

**MOUNT LOWE ELECTRIC MOUNTAIN RAILWAY.**

To unite in one hour's ride the orange orchards, the vineyards, and rose gardens of Italy with the mountain scenery and pine forests of Norway would seem to be an impossible feat anywhere except in California. The "Golden State," it must be borne in mind, is almost an epitome of the globe in its scenic features, its topography, and its climatic subdivisions. It is doubtful if the object lessons of glacial action can be studied anywhere to greater advantage than in the high Sierras of California, unless it should be in Alaska. Captain Dutton, the volcanologist, will say the same as regards the opportunities for studying out the past volcanic history of this coast; and meteorologists can study every climatic zone, including that of the heart of the Sahara, if through the seasons they will only station themselves at the varying altitudes and observe local conditions prevailing in California from the sea-level up to the summits, and beyond the same in the Pacific slope desert areas on the eastern base of the Sierras. The botanist and the zoologist will be equally rewarded.

It is the total ensemble, however, of ocean, valley, coast, hills, and towering mountains that at once impresses the beholder. It is not the gold, it is not the gigantic pumpkins, but it is the endless panorama of beauty and grandeur that unconsciously and permanently takes possession of the true Californian and to which the many cultivated visitors of the Eastern States become equally attached. California, particularly in its southern half, is a condensed edition of the beauty and the sublimity of the North American continent. The Grecian archipelago never rejoiced in a softer or pure atmosphere than that which enfolds the islands of this southern coast; there are no more beautiful and productive orange orchards between Palermo and Turin than those found in the sheltered valleys at the base of the great coast ranges of Southern California; while the Alps of Switzerland and Tyrol do not possess a more grandly picturesque beauty than those snow-covered summits, the splendid whiteness of which will soon bathe the roots of the orange and lemon groves in the form of rippling brooks.

Standing on the high summits of the Sierra Madres, taking in at a glance the singularly harmonious and gracefully undulated landscape from crest to sea, it is difficult to realize that the oranges and roses are at least 5,000 feet below the pine trees against which we lean. The ideal suburban town of Pasadena is ten miles distant by the nearest mountain trail. Los Angeles, down yonder hill slopes, is some thirty miles away, while those frolicsome white caps, seemingly as full of merriment as the bathers themselves, are still further to the west, some fifty-five miles in all.

The initiation and the successful construction of an electric railway connecting the sea shore with the summits, the pine with the rose, the orange with the snowball, were due to Prof. T. S. C. Lowe, of Pasadena. With the exception of the electric road now in process of construction up to the Jungfrau glacier of Switzerland, there is probably no enterprise identical in scope and attractiveness, nor one where greater obstacles have been surmounted.

All the other systems of such mountain roads built for the purpose of making the natural attractions of a region available for the sightseer are constructed on the plan of a revolving cog wheel catching in a center rack-rail and operated by a steam locomotive. One of these roads lands one on top of a sulphurous caldron on the crest of Vesuvius; the Rigi, pioneer of its class in Europe, gives one a delightful glimpse of the mountain meadows of the land of William Tell and its hundreds of glacial lakes; the Pike's Peak rack-rail road lifts one up to an unparalleled view of a vast ocean of gray plains. But here on the summits reached by the Mount Lowe Railway, every one of the attractive landscape features of the others has been included. Below us, seemingly within speaking distance, lies all the beauty of contour, the fragrance, as well as the productiveness, with which we are accustomed to associate the classic lands of the eastern half of the Mediterranean. Round about us are the massive uplifts, the great chasms, the waterfalls, and the evergreen forests associated with our ideas of Alpine fastnesses. In some respects, most impressive of all is that comparatively limited but effective reminder of North Africa, the Mojave Basin desert. There it lies, three hundred miles in circumference, at the base of these mountains, on the northeast flank of the range on which we are standing, while on this side of the range, embowered in luxuriant orange groves, is Pasadena. The Sierra Madres—mother range—is so placed as to apparently divide these natural antipodes equally in this part of the State. There is room enough and to spare, for this country is cast in a gigantic mould, and these seemingly so antagonistic spheres sustain a remarkable and even beautiful relation to each other, which, however, cannot be touched upon here, except in passing and with a view of further enlisting the interest of students of nature in the endless object university here presented. The great desert over to the east, with its contiguous areas in Nevada and Arizona, is undoubtedly the very latest and most remarkable theater of vol-

canic action on this continent. To the east of the range Vulcan seems not yet through with his seemingly appalling reign, while every phase of natural evolution which should precede human occupancy appears completed on the west side of this same range. It may be, however, that all this dreary incompleteness which so repels us is only another way of stating our lack of insight into Nature's laboratory.

