the system, before the period of terrestrial culmination has passed, and the earth's cooling process has perceptibly advanced. Mars in decadence, Jupiter in development, and the earth in the perfection of animate life are but three phases of the physical history of the material universe. We trust the great eye of the Lick telescope will scan the round, red face of the planet Mars at the present oppo sition, and win immortal faine by solving the problem of the double canals and bright spots; or, at least, dis covering a couple of satellites.

## The Human Breath.

Professor Brown-Sequard has recently been making xperiments to:determine whether the human breath was capable of producing any poisonous effects. From the condensed watery vapor of the expired air he ob tained a poisonous liquid, which, when injected under the skin of rabbits, produced almost immediate death He ascertained that this poison was an alkaloid, and not a microbe. The rabbits thus injected died without convulsions, the heart and large blood vessels being en gorged with blood. Brown-Sequard considers it fully proved that the expired air, both of man and animals contains a volatile poisonous principle which is much more deleterious than carbonic acid.

SqUIRE Whipple, the well known civil engineer and號 ess, in the 84th year of his age