The "Wise Men" who came to the Divine cradle hailed from the East; they were learned, greatly so, in the lore of the stars, and they knew more about these stars than anyone else, because the great warm deserts that fringed their Arabian home had absorbed all needless moisture from the atmosphere, and so left them an endless succession of clear, starry nights from which to obtain their "wisdom." For the same reason, these summits are ideal abodes for modern astronomers, one of whom, Dr. Lewis Swift, is already permanently established here in the Mount Lowe Observatory.

The comparatively close proximity of the great ocean, the wide expanse of fertile valley areas, and the mountains and deserts referred to, or perhaps, more correctly speaking, all these climatic and topographical features, together cause another phenomena which, for beauty and uniqueness, can scarcely be surpassed. Reference is here had to the frequent spectacle of a vast billowy sea of snowy white mist, co-extensive with the entire distance between the mountains and the sea, and entirely covering the vast valley as if a ceiling were extended over it. It has well been termed a "Phantom Sea." It is the Southern Pacific coast variety of fog, which, in this respect, as in all others, is sui generis.

Some twenty-odd years ago the passenger trains used to halt in the morning at a point high up in the foot hills of the Sierra Nevadas, just before descending into the Sacramento Valley. Here it was possible to observe this remarkable atmospheric effect, the result of mingling the ocean humidity with the warmer atmospheric conditions prevailing in the valley, and with the still greater variations of density and temperature as it begins its ascent along the mountain walls. The impression left on the beholder of such a spectacle, he himself standing in clear air, is one never to be forgotten. In Southern California these fogs are not so dense as in the northern half of the State, because the average temperature, both of ocean and valley, is higher. This implies greater buoyancy and more elastic movement of the "Phantom Sea."

These fogs never rise above 2,500 feet, thus leaving the mountains above in transparent sunshine, giving the beholder a clear and distinct view of all below.

It is sincerely to be hoped, in the interest of meteorological science, that Prof. Lowe's great desire to found a scientific school for the study of the meteorological conditions prevailing in a region so fruitful in atmospheric effects may be realized.

The cable incline, which constitutes the first division of this mountain road proper, is one of the most successful railroad devices of its kind in practical use in the world.

The electric power is transmitted by large copper conductors to the Echo Mountain power house, in which is a 100 horse power electric motor, which makes 800 revolutions per minute. By a series of gears the revolutions are reduced from 800 to 17 per minute, which is the speed at which the massive grip-sheave turns. The grip-sheave consists of a heavy wheel which carries some 70 automatic steel jaws. As the wheel revolves, these jaws close and grip an endless cable, to which the cars are permanently attached. By this method there is practically no wear whatever to the cable. It is not strained and chafed by the constant operation of gripping, as on the street railway cars, where the inertia of trains of cars of many tons weight has to be overcome by the gripping of the ever-moving cable.

So much for the incline division. From the end of this, i. e., starting from the Echo Mountain House, begins the overhead trolley road, which reaches the "Alpine Tavern" after a rapid and remarkable ascent by which the very heart of the range is penetrated, and over five miles of steep mountain grades are surmounted in the space of thirty-five minutes. The terminus of this Alpine division connects with some 30 miles of most excellent bridle paths and carriage roads, leading in all directions over the crest and through the range.

All European travelers will recall with pleasure the charming effects obtained at the mountain resorts in Switzerland by turning flashlights of colored rays on nearby mountain cascades. At the summit of Mount Lowe this idea is applied on a scale and under atmospheric conditions never before available. The gigantic searchlight which was placed on the top of the Liberal Arts building was one of the well remembered sights of the World's Fair. As its rays were projected up to the northward on the passing steamer or on the merry crowds of the "Midway," it constituted an unfailing source of comment and awakened endless curiosity, but it is doubtful if the inventor of that appliance himself had any idea of the latent possibilities of his instrument under conditions such as obtain at the summit of Mount Lowe.

Until this great searchlight was established in its present location its powers could not be brought out, on account of its location so near the general level of the surrounding country. Here, however, it is so located that its rays can be seen for 150 miles out on the ocean, and the most distant mountain peaks can be made visible. The beam of light is so powerful that its full sweep illuminates the peaks of mountains which are hundreds of miles apart.

It is of 3,000,000 candle power, and stands on a wooden base, built in octagon form, which has a diameter of about 8 feet. The searchlight itself stands about 11 feet high and its total weight is 6,000 pounds, yet it is so perfectly mounted and balanced that a child can move it in any direction.

The reflecting lens is  $3\frac{1}{4}$  inches thick at the edges and only  $\frac{1}{8}$  of an inch thick at the center, and weighs about 800 pounds. The metal ring in which the lens is mounted weighs about 750 pounds, the total weight of lens, ring, and cover being about 1,600 pounds. This great mirror is mounted at one end of a big drum, the outer end of which is furnished with a door, consisting of a narrow metal rim, in which are fixed a number of plate glass strips  $\frac{1}{8}$  of an inch thick and 6 inches wide.

Prof. T. S. C. Lowe is one of the greatest living scientific aeronauts. While engaged as such he presented to President Lincoln the idea of aiding Gen. McClellan's operations on the Potomac by a regular system of observations of the movement of the enemy by means of captive balloons to be made a part of the equipment of the army. Prof. Lowe carried this plan into successful operation and earned international fame for his achievement. Many of the foremost institutions of learning in the United States and abroad have recognized his discoveries and scientific achievements. He is especially desirous that the practical scientific opportunities made available at Mount Lowe shall be utilized to the fullest extent, and he hopes to see established fully equipped stations for meteorological and astronomical research in the Sierra Madres. He would see in such establishments the crowning achievement of his long, useful, and most honorable career. Could the many wealthy patrons of science and art in the far East see and realize these opportunities as they only can be seen and realized by personal observation, it is believed there are scores of men who would hasten to identify their names with this unique and worthy enterprise.

OLAF ELLISON.

**Mausers vs. Krag-Jorgensens.**

While no decision has yet been made as to what shall be done with the Spanish Mauser rifles which arrived at the United States Arsenal recently, it is expected that, after having been cleaned and repaired, these weapons will be sold to the public as curiosities.

Officials at the arsenal state that these Spanish guns, besides being in every way inferior to the Krag-Jorgensen rifles used by our regular army, show rough and ignorant usage at the hands of the Spanish soldiers.

The main difference between the Krag and the Mauser is that, while both are bolt guns, the former has a magazine which, filled with five cartridges, can be cut off so as to make the rifle practically a single shooter; the latter's magazine cannot be so cut off. It is, therefore, really a repeating rifle. Furthermore, in the Krag the bolt is opened and closed by the action of cams, while with the Mauser the soldier has to compress the main spring by direct force.

It is probable that these Mausers will be sold for not less than \$15 apiece, so that for every one sold the government will be a little more than reimbursed for the manufacture of one Krag-Jorgensen, which, as made at the arsenal, costs \$14.50.

Several Krags have arrived at the arsenal for repairs, after having been used by rough riders. They show that they can stand very hard usage without impairing their efficiency, proving thereby the excellence of their pattern, manufacture, and material. There are two which, after having been carried through the surf, filled with sand, and wet with water, and after having gone through all the fighting, were quite ready for use just as they were when they arrived, without any cleaning or oiling. The butt of one of these—carbine pattern—was split and perforated by a Mauser bullet, which most likely bored a hole also through the arm of whatever rough rider held the gun at the time.

One of the reasons for the inferiority of the Mausers is that they are made by contract by a firm in Berlin, Germany, while our guns are made at the Springfield Arsenal, says The Springfield Union, under the direct supervision of ordnance officers. Our guns are therefore exactly alike, one to the other, while the material and workmanship of the Spanish rifles show many degrees of quality.

In Austria the manufacture of bicycles is making rapid progress. The lowest estimate of the 1897 output is 70,000 wheels, which is nearly double the amount produced in 1896. Exports increased from 5,735 bicycles in 1896 to 8,690 in 1897, or 69 per cent, while the production increased 66½ per cent (28,000 bicycles more than in 1896), and imports 37½ per cent (815 bicycles).—Umland's Wochenschrift.